

Distribution of *Hemidactylus* geckos (Reptilia: Gekkonidae) in Fars Province, Southern Iran

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Abstract.—During extensive field work on the reptiles of Fars Province, Iran from November 2007 to September 2010, a total of 18 specimens of *Hemidactylus*, belonging to three species, were collected. In April 2010 a single specimen of *H. turcicus*, with two additional specimens in September 2010, were collected from different urban areas close to a mountainous region in the city of Varavi, 25 km from the city of Lamerd, in southwestern region of Fars Province.

Key words. Lizard, *Hemidactylus*, distribution, Fars Province, southern Iranian Plateau

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Introduction

The genus *Hemidactylus* Oken, 1817 comprises about 100 described species and is one of the most speciose genera of the second most species-rich lizard family in the world, Gekkonidae, as well as one of the most widely distributed genera of geckos (Carranza and Arnold 2006; McMahan and Zug 2007; Sindaco et al. 2009; Javed et al. 2010). These geckos are distributed over large parts of Africa, Mediterranean Europe, southern Asia, Oceania, and tropical America, with the main center of speciation in Somalia and its adjoining areas (Carranza and Arnold 2006; Sindaco et al. 2007, 2009; Giri and Bauer 2008). Somalia, Kenya, Ethiopia, and Eritrea host more than 40 species of *Hemidactylus*, most of which are endemics (Sindaco et al. 2007, 2009; Spawls and Lergen 2010). However, the great majority of *Hemidactylus* species have relatively small distributions confined to southern Asia and Africa, with only eight species namely *H. brookii*, *H. bowringii*, *H. flaviviridis*, *H. frenatus*, *H. garnotii*, *H. persicus*, *H. mabouia*, and *H. turcicus* colonizing most of the geographical extent of this genus (Carranza and Arnold 2006; Giri and Bauer 2008; Javed et al. 2010). The gekkotan fauna of Iran includes about 45 species (Anderson 1999; Rastegar-Pouyani et al., 2008). Among these, Iran hosts four species of *Hemidactylus* geckos including: *H. persicus* J. Anderson, 1872; *H. turcicus* (Linnaeus 1758); *H. flaviviridis* Rüppell, 1840; and *H. robustus* Heyden, 1827 (Rastegar-Pouyani et al. 2008). Fars Province (Fig. 1) has one of the most diverse climates in southern Iran and is of great significance in

terms of amphibian and reptilian fauna owing to geographical and zoogeographical features. After carrying out field work in various regions of Fars Province, we aim here to update the knowledge of the genus *Hemidactylus* in this region and report our findings.

Materials and methods

The province of Fars covers a land area of about 125,000 km² (7.6% of total area of Iran) and is located between latitudes 27°-31°N and longitudes 50°-55°E. The region is bordered to the north by Esfahan and by Kohgiluyeh and Boyer Ahmad Provinces, to the south by Hormozgan Province, to the west by Bushehr Province, and to the east by Yazd and Kerman Provinces. The elevational range in this province extends from 4050 m in the northern parts (Boll Mountain) to about 450 m in the southern parts, with a mean of 1491 m. The mean yearly precipitation ranges from 150 mm to 1200 mm. This survey was carried out from November 2007 to September 2010. The material collected during this survey consists of 18 specimens of *Hemidactylus* which are now deposited in the Collection of the Biology Department of Shiraz University (CBSU), Iran (see material examined). The collected specimens were kept at low temperature (0°C), fixed in 75% ethanol, and then identified using valid identification keys (Leviton et al. 1992; Anderson 1999; Rastegar-Pouyani et al. 2006). In April 2010, during our field work on the herpetofauna of southern regions of Fars Province, a single specimen of *Hemidactylus turcicus* (Fig. 2) was

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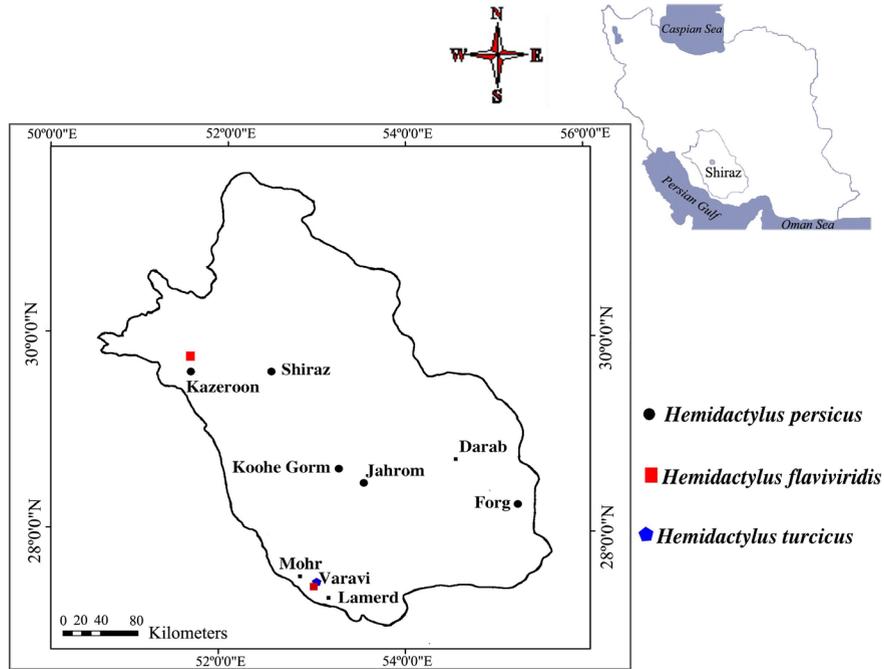


Figure 1. Location of Fars Province on the Iranian Plateau. The black circle, red quadrangular and blue polygon indicate the previous and new locality records for *H. persicus*, *H. flaviviridis*, and *H. turcicus*, respectively.

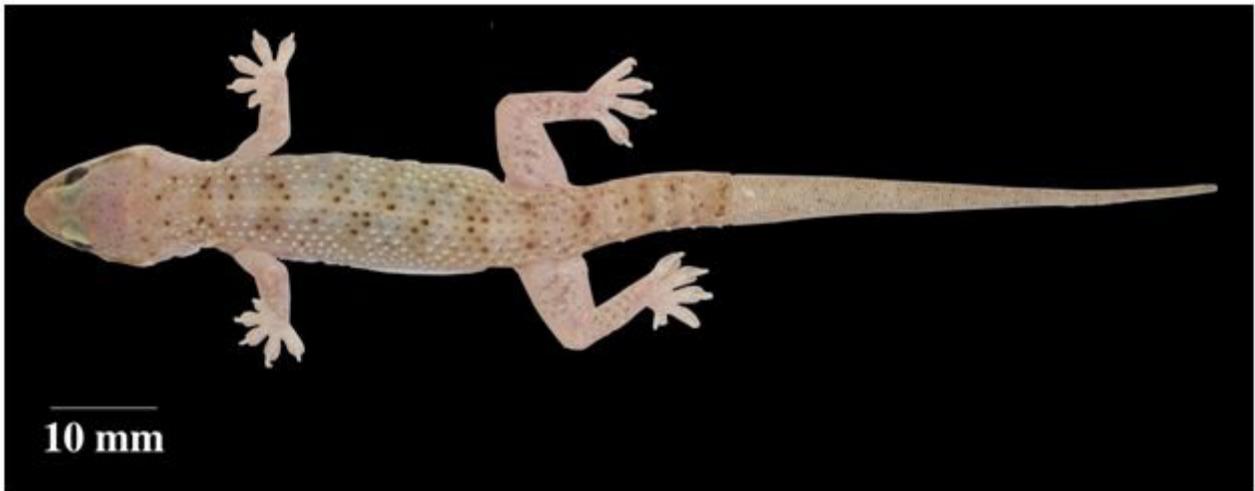


Figure 2. One of the three collected specimens of *Hemidactylus turcicus* from southwestern regions of Fars Province.



Figure 3. A specimen of *H. persicus* with autotomized tail from Shiraz, the capital of Fars Province.



Figure 4. A new specimen of *H. flaviviridis* from southwest of Fars Province.

Table 1. List of the previous (*) and new locality records of *Hemidactylus* in Fars Province.

Species	Locality	Coordinates
<i>Hemidactylus persicus</i>	Fork, Darab Township	28°17'04.1" N, 55°13'24.1" E; ele. 897 m
<i>Hemidactylus persicus</i>	Jahrom, Jahrom Township	28°57' N, 53°57' E, ele. 1050 m
<i>Hemidactylus persicus</i>	Shiraz, Shiraz Township	29°37' N, 52°32' E, ele. 1500 m
<i>Hemidactylus persicus</i>	Kazeroon, Kazeroon Township	29°37'6" N, 51°39'30" E, ele. 860 m
<i>Hemidactylus persicus</i> *	Koohe Gorm Non Hunting Area, Jahrom Township	Zareian et al. 2010
<i>Hemidactylus flaviviridis</i> *	Ghaleh Seied, approximately 25 km northwest of the Parishan Lake, Kazeroon Township	29°36'15" N, 51°32'51" E; ele. 900 m
<i>Hemidactylus flaviviridis</i>	Varavi, Mohr Township	27°27'58.36" N, 53°03'45.03" E; ele. 447 m
<i>Hemidactylus turcicus</i>	Varavi, Mohr Township	27° 28'21.12" N, 53° 03'00.20"E; ele. 421 m
<i>Hemidactylus turcicus</i>	Varavi, Mohr Township	27° 28'02.38" N, 53° 02'55.52"E; ele. 421 m

collected from the city of Varavi, 25 km from the city of Lamerd, and 15 km from the city of Mohr. The collected specimen was found active at night on the wall of a house near to a mountainous area. In September 2010, two additional specimens of *H. turcicus* were collected at midday in a house depot, approximately one km from the previous record. These two specimens were relatively active during midday, though they were fully active at night.

Results and discussion

Previous and new records of *Hemidactylus* in Fars Province are given in (Table 1). The newly collected specimens were identified as *H. turcicus* (Fig. 2), *H. persicus* (Fig. 3), and *H. flaviviridis* (Fig. 4). Among the collected material three specimens of *H. turcicus* are reported for the first time from Fars Province. So far, 14 species of gekkotan lizards have been reported from Fars Province. Of these, three species belonging to the genus *Hemidactylus* (Rastegar-Pouyani et al. 2006, 2008; Gholamifard et al. 2009, 2010) which are as follows:

***Hemidactylus persicus* Anderson, 1872.** **Persian gecko**

The type locality of *H. persicus* is Iran but no exact locality was given. According to Smith (1935) the type speci-

men is from Shiraz in Fars Province (Anderson 1999). This species is distributed in Coastal eastern Arabia north to southern Iran and Iraq, east to Sind and Wazirestan, Pakistan. In Iran it is known from Ilam, Khuzestan, Chaharmahal and Bakhtiari, Kohgiluyeh and Boyer Ahmad, Fars, Bushehr, Hormozgan, Kerman, and Sistan and Baluchistan Provinces (Leviton et al. 1992; Anderson 1999; Rastegar-Pouyani et al. 2006, 2007). *Hemidactylus persicus* has been collected from five different localities in Fars Province (Table 1). The northernmost records are from Shiraz and the southernmost records from Forg (Darab Township), close to Hormozgan Province. According to our data, it seems that of the three species, *H. persicus* has the largest distribution range of any *Hemidactylus* species in Fars Province.

***Hemidactylus flaviviridis* Rüppell 1840.** **Yellow-bellied house gecko**

The type specimen of *H. flaviviridis* is from Massawa Island, Eritrea (Anderson 1999). The yellow-bellied house gecko, has been reported occurring from the northeastern African and Arabian shores of the Red Sea and around the coast of Arabia and Iran, across Pakistan, eastern Afghanistan and northern India to West Bengal and south to the vicinity of Bombay (Anderson 1999). In Iran, *H. flaviviridis* has already been reported from the coastal towns and villages of southern Baluchistan, Kerman, Fars, and Khuzestan Provinces (Anderson 1999). Ac-

According to the new provincial divisions, Rastegar-Pouyani et al. (2006) reported this species from the towns and villages of coastal provinces, including: Sistan and Baluchistan, Hormozgan, Bushehr and Khuzestan. Recently, Gholamifard et al. (2010) recorded *H. flaviviridis* from Fars Province and completed the distribution range in the southern belt of the Iranian Plateau. The previously recorded specimens of *H. flaviviridis* are from “Ghaleh Seied,” approximately 25 km northwest of Parishan Lake in Kazeroon Township, western Fars Province (Fig. 1) (Gholamifard et al. 2010). In the present work, a single specimen of *H. flaviviridis* was photographed (Fig. 4) (not collected) on the walls of a house (syntopic with *Cyrtopodion scabrum*), near a mountainous area northeast of the city of Varavi (Mohr Township), in the southwestern region of Fars Province (Fig. 1). This new locality is about 300 km northwesterly from the only previously published record for Fars.

***Hemidactylus turcicus* (Linnaeus, 1758). Mediterranean house gecko**

The type locality of this species is “in Oriente,” restricted to Asiatic Turkey (Leviton et al. 1992; Anderson 1999). The Mediterranean house gecko is native to countries surrounding the Mediterranean Sea and extends east to India and south to Somalia. However, *H. turcicus* has spread to several New World countries including Cuba, Mexico, Puerto Rico, Panama, and the United States (Anderson 1999; Farallo et al. 2009). In Iran, it has been collected primarily in port towns of the Persian Gulf, although there are scattered inland records (Shahbazan, Qazvin, Rig Mati) as is also the case in Turkey, Jordan, and Iraq, but all of these localities lie along trade routes (Anderson 1999). In Iran, this species has been recorded from Sistan and Baluchistan, Kerman, Hormozgan, Bushehr, Khuzestan, Ilam, and Qazvin Provinces (Rastegar-Pouyani et al. 2006). Populations of this species in Iran are considered as *H. t. turcicus* (Rastegar-Pouyani et al. 2006, 2008). Both *H. turcicus* and *H. robustus* have been recorded for the herpetofauna of Iran by Rastegar-Pouyani et al. (2008); however, populations of *H. turcicus* in Iran are referred as *H. robustus* by Bauer et al. (2006) as well as Sindaco and Jeremčenko (2008). *Hemidactylus robustus*, of coastal Northeast Africa and Arabia, Iran and Pakistan (Baha El Din 2005; Bauer et al. 2006; Carranza and Arnold 2006), has often been regarded as conspecific with *H. turcicus*, and its complex nomenclatorial history is most recently reviewed by Moravec and Böhme (1997). Carranza and Arnold (2006) in their molecular study confirmed separate status of both taxa. According to their study, *H. robustus* populations from Egypt and the United Arab Emirates show approximately 14% genetic divergence from *H. turcicus*, and the two taxa have recently been found in sympatry on the Red Sea

coast of Egypt (Baha el Din 2005). Iran probably hosts both *H. turcicus* and *H. robustus*. Presumably, populations of *H. turcicus* expanded their distributional range from their area of origin, probably in the Mediterranean region, to northwest of Iran and expanded, or were introduced into other regions of Iran in different ways, and *H. robustus* was introduced via Arabian Peninsula to Iran and expanded in different directions, as its distribution range is completed in the southern belt of the Iranian Plateau. Baha El Din (2005) stated that human activity highly influenced the current distribution pattern of *H. robustus*. As well, Caravan routes had spread *H. turcicus*-like geckos through much of the Middle East (Anderson 1999). However, the presence and definition of exact distributional ranges of these species, in Iran, needs more material and DNA analyses. According to Moravec and Böhme (1997), *H. robustus* differs markedly from *H. t. turcicus* in its robust head, body, and tail, in very small and weakly keeled tail tubercles and in having an inconspicuous color pattern. According to this study, it seems that *H. turcicus* has a smaller distribution range than its congeners in Fars Province.

Presumable routes of distribution of *Hemidactylus* species in Fars Province

Based on the available evidence, *H. flaviviridis* has been reported only from the northwestern regions of Fars Province (Gholamifard et al. 2010). In this survey, as mentioned above, it was recorded from a new locality in the southwestern Fars Province. Since these localities are near the borders with Bushehr Province, and as one of the previously recorded localities of this species, probably southern and western parts of Fars Province are within the natural distributional range of this lizard. As another possible mechanism of distribution, *H. flaviviridis* could have been distributed to Fars Province incidentally via human agency or by destruction and reduction of geographical barriers. The possible mechanisms of distribution, mentioned above, may also be considered for *H. turcicus*. Probably this species colonized Fars Province or expanded its distributional range from the southern provinces (Bushehr and Hormozgan Provinces). Among the three studied taxa here, *H. persicus* has the widest range in Fars Province. The type locality of this species is Iran, but no exact locality was given. Terra typica probably is near Bushehr, Bushehr Province (Leviton et al. 1992; Anderson 1999), and restricted to Shiraz, Fars Province by Smith (1935). With regard to these ambiguities, as one of the possible mechanisms of distribution, *H. persicus* could have expanded its range into Fars Province from Bushehr Province (southwest) or, alternatively, it originated in Fars Province and expanded its range into neighboring provinces in different directions.

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Appendix

Material examined

Hemidactylus persicus (n=12)

CBSU R014, R015: Iran, Fars Prov., SE Darab, Fork [28°17'04.1" N, 55°13'24.1" E, alt. 897 m]. CBSU 4217: Iran, Fars Prov., Jahrom [28°57' N, 53°57' E]. CBSU 5395, 8056.

R009: Iran, Fars Prov., Shiraz [29°37' N, 52°32' E]. CBSU 8055: Iran, Fars Prov., Kazeroon [29°37'6" N, 51°39'30" E]. CBSU 8068, 8071, 8083, 8091, B628 (Re. ex.): Iran, Fars Prov., NW Jahrom Township, Koohe Gorm non-Hunting Area [28°33' N, 53°6' E].

Hemidactylus turcicus (n=3)

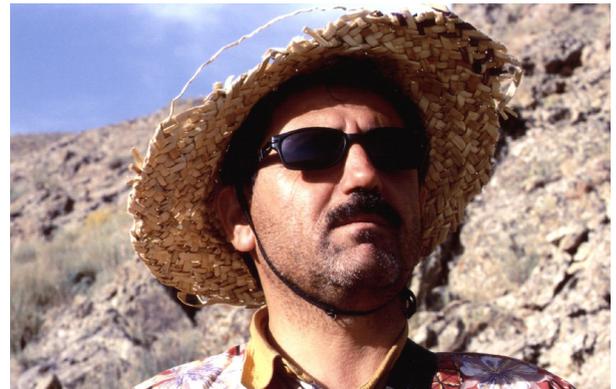
CBSU R081- 83: Iran, Fars Prov., 25 km NW of Lamerd, Varavi [27° 28' N, 53° 03' E, ele. 421 m].

Hemidactylus flaviviridis (n=3)

CBSU B636, R004, R044: Iran, Fars Prov., Kazeroon, Ghaleh Seied village, 25 km NW Parishan Lake [29°36'15" N, 51°32'51" E, ele. 900 m].



Ali Gholamifard earned his B.S. in Animal Biology from the Shahed University of Tehran, Iran, 2005 and his M.S. in Animal Biosystematics from Shiraz University, Shiraz, Iran in 2009, where he studied the reproductive biology of the endemic Iranian cyprinid, *Cyprinion tenuiradius* Heckel, 1849 under the advisement of Dr. Hamid Reza Esmaeili. His research interests include taxonomy, ecology, biology, conservation, and phylogeography.



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