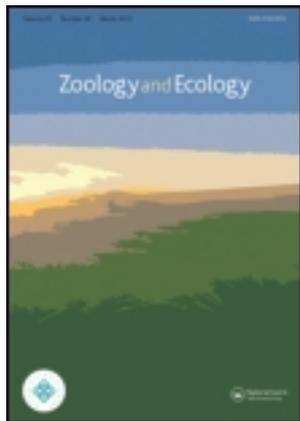


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Saeed Mohammadi^a, Sylvain Dubey^b & Ali Sabbaghzadeh^a

^a Faculty of Natural Resources, Department of Environmental Sciences, University of Zabol, Zabol, Iran

^b Department of Ecology and Evolution, University of Lausanne, Lausanne, Switzerland
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SHORT COMMUNICATION

New record of *Crocidura zarudnyi* from Zabol, Iran

Saeed Mohammadi^{a*}, Sylvain Dubey^{b*} and Ali Sabbaghzadeh^a

^aFaculty of Natural Resources, Department of Environmental Sciences, University of Zabol, Zabol, Iran; ^bDepartment of Ecology and Evolution, University of Lausanne, Lausanne, Switzerland

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The Zarudny's rock shrew, *Crocidura zarudnyi* Ognev, 1928, is found in very few localities in Afghanistan, Pakistan and Iran. Therefore, a record of the occurrence of additional populations of this species is very interesting. During surveys in Zabol (Iran), we caught three adult males of *Crocidura* sp. Based on external, dental and cranial measurements as well as genetic analyses, the individuals were identified as *C. zarudnyi*, which represents the first record of this species in this area.

Kirstukas *Crocidura zarudnyi* Ognev, 1928 aptinkamas labai nedaugelyje Afganistano, Pakistano ir Irano vietovių, todėl naujos radimvietės yra svarbios rūšies paplitimo įvertinimui. Tyrimų Zabole (Iranas) metu sugauti trys suaugę *Crocidura* sp. patinėliai, kurie pagal išorinius, dantų ir kaukolės matmenis bei genetinės analizės rezultatus buvo identifikuoti kaip *C. zarudnyi*. Tai nauja rūšies radimvietė Zabole.

Keywords: *Crocidura zarudnyi*; Zabol; Iran

The Zarudny's rock shrew, *Crocidura zarudnyi*, was described by Ognev, 1928 based on a single specimen from the Baluchestan province in southeastern Iran and is currently known from very few localities in Afghanistan, Pakistan and Iran (Hassinger 1970; De Roguin 1988; Hutterer 2005; Dubey, Nová et al. 2007). It was only recently found that an additional specimen had been recorded in Pir sohrab, Chabahar in southeastern Iran (Baluchestan) and characterised morphologically, genetically and karyotypically by Dubey, Nová et al. (2007). The latter study revealed that *C. zarudnyi* is closely related to the widespread *C. suaveolens* group (see e.g. Dubey et al. 2006; Dubey, Cosson et al. 2007) and exhibits a similar karyotype ($2N=40$; $FN=50$).

Twelve shrew species are currently known to occur in Iran (Ziaei 2008). The taxonomic status of many rare species such as the Zarudny's rock shrew is often uncertain and their range boundaries are also poorly known (Hutterer 2005; Esmaeili et al. 2008). So far, less than 20 specimens of the species have been collected (Dubey, Nová et al. 2007). Therefore, a record of the occurrence of additional populations of *C. zarudnyi*, although obtained accidentally, can be of interest.

During surveys in Zabol, Iran, we caught three adult males of *C. zarudnyi* on the 15 and 16 November 2012 at the campus of the University of Zabol ($31^{\circ}02'28''N$, $61^{\circ}32'04''E$) (Figure 1). The caught specimens represent

the first record of this species in this area. Our specimens were captured close to irrigation channels at the edge of fields and in cultivated lands overgrown with *Medicago sativa*, *Haloxylon* sp., *Eucalyptus* sp. and grape bushes.

The identification of specimens was carried out by external, dental and cranial measurements and genetic analyses. For genetic analyses, we extracted total cellular DNA using the DNeasy Tissue kit (Qiagen, Valencia, PA, USA) and amplified a fragment of the cytochrome-b gene by PCR using the primer pair L14724/H15149 (Irwin, Kocher and Wilson 1991). The amplification condition included 35 cycles of 60 s denaturation at 94 °C, 60 s annealing at 50 °C and 120 s extension at 72 °C. The amplified products were sequenced with an ABI 3100 genetic analyzer (Applied Biosystems). To clarify the genetic relationship between the three samples of *Crocidura* from Iran and other Eurasian crocidurine shrews, we obtained additional DNA sequences from GenBank (Figure 2). *Sorex minutus* (Soricini) was used as an outgroup. Concerning maximum likelihood (ML) analyses, we selected the model of DNA substitution using the Bayesian Information Criterion (BIC; Schwarz 1978) implemented in JModeltest 0.1.1 (Guindon and Gascuel 2003; Posada 2008). The GTR+I+G model fit the data-set best. ML heuristic searches and bootstrap analyses (1000 replicates) were performed using

*Corresponding authors. Email addresses: smohammadi@uoz.ac.ir; sylvain.dubey@unil.ch
Saeed Mohammadi & Sylvain Dubey contributed equally to this work.



Figure 1. Map of Iran showing the geographical distribution of Zarudny's rock shrew; blue point: new record from Zabol, and black point: Pir sohrab in Chabahr (by Dubey, Nová et al. 2007).

Table 1. Measurements of *Crocidura zarudnyi* specimens (in mm).

Characteristics	This study (N=3)			Holotype Ognev (1928)	Specimen from Dubey, Nová et al. (2007)	Series ^a (N=11–15)
	1	2	3			
Head and body length	60	74	70	–	–	–
Tail length	42	47	40	47.7	47	–
Hind foot length	12	13	10	–	–	–
Weight, g	6	7	6	–	–	–
Condylbasal length	13.1	18	14	–	16.9	– (16.5–18.2)
Zygomatic breadth	5.5	8	5	–	5.5	–
Braincase height	6.2	5	6	–	–	–
Height of mandible	6	5	5.2	–	–	–
P ₄ – M ₃ length	5	4.5	5.5	–	–	–

Note: ^aHassinger 1970 (specimens from Iran, West Pakistan, and Afghanistan).

PHYML with GTR+I+G model (Guindon and Gascuel 2003).

The external and skull characteristics of the samples are presented in Table 1. The colouration of all specimens was almost identical. Dorsal pelage was dark greyish-brown and ventral pelage was distinctly paler and more greyish, but generally of a similar tinge as the dorsal pelage. The tail was unicoloured (Figure 3).

The cytochrome-b sequences (399 bp) of the three analysed individuals were identical (Genbank accession number: KC590097) and closely related to the previously published sequence of *C. zarudnyi* from Baluchestan (Genbank accession number: EF524711; Dubey, Nová et al. 2007), confirming our morphological identification (K2P distance: 0.3%, corresponding to one transition in position 161 {KC590097: T and EF524711: C}; see

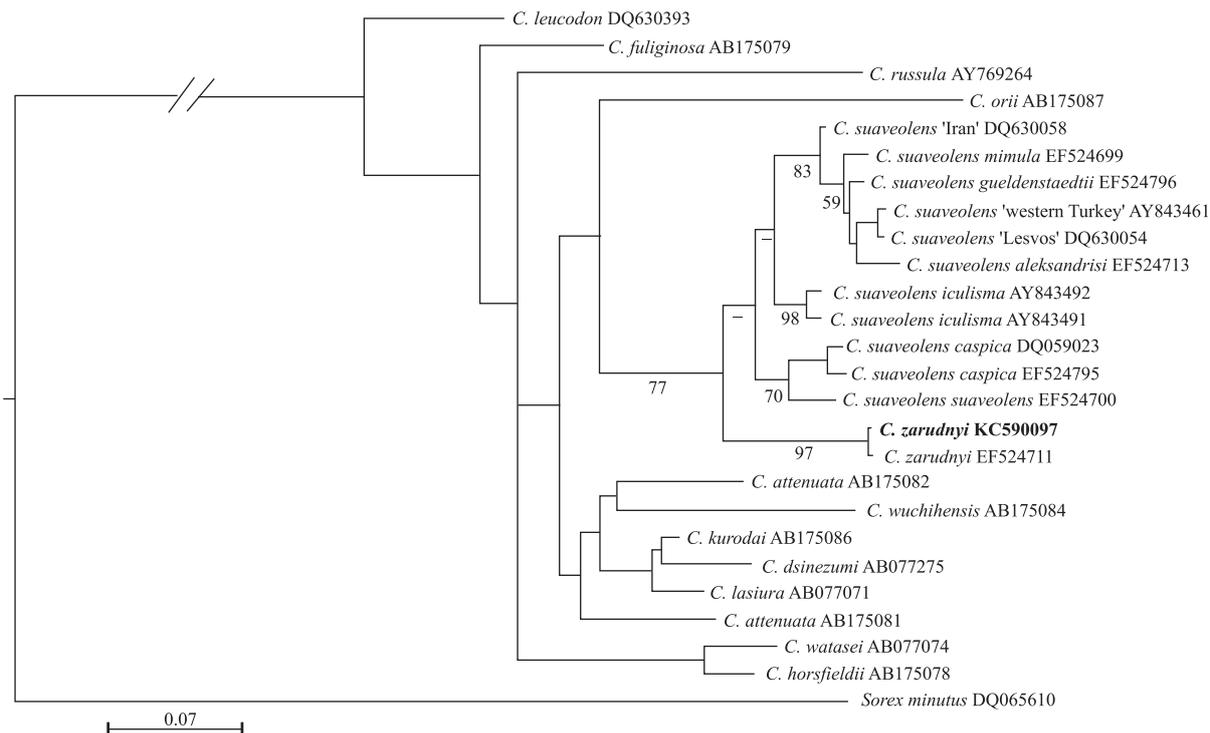


Figure 2. Phylogeny of the 399bp Cytb fragments analysed by ML analysis. Values in branches are bootstrap indices (1000 replications) of support for ML analyses for *Crocidura zarudnyi* and its close relative (in bold: sequence of *C. zarudnyi* from Zabol).



Figure 3. Zarudny's rock shrew (*Crocidura zarudnyi*) from Zabol, southeastern Iran.

Figure 2 for phylogenetic relationships with other Eurasian species).

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