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Three new species of *Hemidactylus* Oken, 1817 (Squamata, Gekkonidae) from Iran

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***Abstract.*—Based on morphological characters, three new species of the genus *Hemidactylus* are described, one from the Zagros Mountains (Khuzestan Province) and two from the coastal Persian Gulf (Bushehr Province) of Iran. The three new species can be differentiated from all other *Hemidactylus* inhabitants of Iran and adjacent area congeners by distinct morphometric, meristic, and color characters. Comparisons with other species of *Hemidactylus* are presented and a key to the genus is provided. Some information about the ecology, biology, and conservation of the three new species is provided. Existing data suggest these geckos are point endemics. Some additional historical information about the *Hemidactylus* inhabitants of Iran is discussed, particularly *H. parkeri*.**

Keywords. Bushehr, *Hemidactylus achaemenidicus* **sp.n.**, *H. pseudoromeshkanicus* **sp.n.**, *H. sassanidianus* **sp.n.**, *H. parkeri*, Khuzestan, Sauria, Reptilia

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Introduction

Globally, the gekkonid genus *Hemidactylus* Oken, 1817 currently consists of 154 species distributed across all tropical and subtropical continental landmasses, including intervening oceanic and continental islands (Carranza and Arnold 2012; Šmíd et al. 2013a,b, 2015; Uetz 2019). Four families and 70 species of geckos occur in Iran: 50 species of Gekkonidae, 10 species Phyllodactylidae, seven species of Sphaerodactylidae, and three species of Eublepharidae (Uetz 2019). The four *Hemidactylus* species reported so far from Iran are: *H. flaviviridis*, *H. persicus, H. robustus,* and *H. romeshkanicus* (Anderson 1999; Bauer et al. 2006a; Rastegar-Pouyani et al. 2006; Torki et al. 2011; Kamali 2013; Šmíd et al. 2014). Only one of them is endemic to Iran (*H. romeshkanicus*). During a 2007–2010 collection program in southwestern Iran, from the Zagros Mountains and coastal Persian Gulf, several geckos were collected which, upon laboratory examination, were found to differ in important characters from Iranian geckos already known.

In this article, they are described morphologically and compared to the previously known *Hemidactylus* species from Iran, as well as those from neighboring regions. Additionally, two notes regarding *H. parkeri* are presented, and comments on the conservation of geckos in Iran are provided.

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Materials and Methods

During several field trips in the Iranian plateau, three new *Hemidactylus* species were collected from this region (Fig. 1): (a) Kangan region, near the coastal Persian Gulf, Bushehr province, (b) Tangestan region, Bushehr province, and (c) Kole-Saat, Khuzestan province. All specimens of the three new species were assigned catalog numbers for the ZFMK (Zoologisches Forschungsmuseum Alexander Koenig, Bonn, Germany); and FTHM (Farhang Torki Herpetological Museum, Nourabad City, Iran), with the latter deposited in Farhang Torki Ecology and Herpetology Center for Research (FTEHCR).

The taxonomic characters of *Hemidactylus* species from Iran are not well defined. For most species, no museum specimens were available for comparison. Rather, published descriptions of geckos known from Iran were compared to the morphological characters of the newly collected material (e.g., Moravec et al. 2011;

Fig. 1. Type localities of three new geckos in Iran.

Carranza and Arnold 2012; Šmíd et al. 2013a, 2015). For comparison with *H. romeshkanicus* ZMB 75020 from the Museum für Naturkunde, Leibniz Institut für Biodiversitats- und Evolutionsforschung zu Berlin (formerly Zoologisches Museum Berlin, Germany) was used. For comparison with *Hemidactylus* spp. distributed outside Iran, original descriptions or other publications containing morphological analyses of *Hemidactylus* species were used (e.g., Anderson 1999; Giri et al. 2003; Baha el Din 2003, 2005; Bauer et al. 2006a,b, 2007; Sindaco et al. 2007; Giri and Bauer 2008; Giri 2008; Mahony 2010; Agarwal et al. 2011; Busais and Joger 2011; Moravec et al. 2011; Torki et al. 2011; Mirza and Rajesh 2014; Vasconcelos and Carranza 2014; Carranza and Arnold 2012; Šmíd et al. 2013a, 2015; Safaei-Mahroo et al. 2017).

Characters were selected to optimize comparisons with data reported by Moravec et al. (2011), Carranza and Arnold (2012), Wagner et al. (2014), Vasconcelos and Carranza (2014), and Šmíd et al. (2013a, 2015). Measurements were taken using a dial caliper with 0.01 mm precision. Additionally, other characters important for the taxonomy of *Hemidactylus* were used, such as nasals in contact and 1st postmental in contact with 2nd lower labial (e.g., Moravec et al. 2011; Šmíd et al. 2013). Characters used to describe the three new *Hemidactylus* are as follows: SVL: snout-vent length; TRL: trunk length; TL: tail length; R1: TL/SVL; HL: head length; HW: head width; HH: head height; R2: HL/SVL; R3: HW/HL; R4: HH/HL; OD: orbital diameter; NE: nares to eye distance; IN: internarial distance; IO1: anterior interorbital distance; IO2: posterior interorbital distance; TB: longitudinal tubercle rows; PAP: number of precloacal pores; SL (L/R): number of supralabials; IL (L/R): number of infralabial scales; LP1 (L/R): number of lamellae under the first finger of the pes; LP4 (L/R): number of lamellae under the fourth finger of the pes; FP: femoral pores; and PM: postmentals. Abbreviations used in tables are as follows: M: male; F: female; T: total; A: ANOVA test; F: one-way ANOVA *F* value; dF: degrees of freedom; P: probability; DM: Difference of means; and DD: Direction of difference.

Because of the absence of sexual size dimorphism in the arid clade of *Hemidactylus* (Carranza and Arnold 2012), both sexes were analyzed together. Statistical procedures used to test for differences between the sexes included one-way ANOVA (at 95% confidence level [$P < 0.05$]) and Principal Component Analysis (PCA).

Taxonomy

***Hemidactylus achaemenidicus* sp.n.** (Figs. 2–5)
Hemidactylus turcicus - Torki et al. 2011
Hemidactylus persicus - Carranza and Arnold 2012
Hemidactylus persicus - Šmíd et al. 2013

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Fig. 2. Dorsal and ventral views of **(a, b)** holotype and **(c, d)** paratype specimens of *Hemidactylus achaemenidicus* **sp.n.**

Holotype

ZFMK 98567, adult male, collected at the end of the southern Zagros Mountains, Kangan, Bushehr Province, Southern Iran, on 10 May 2008 (27º18'N, 52º42'E, 50–221 m asl).

Paratypes

ZFMK 97750–97753; ZFMK 98568–73; and FTHM 005110, six adult male specimens (ZFMK 97750–97752; ZFMK 98569–70; FTHM 005110), and four adult female specimens (ZFMK 97753; ZFMK 98568, 71, 72), same data as for holotype.

Diagnosis

A small sized *Hemidactylus*, maximum snout-vent length 39.8 mm; tubercles distributed over the entire dorsum (except for forelimbs); granules cover head and extend to neck; tubercle rugosity dimorphism occurs between males and females over dorsal body, limbs, and tail (males have more rugose tubercles than females); proximal portion of tail (ventral view) covered by small scales without femoral pores; precloacal pores present; six tubercles on most whorls of tail; two postmentals; low number of lamellae under pes; subcaudal scales started more distally (approximately after proximal one-third of tail), only a few subcaudals (plate-like) in original tail (0–22), that started so far as anal; proximal dorsal tail covered by regular whorls of tubercles (keeled in male and plate-like in female); ventral scales not imbricate; the ends of ventral scales are denticulated; enlarged scansors beneath fingers, scansors are mostly divided, terminal scansor is single; dorsal color pattern shows much variability (regular or irregular crossbars, longitudinal bands, large or small spots), and this is true for the tail (regular or irregular bars, large and small spots), venters of all specimens are without spots (uniform).

Description of Holotype (Figs. 2–3)

Measurements (in mm): body size: 39.8; tail length: 40.5; interlimbs: 18.3; head width: 7.3; head length: 11.7; head depth: 4.9; eye-eye: 4.7; ear opening: 0.82; eye diameter: 3.0; forelimb length: 12.3; hindlimb length: 15.5.

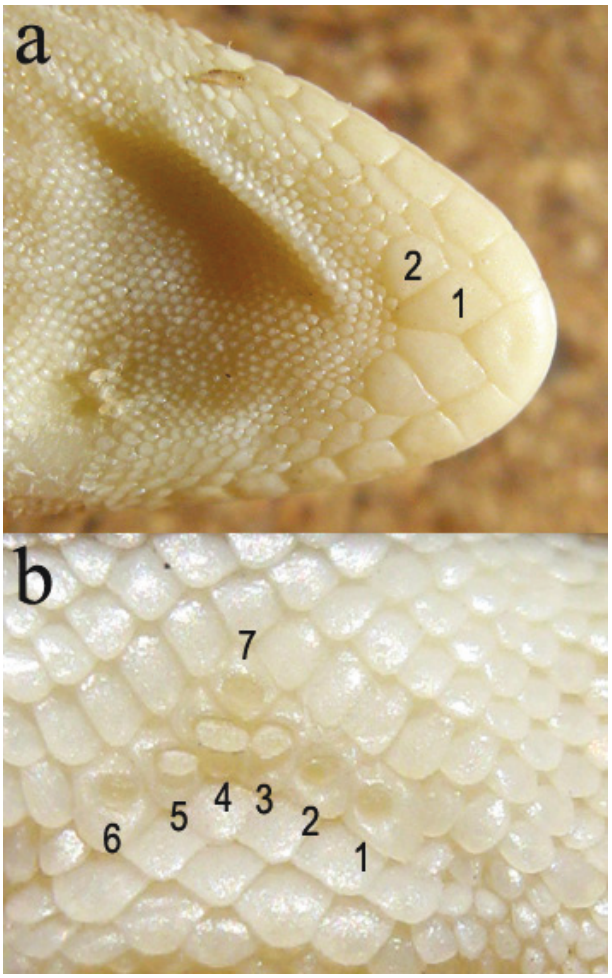

Fig. 3. (a) Postmentals and **(b)** precloacal pores in holotype of *Hemidactylus achaemenidicus* **sp.n.**

Body depressed, tail more or less flattened; head triangular-shaped; two postmentals, 1st postmentals enlarged and in contact, 2nd postmentals behind the first enlarged postmentals, the 1st postmentals in contact with the 1st infralabials, the 2nd left postmental distinct from infralabials by one series of scales, the 2nd right postmentals in contact with the 2nd infralabials (and weakly with the 1st), four scales between 2nd postmentals; Infralabials: eight; supralabials: nine; nostril surrounded by five scales (the 1st supralabial, rostral, three small on posterior); nasals not in contact and separated by one scale; ear openings more or less falcate-shaped, and horizontal; 14 scales between nostril and eye; 24 scales between eye and ear; rostrum covered by large granules; space between eyes covered by 27 small granules, and 10 small simple tubercles distributed among them; upper head covered by smallest granules and many small simple tubercles distributed among them; tubercles on upper ears and behind eyes are simple; tubercles on occiput mostly simple and less pointed; tubercles on neck are pointed and keeled (heterogeneous); from rostrum to neck body covered by granules; tubercles distributed on dorsum, head, and limbs; tubercles not found on arm; most body tubercles are keeled; dorsal tubercles are strongly keeled,

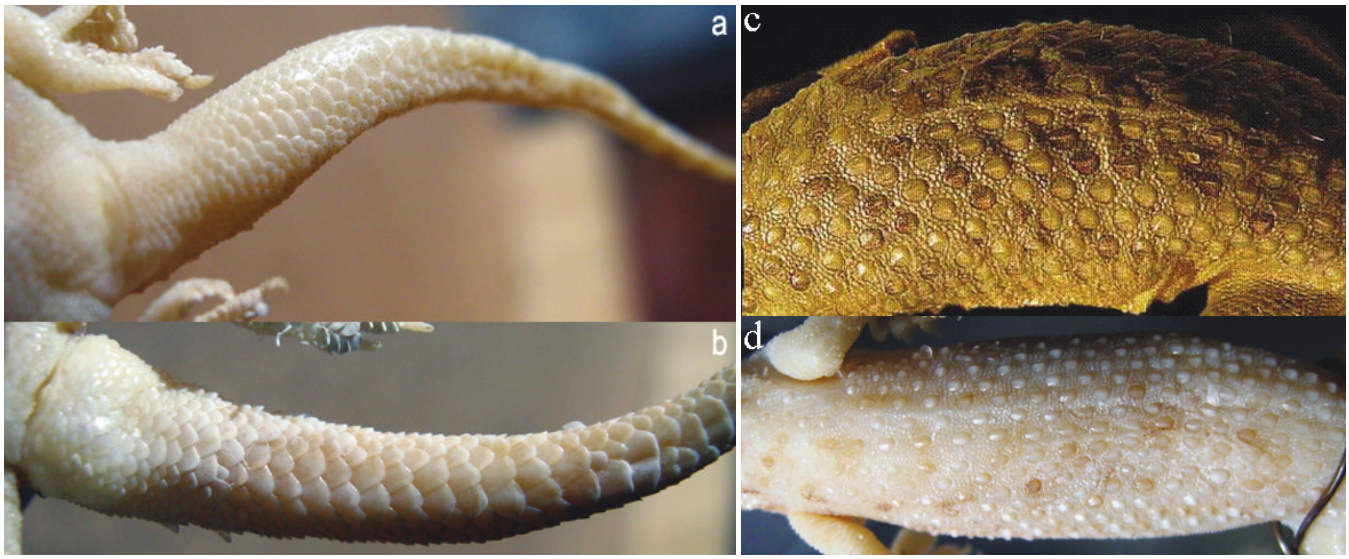

Fig. 4. Subcaudal of tail of **(a)** ZFMK97753 and **(b)** ZFMK 98567 of *Hemidactylus achaemenidicus* **sp.n.** Comparison of dorsal body between **(c)** holotype of *H. achaemenidicus* **sp.n.** and **(d)** lectotype of *H. robustus*. *Photo from Šmíd et al. 2015*.

tubercles on proximal of back surrounded by 11–12 scales (middle: 12–13, distal: 13), dorsal tubercles do not show regular form and abnormalities occur in a few points (intermixed with some small simple tubercles); enlarged, trihedral, and strongly keeled tubercles distributed on distal part of dorsum (between hindlimbs) as well as nearest to tail; tubercles on forearm are simple; tubercles on femur heterogeneous (simple, pointed, and keeled); foreleg tubercles heterogeneous in size and shape (pointed and keeled); size of the tubercles on limbs is different and is as follows: foreleg > femur > forearm; scales on palm and sole are granule-like; 17 rows (mostly regular) of tubercles on back; 21 tubercles between interlimbs.

Tail is original; first part of tail (one-third) covered by small scales, subcaudal plates cover following third, less than 12 scales (moderate size: 50% of tail width, not imbricate) on subcaudal, last part; distal one-third of tail is without subcaudals (covered by small scales); without crossbars on dorsum of tail, small irregular spots present in first half of tail; tubercle whorls only found on first half of tail, 1st to 6th whorls more or less irregular and separated by one scale, includes six large, trihedral, and strongly keeled tubercles, after them real whorls start: six tubercles in 1st to 3rd whorl, four for 4th to 7th, first whorl separated from secondary by two scales, four scales between 2nd–3rd and 3rd–4th, six scales between 4th–5th, five between 5th–6th and 6th–7th, after them tubercles converted to scales; seven (3+1+3) precloacal pores; no femoral pores; enlarged scansors are plate-like; terminal scansor is single; lamellae on fingers as follows: 1st: five, 2nd: seven, 3rd: seven, 4th: seven, 5th: eight; lamellae on pes as follows: 1st: six, 2nd: eight, 3rd: nine, 4th: 10, 5th: eight; claws in front of scansors. Palm and sole covered by granule-like scales.

Coloration of upper head is covered by longitudinal discontinuous rows that extended to neck, and are irregular onto dorsal body; dorsum without bars; few irregular bars and small spots cover dorsum of tail; one bar between nostril-eye-ear; venter of body, limbs, and tail uniformly without pattern; pattern in preserved specimen is similar to the live specimen and all spots and bars are obvious; the preserved specimen is colorless.

Variation (Fig. 4a–b)

Some variation among paratypes is described as follows: tubercles distributed all over dorsum (except arms); granules cover head and extend to neck. Tubercle rugosity differed between males and females on overall dorsal body, limbs, and tail (males with more strongly rugose tubercles than females), females have wide (approximately flattened shape) dorsal tubercles and males have extended trihedral tubercles. Proximal tail in most specimens is cycloid and ventral view covered by small scales (same as dorsum); proximal tail (dorsal view) covered by 4–6 irregular whorls of tubercles (strongly keeled) separated by one scale, followed by regular whorls of six tubercles in each whorl, started and separated by 2–6 scales, more than six regular whorls are obvious in all specimens (first half) and do not continue to posterior half of tail (tubercles converted to scales). Number of precloacal pores is variable as follows: six (five specimens), seven (holotype), and eight (ZFMK97751). Most specimens have two postmentals, postmentals in all specimens are not uniform and variability is as follows: one specimen (ZFMK 98570) has five postmentals (left+right), two anterior, two posterior, and one large scale between anteriors; anteriors not in contact with one another and in contact with 1st and 2nd infralabials; seven specimens have normal postmentals and anterior in all specimens in contact with 1st and 2nd infralabials; in one specimen (FTHM005110) 2nd postmentals (left and right) separated from infralabials by one series of scales, and 1st postmentals in contact with 1st infralabial; left 2nd

Fig. 5. Type locality of *Hemidactylus achaemenidicus* **sp.n.**, Kangan, Bushehr, southern Iran.

postmental in ZFMK97751 separated from infralabials by one series of scales, and 1st postmentals are in contact with 1st infralabials; finally left 1st postmental of ZFMK 98571 contacts 1st infralabials. Subcaudal scales begin approximately after first third of tail, a lesser number of subcaudals (plate like) in original tail (0 to 22); first half of dorsal tail covered by regular whorls of tubercles (strongly keeled in males and plate-like in females). Dorsal color pattern is variable (regular or irregular cross bars, longitudinal band, large or small spots), this is true for tail (regular or irregular bars, large and small spots), venter of all specimens is uniform, without spots; venter in live specimens is white and tail is yellowish or dark, in preserved specimens ventral is yellowish and ventral of tail is darkish. More data on the variation are shown in Table 1.

Sexual dimorphism is evident. In general, males show larger body size and head size than females (Table 1). Based on statistical analysis three characters, TRL, IO2, and LP4R, are significantly different between the sexes as follows: males have significantly (P = 0.03, f = 6.21) larger trunk length than females (16.9 ± 0.37 vs. 14.3 ± 1.28); this is true for IO2 and in males (4.70 ± 0.1) is significantly (P = 0.03, f = 6.09) larger than in females (4.22 ± 0.18). In contrast, number of lamellae under 4th pes (right side) in females (10 ± 0.0) is significantly (P = 0.01, f = 8.18) greater than in males (9.28 ± 0.18). Five characters (SVL, TRL, TL, HW, HL) in females show much more variability than in males; in contrast, three characters (OD, NE, IN) in males are much more variable than in females. All females have 16 dorsal tubercle rows, and in males they number 16 or 17 (16.4 ± 0.2). Lamellar variability under 1st and 4th finger of pes in females is zero and in males is one (except ILL: female is one and males are zero). More data on the dimorphism are shown in Table 1.

Habitat and Ecology (Fig. 5)

Hemidactylus achaemenidicus **sp.n.** are distributed in the eastern part of Bushehr Province (edge of Hormozgan Province), in Kangan, Assaloye City. The habitat of *H. achaemenidicus* **sp.n.** is flat land covered by Jujube trees (*Ziziphus jujuba*). The type locality is located in the northern part of the Persian Gulf. A few lizard and snake species were observed at the type locality: *Trapelus agilis*, *Laudakia nupta*, and *Echis carinatus*.

Distribution

So far, the species is only known from the type locality.

Etymology

The species name "*achaemenidicus*" refers to "The Achaemenid Empire," also called the First Persian Empire. It was an empire based in Western Asia, founded by Cyrus the Great, and notable for including various civilizations and becoming the largest empire at that time.

Comparisons

Based on a phylogenetic study of one paratype specimen (FTHM 005100 is erroneous and FTHM 005110 is the true code; also the locality cited in the phylogeny section must be changed to the type locality of the new species) *H. achaemenidicus* **sp.n.** is completely distinct from *H. robustus*, *H. turcicus*, and other recently described species inhabiting Oman (see phylogram of Carranza and Arnold 2012; Šmíd et al. 2015). *Hemidactylus achaemenidicus* **sp.n.** was compared with the re-description of *H. robustus* Šmíd et al. (2015) [see Table 2]. *Hemidactylus achaemenidicus* **sp.n.** is different from *H. robustus* by smaller body size in males (36.5 ± 0.9 mm vs. 41.8 ± 2.3) and females (33.1 ± 2.0 mm vs. 43.6 ± 4.7), more longitudinal tubercle rows (16.2 ± 0.1 vs. 14.8 ± 1.2), and keeled (vs. weakly keeled and posteriorly pointed) as well as rugosity dimorphism (quite distinct

Table 1. Measurements and scale counts of *Hemidactylus achaemenidicus* **sp.n.** Abbreviations: SVL: snout-vent length; TRL: trunk length; TL: tail length; R1: TL/SVL; HL: head length; HW: head width; HH: head height; R2: HL/SVL; R3: HW/HL; R4: HH/HL; OD: orbital diameter; NE: nares to eye distance; IN: internarial distance; IO1: anterior interorbital distance; IO2: posterior interorbital distance; TB: longitudinal tubercle rows; PAP: number of preanal pores; SL (L/R): number of supralabials; IL (L/R): number of infralabial scales; LP1 (L/R): number of lamellae under the first finger of the pes; LP4 (L/R): number of lamellae under the fourth finger of the pes; M: male; F: female; T: total; A: ANOVA test; F: one-way ANOVA *F* value; dF: degree of freedom; P: probability (following Carranza and Arnold 2012); DM: difference of means; DD: direction of difference.

		SVL	TRL	TL	R1	HL	HW	HH	R2	R3	R4	OD	NE	IN	IO1	IO2	TB	PAP	SLL	SLR	ILL	ILR	LP1L	LP1R	LP4L	LP4R
M	N	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
	Mean	36.5	16.9	38.5	1.03	10.9	6.91	4.68	0.29	0.62	0.42	2.55	2.91	0.97	3.22	4.70	16.4	6.42	9.42	9.71	8.00	7.85	5.57	5.71	9.42	9.28
	SEM	0.92	0.37	1.48	0.01	0.28	0.17	0.11	0.00	0.01	0.01	0.11	0.11	0.07	0.08	0.10	0.20	0.29	0.20	0.18	0.00	0.14	0.20	0.18	0.20	0.18
	Max	39.8	18.3	41.4	1.09	12.2	7.40	5.00	0.31	0.68	0.47	3.00	3.40	1.30	3.40	5.00	17	8.00	10.0	10.0	8.00	8.00	6.00	6.00	10.0	10.0
	Min	32.9	15.8	34.9	1.01	10.2	6.20	4.30	0.27	0.60	0.38	2.10	2.50	0.80	2.80	4.30	16	6.00	9.00	9.00	8.00	7.00	5.00	5.00	9.00	9.00
	R	6.90	2.50	6.50	0.08	2.00	1.20	0.70	0.04	0.08	0.09	0.90	0.90	0.50	0.60	0.70	1.00	2.00	1.00	1.00	0.00	1.00	1.00	1.00	1.0	1.00
F	N	7	7	4	4	7	7	7	7	7	7	7	7	7	7	7	7		7	7	7	7	7	7	7	7
	Mean	33.1	14.3	31.3	0.93	9.95	6.30	4.25	0.29	0.62	0.42	2.30	2.70	0.97	2.90	4.22	16.0		9.75	9.25	7.75	7.75	6.00	6.00	10.0	10.0
	SEM	2.05	1.28	3.10	0.05	0.51	0.44	0.35	0.00	0.01	0.01	0.07	0.12	0.04	0.14	0.18	0.00		0.25	0.25	0.25	0.25	0.00	0.00	0.00	0.00
	Max	38.5	17.4	38.8	1.07	11.1	7.50	5.30	0.30	0.67	0.47	2.50	3.00	1.10	3.20	4.70	16.0		10.0	10.0	8.00	8.00	6.00	6.00	10.0	10.0
	Min	28.9	11.5	24.5	0.84	8.70	5.40	3.70	0.29	0.60	0.39	2.20	2.40	0.90	2.60	3.80	16.0		9.00	9.00	7.00	7.00	6.00	6.00	10.0	10.0
	R	9.60	5.90	14.3	0.23	2.40	2.10	1.60	0.01	0.07	0.08	0.30	0.60	0.20	0.60	0.90	0.00		1.00	1.00	1.00	1.00	0.00	0.00	0.00	0.00
T	N	11	11	8	8	11	11	11	11	11	11	11	11	11	11	11	11	4	11	11	11	11	11	11	11	11
	Mean	35.3	15.9	34.9	0.98	10.6	6.69	4.52	0.29	0.62	0.42	2.46	2.83	0.97	3.10	4.52	16.27	6.42	9.54	9.54	7.90	7.81	5.72	5.81	9.63	9.54
	SEM	1.03	0.62	2.10	0.03	0.28	0.20	0.15	0.00	0.00	0.00	0.08	0.08	0.04	0.08	0.11	0.14	0.29	0.15	0.15	0.09	0.12	0.14	0.12	0.15	0.15
	Max	39.8	18.3	41.4	1.09	12.2	7.50	5.30	0.31	0.68	0.47	3.00	3.40	1.30	3.40	5.00	17.0	8.00	10.0	10.0	8.00	8.00	6.00	6.00	10.0	10.0
	Min	28.9	11.5	24.5	0.84	8.70	5.40	3.70	0.27	0.60	0.38	2.10	2.40	0.80	2.60	3.80	16.0	6.00	9.00	9.00	7.00	7.00	5.00	5.00	9.00	9.00
	R	10.9	6.8	16.9	0.25	3.50	2.10	1.60	0.04	0.08	0.09	0.90	1.00	0.50	0.80	1.20	1.00	2.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
A	F	3.17	6.21	4.47	2.70	3.64	2.38	2.05	0.05	0.00	0.02	2.37	1.44	0.00	4.62	6.09	2.45		0.96	2.26	1.90	0.16	2.45	1.30	4.36	8.18
	dF	9	9	6	6	9	9	9	9	9	9	9	9	9	9	9	9		9	9	9	9	9	9	9	9
	P	0.10	0.03	0.07	0.15	0.08	0.15	0.18	0.81	0.98	0.88	0.15	0.26	0.97	0.06	0.03	0.15		0.35	0.16	0.20	0.69	0.15	0.28	0.06	0.01
	DM	3.47	2.62	7.27	0.10	1.02	0.61	0.43	0.00	0.00	0.00	0.25	0.21	0.00	0.32	0.47	0.42	6.42	0.32	0.46	0.25	0.10	0.42	0.28	0.57	0.71
	DD	M > F	M > F	M > F	M > F	M > F	M > F	M > F	M = F	M = F	M = F	M > F	M > F	F=M	M > F	M > F	M > F	M > F	M < F	M > F	M > F	M > F	M < F	M < F	M < F	M < F

Table 2. Comparison three new *Hemidactylus* species with other *Hemidactylus* which occur in Iran. Data from: (1): Carranza and Arnold 2012; (2): Torki et al. 2011; (3): FTHM collections. Abbreviation are as given in Materials and Methods and Table 1 header.

Characters	*H. achaemenidicus* **sp.n.**	*H. sassanidianus* **sp.n.**	*H. pseudoromeshkanicus* **sp.n.**	*H. persicus* (1)	*H. romeshkanicus* (2)	*H. flaviviridis* (3)
SVL	28–39	48–63	74–75	36–67	70	59–79
TL	24–41	66–79	88	55–77	83	60–97
SL	9–10	10–13	11	10–13	15	12–17
IL	7–8	8–10	9	8–11	9	11–12
HL	8.7–12.2	13.5–20.6	22.8–23.4	9.1–16.8	23.2	17–23
HW	5.4–7.5	9.7–13	14.6–15.2	7.1–14.4	14.5	12.5–18.5
HH	3.7–5.3	6.1–8.9	8.7–9.1	4.9–9.6	9.1	7.9–10.9
HL/SVL	0.27–0.31	0.28–0.31	0.30–0.31	0.21–0.28	0.33	0.28–0.31
HW/HL	0.60–0.68	0.60–0.71	0.64–0.65	0.67–0.92	0.62	0.65–0.80
HH/HL	0.39–0.47	0.35–0.45	0.37–0.40	0.42–0.60	0.39	0.40–0.48
DTR	16–17	14–16	16–17	14–16	16	–
PAP	6–8	6–8	12	8–11	12	–
LP1	5–6	6–9	11	8–9	8	8–9
LP4	9–10	9–14	15	13–14	12	11–13
PM	2	2–4	2	2	3	2

for new *Hemidactylus* species), subcaudal scales (scale like and/or enlarged vs. enlarged), less head width/head length (0.62 vs. 0.74), internarial distance (0.97 ± 0.04 vs. 1.5 ± 0.08), lower number of lamellae under the 1st pes (5.7 ± 0.1 vs. 6.1 ± 0.5), internarial distance (0.97 vs. 1.5), and nasal in contact % (0% vs. 22%) [Carranza and Arnold 2012; Šmíd et al. 2015]. Based on photograph of lectotype of *H. robustus* (Figs. 4–9 in Šmíd et al. 2015; as a female specimen), females of *H. robustus* have approximately full rugosity (lectotype of *H. robustus* is female) and it is more than in male *H. achaemenidicus* **sp.n.** (males of *H. achaemenidicus* **sp.n.** have much greater rugosity than females); dorsal tubercle density (especially on proximal part) in *H. robustus* is more than *H. achaemenidicus* **sp.n.** dorsal, and dorsolaterals of *H. robustus* have maximum uniformity; in contrast the dorsum of *H. achaemenidicus* **sp.n.** has heterogeneity of dorsal and dorsolateral tubercles; also shape and size of tubercles on dorsolateral of *H. achaemenidicus* **sp.n.** is different from mid-dorsum, in contrast to *H. robustus* (Fig. 4c–d); photographic comparison: limbs (especially hind limbs) in *H. achaemenidicus* **sp.n.** are smaller than *H. robustus*; additional differences are: longer head for *H. robustus*; smaller interlimbs for *H. robustus*; base of tail in *H. robustus* is much more flattened and in *H. achaemenidicus* **sp.n.** is approximately cylindrical.

Differs from *H. flaviviridis, H. persicus,* and *H. romeshkanicus* by smaller body size. More comparisons with *Hemidactylus* inhabiting Iran are shown in Table 2. Differs from *H. turcicus* by smaller body size (36.5 ± 0.9 mm vs. 46.0 ± 5.8 in males, 33.1 ± 2.0 mm vs. 49.2 ± 5.1 in females), short tail relative to SVL (TL 0.98 vs. 112.8% of SVL), more longitudinal tubercle rows (16.2 ± 0.1 vs. 13.8 ± 0.7), nasal in contact % (0% vs. 13.3%), 1st and 2nd postmentals in contact with 2nd infralabials (81.8% vs. 12.9%), lower number of lamellae under the 1st pes (5.7 vs. 6.6), supralabials (9.5 ± 0.1 vs. 8.3 ± 0.5), infralabials (7.8 ± 0.1 vs. 6.8 ± 0.4), number of precloacal pores (6.42 vs. 7.2), less head width/head length (0.62 vs. 0.77) [Moravec et al. 2011; Šmíd et al. 2013]. Different from *H. persicus* in body size, tail length, head shape and ratio, dorsal tubercle rows, precloacal pores, and number of lamellae under the 1st and 4th pes (see Table 2). Different from *H. romeshkanicus* in body size, tail length, head shape, precloacal pores, and number of lamellae under the 1st and 4th pes (see Table 2).

In this section *H. achaemenidicus* **sp.n.** is briefly compared with other *Hemidactylus* spp. from Iran. Different from *H. adensis*, *H. awashensis*, *H. lavadeserticus, H. mandebensis, H. ulii*, and *H. jumailiae* by more longitudinal tubercle rows (16.27 vs. 14, 14, 14, 13.3, 14.1, and 14) [Šmíd et al. 2013a, 2015]. Different from *H. dawudazraqi* by more dorsal tubercle rows (16–17 vs. 12–15). Different from *H. alfarraji* by precloacal pores (6–8 vs. 4) [Šmíd et al. 2016]. Different from *H. kurdicus* by postmentals (2 vs. 1) [Safaei-Mahroo et al. 2017]. Different from *H. foudaii* by precloacal pores (6–8 vs. 9) and well developed dorsal and tail tubercles (vs. less developed and protuberant dorsal and particularly tail tubercles). Different from *H. mindiae* (Jordan) and *H. asirensis* by smaller body size (36.5 mm vs. 49.3, 43–48.5 in males, 33.1 mm vs. 49.8, 38–51 in females, respectively) [Baha el Din 2005, Moravec et al. 2011; Šmíd et al 2017]. Different from *H. saba*, *H. granosus*, *H. yerburii*, *H. montanus*, *H. minutus*, *H. homoeolepis*, and *H. mindiae* (Egypt population) by number of precloacal pores (6.42 vs. 8, 5.6, 13.7, 11.2, 5.8, 4.3, 12.8, and 4) [Baha el Din 2005; Carranza and Arnold 2012; Šmíd et al. 2013a, 2016; Vasconcelos and Carranza 2014], respectively. Different from *H. endophis* by lacking femoral pores. Different from *H. shihraensis*, *H. hajarensis*, *H. luqueorum*, *H. festivus,* and *H. alkiyumii* by smaller body size. Significantly different from *H. mindiae*, *H. lavadeserticus*, *H. dawudazraqi*, *H. shugraensis*, and *H. sinaitus* by small body size and more dorsal tubercle rows. Different from *H. leschenaultii*, *H. homoeolepis*, *H. paucituberculatus*, *H. inexpectatus*, *H. masirahensis*, and *H. lemurinus* by having large and keeled tubercles on dorsal body.

Fig. 6. Dorsal tubercles of **(a)** holotype and **(b)** paratype of *Hemidactylus sassanidianus* **sp.n.**

Based on recent a molecular study on *Hemidactylus* (Maximum-likelihood tree inferred using 350 bp of the 12S gene, Appendix III, by Carranza and Arnold 2012; Šmíd et al. 2013b, 2015), *H. achaemenidicus* **sp.n.** (FTHM005110 is the accurate specimen number) is significantly different from: *H. luqueorum*, *H. hajarensis*, *H. lemurinus*, *H. yerburii*, *H. montanus*, *H. jumailiae*, *H. alkiyumii*, *H. robustus*, *H. sinaitus*, *H. saba*, *H. shihraensis*, *H. festivus*, *H. paucituberculatus*, *H. masirahensis*, *H. inexpectatus,* and *H. homoeolepis*.

***Hemidactylus sassanidianus* sp.n.** (Figs. 6–9)
Hemidactylus persicus Torki et al. (2011)

urn:lsid:zoobank.org:act:61CDBB8A-CE1F-4219-8F66-9DB6275C577E

Holotype
ZFMK 98573, adult male, collected at the southern end of Zagros Mountains, Khaiiz, Tangestan City, Bushehr Province, Southern Iran, on 4 May 2008 (28º43'N, 51º31'E, 525 m asl).

Paratypes
ZFMK 97754–56, ZFMK 98574–77, FTHM 005029; four adult male specimens (ZFMK 97756, ZFMK 98575–77), and four adult female specimens (ZFMK 97754–55, ZFMK 98574, FTHM 005029), same data as for holotype.

Diagnosis
A small-sized *Hemidactylus*, snout-vent length at least 48.3 mm; tubercles distributed all over dorsum, except for arm; back with enlarged keeled tubercles; heterogeneity of dorsal tubercles occurred in all specimens (a few parts or most of dorsal body); dorsal scales in a few places converted into granules; granules cover snout, between eyes, upper head, neck, and in some specimens onto middle of dorsum and dorsolaterals; 2–4 postmentals; 4–8 whorls of tubercles on first half of dorsum of tail, distal part of tail without tubercles; without femoral pores; precloacal pores present; more lamellae under fingers; subcaudal scales enlarged; ventral scales not imbricate; enlarged scansors beneath fingers, scansors mostly divided, terminal scansor single; limbs without color pattern and uniform, dorsolaterals without any pattern and uniform, pattern only present on middle part of dorsum (longitudinal) of all specimens, various patterns on dorsum such as: spotty (small or large), bars (irregular and regular); ventrum without pattern.

Description of Holotype (Fig. 6)
Measurements (in mm): body size: 54.2; tail length: 79.3; interlimbs: 21.6; head width: 10.6; head length: 16.4; head depth: 6.4; eye-eye: 6.2; ear opening: 1.9; eye diameter: 4.3; forelimbs length: 18.3; hind limbs length: 24.8.

Body depressed; body, as well head are flattened; tail flattened; head triangular-shaped; two postmentals, the first postmentals are enlarged and are widely in contact together, the 2nd postmentals one behind the first enlarged postmentals, the 1st postmentals are in contact with the 1st infralabials, the 2nd postmentals are in contact with the 2nd infralabials, four scales between 2nd postmentals; infralabials: nine; supralabials: left: 11, right: 12; nostril surrounded by five scales (the 1st supralabial, rostral, internasal scale and two postlabials); nasals not in contact and separated by one small scale; ear openings are falcate-shaped, and horizontal; 14 scales between nostril and eye; 26 scales between eye and ear; 31 scales between eyes; rostrum covered by large granules and a few tubercles distributed in distal part; between eyes covered by small granules, and nine small smooth and simple tubercles distributed among them; upper head covered by smallest granules and small tubercles distributed among them; tubercles on upper ears simple and pointed; tubercles on occipital are mostly pointed; tubercles on neck are simple, pointed and keeled (heterogeneous); granules cover rostrum to neck body; tubercles distributed on dorsum, head, and limbs; tubercles extend to in front of eyes; tubercles not found on arm; most body tubercles are keeled; dorsal tubercles are keeled, a few areas of mid-dorsum covered by abnormal tubercles (heterogeneous in

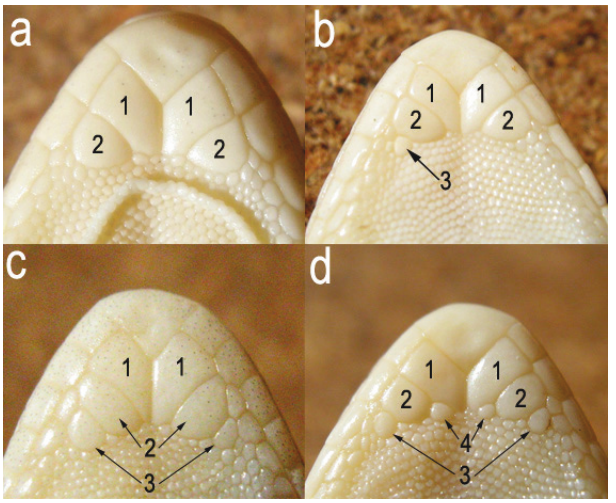

Fig. 7. Postmental variation in *Hemidactylus sassanidianus* **sp.n. (a)** ZFMK 98573; **(b)** FTHM 005029; **(c)** ZFMK 97756; **(d)** ZFMK 98575.

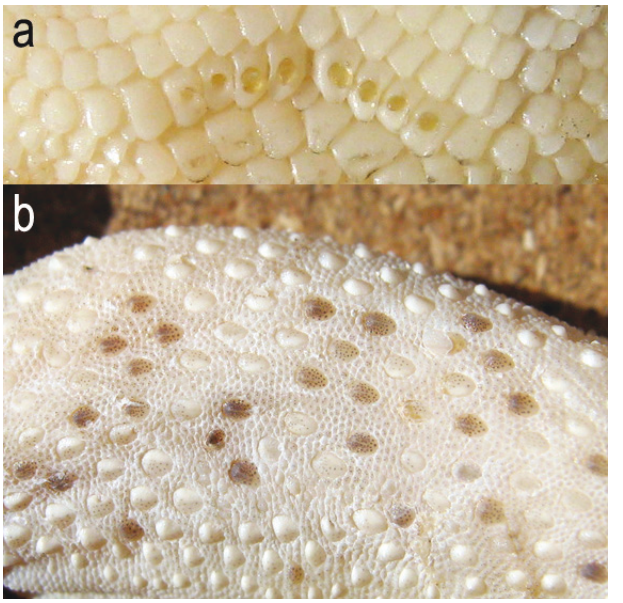

Fig. 8. (a) Precloacal pores (ZFMK 98573), and **(b)** dorsal tubercles (ZFMK 98573) of *Hemidactylus sassanidianus* **sp.n.**

shape and type) and granules; dorsolateral tubercles are keeled and wide; forearm tubercles are small and simple; size of the forearm tubercles are smaller than hindlimb tubercles; number of tubercles on femur (pointed and keeled) are less than foreleg (mostly keeled); scales on palm and sole are granular; 16 regular rows of tubercles on back; 6–8 small simple tubercles between interorbits, 32 scales between interorbits (mid-part); 22 enlarged tubercles between fore- and hindlimbs; 12–14 scales surround each mid-dorsal tubercle (11–12 proximally, 12–13 distally); 3–4 scales between each dorsal tubercle.

Tail is original; 52 enlarged imbricate subcaudal scales; last part of tail cycloid-shape and covered by raised scales; proximal of tail covered by several continuous indistinct bars, 13 crossbars on dorsum of tail, tubercle whorls only found in anterior part of tail, 5–6 scales between each whorl, six tubercles in first whorl, six tubercles in the second, six in third, five in fourth, five in fifth, six in sixth, and six tubercles in the seventh whorl, after the seventh whorl tubercles become very small (six in each whorl) and converted into scales; ventral scales (mostly oval shape) are not imbricate and their size in the middle part of the body are larger than other regions; eight (4+4) precloacal pores; without femoral pores; enlarged scansors are plate-like, terminal scansor is unique (not paired); lamellae on fingers as follows: 1st: nine (1–3 undivided), 2nd: 10 (1 undivided), 3rd: 10 (1 undivided), 4th: 11, 5th: 11(1–2 undivided); lamellae on pes as follows: 1st: nine (1–2 undivided), 2nd: 11 (1 undivided), 3rd: 12 (1 undivided), 4th: 14 (1–2 undivided), 5th: 13; palm and sole covered by granule-like scales.

Coloration: upper head, neck, and middle part of dorsum covered by smallest spots and few large paled spots (background view), don't form bar; without spots or bars on dorsolaterals and limbs; one narrow stripe between nostril-eye and eye-ear; three moderate spots on snout; a paled and irregular bar on occipital and neck; color of venter is uniform white; palm of digits (hindlimbs and forelimbs) more or less white; pattern of preserved specimen is similar to the live specimen, but has lost color.

Variation (Figs. 7–8)

Heterogeneity of dorsal tubercles occurs in a few areas, mostly on the dorsal body; tubercles converted to simple (not-keeled) and have abnormal shape (e.g., rounded, width, semi), in these parts most dorsal scales converted to granules (small or large); granules cover snout and extend to upper head and neck (all specimens), or onto proximal dorsum (ZFMK 97754 and 28) or onto mid-dorsum (ZFMK 97755), lateral sides of neck strongly covered by granules and tubercles (ZFMK 97756); most specimens have 1–2 tubercles in front of ear, or 4–5 (ZFMK 98573 and ZFMK 97756) or lack tubercles (ZFMK 98577); internasals in four specimens are in contact (ZFMK 98573, ZFMK 98575, ZFMK 97754–55) and in others separated by one (ZFMK 97756, FTHM005029), two (ZFMK 98577) or three (ZFMK 98574) scales; number of postmentals is variable (usually two) between 2–4, asymmetry occurs in some of them; ZFMK 98575 have four PM as follows: 1st PM is large and in contact with 1st and 2nd infralabials, 2nd PM on posterior of 1st PM and in contact with 2nd infralabials, 3rd PM behind 2nd PM and separated from infralabials by one series of scales; 4th PM in contact with 1st and 2nd postmentals; ZFMK 97756 has three postmentals as follows: 1st larger and in contact with 1st and 2nd infralabials, 2nd PM is behind 1st PM and in contact with 2nd infralabials, 3rd PM is behind 2nd PM and separated from infralabials by one series of scales, 10 scales between 2nd postmentals; FTHM005029 has three PM on left and two on right; ZFMK 98574 has three PM on left and two on right; 4–8 whorls of tubercles on proximal half of dorsum of tail (usually six), without tubercles on distal part of tail; limbs and

Table 3. Measurements and scale counts of *Hemidactylus sassanidianus* **sp.n.** (all measurements in mm). Abbreviations: SVL: snout-vent length; TRL: trunk length; TL: tail length; R1: TL/SVL; HL: head length; HW: head width; HH: head height; R2: HL/SVL; R3: HW/HL; R4: HH/HL; OD: orbital diameter; NE: nares to eye distance; IN: internarial distance; IO1: anterior interorbital distance; IO2: posterior interorbital distance; TB: longitudinal tubercle rows; PAP: number of preanal pores; SL (L/R): number of supralabials; IL (L/R): number of infralabial scales; LP1 (L/R): number of lamellae under the first finger of the pes; LP4 (L/R): number of lamellae under the fourth finger of the pes; M: male; F: female; T: total; A: ANOVA test; F: one-way ANOVA *F* value; dF: degrees of freedom; P: probability (following Carranza and Arnold 2012); DM: difference of means; DD: direction of difference.

		SVL	TRL	TL	R1	HL	HW	HH	R2	R3	R4	OD	NE	IN	IO1	IO2	TB	PAP	SLL	SLR	ILL	ILR	LP1L	LP1R	LP4L	LP4R
M	N	5	5	2	2	5	5	5	5	5	5	5	4	5	5	5	4	5	5	5	5	5	5	5	5	5
	Mean	54.7	22.8	72.7	1.35	16.7	10.9	6.90	0.30	0.65	0.41	3.94	4.80	1.56	4.80	6.80	15.7	7.40	11.2	12.0	9.00	8.60	8.00	8.20	12.2	12.4
	SEM	2.44	0.87	6.55	0.10	1.13	0.58	0.52	0.00	0.01	0.01	0.32	0.24	0.16	0.26	0.27	0.25	0.40	0.37	0.31	0.31	0.40	0.54	0.58	0.86	0.92
	Max	63.3	25.9	79.3	1.46	20.6	13.0	8.90	0.31	0.71	0.45	5.00	5.20	2.20	5.70	7.80	16.0	8.00	12.0	13.0	10.0	10.0	9.00	9.00	14.0	14.0
	Min	48.3	20.8	66.2	1.25	13.5	9.70	6.10	0.28	0.61	0.37	3.20	4.10	1.30	4.20	6.20	15.0	6.00	10.0	11.0	8.00	8.00	6.00	6.00	9.00	9.00
	R	15.0	5.10	13.1	0.21	7.10	3.30	2.80	0.03	0.10	0.08	1.80	1.10	0.90	1.50	1.60	1.00	2.00	2.00	2.00	2.00	2.00	3.00	3.00	5.00	5.00
F	N	4	4	1	1	4	4	4	4	4	4	4	4	4	4	4	4		4	4	4	4	4	4	4	4
	Mean	56.4	26.5	67.5	1.23	17.0	10.9	6.65	0.30	0.63	0.38	3.72	5.40	1.45	4.90	6.87	15.2		12.0	12.2	8.50	8.50	9.00	9.00	13.7	13.5
	SEM	0.66	0.74			0.41	0.25	0.29	0.00	0.01	0.01	0.17	0.10	0.11	0.14	0.16	0.47		0.40	0.25	0.28	0.28	0.00	0.00	0.25	0.28
	Max	57.4	28.7	67.5	1.23	17.8	11.7	7.40	0.31	0.66	0.42	4.10	5.70	1.80	5.30	7.10	16.0		13.0	13.0	9.00	9.00	9.00	9.00	14.0	14.0
	Min	54.5	25.4	67.5	1.23	15.9	10.6	6.10	0.29	0.60	0.35	3.30	5.20	1.30	4.60	6.40	14.0		11.0	12.0	8.00	8.00	9.00	9.00	13.0	13.0
	R	2.9	3.3	0.00	0.00	1.90	1.10	1.30	0.02	0.06	0.07	0.80	0.10	0.50	0.70	0.70	2.00		2.00	1.00	1.00	1.00	0.00	0.00	1.00	1.00
T	N	9	9	3	3	9	9	9	9	9	9	9	8	9	9	9	8	5	9	9	9	9	9	9	9	9
	Mean	55.4	24.4	71.0	1.31	16.8	10.9	6.78	0.30	0.64	0.40	3.84	5.10	1.51	4.84	6.83	15.5	7.40	11.5	12.1	8.77	8.55	8.44	8.55	12.8	12.8
	SEM	1.35	0.85	4.16	0.07	0.62	0.32	0.30	0.00	0.01	0.01	0.18	0.16	0.10	0.15	0.16	0.26	0.40	0.29	0.20	0.22	0.24	0.33	0.33	0.53	0.53
	Max	63.3	28.7	79.3	1.46	20.6	13.0	8.90	0.31	0.71	0.45	5.00	5.70	2.20	5.70	7.80	16.0	8.00	13.0	13.0	10.0	10.0	9.00	9.00	14.0	14.0
	Min	48.3	20.8	66.2	1.23	13.5	9.70	6.10	0.28	0.60	0.35	3.20	4.10	1.30	4.20	6.20	14.0	6.00	10.0	11.0	8.00	8.00	6.00	6.00	9.00	9.00
	R	15.00	7.90	13.1	0.23	7.10	3.30	2.80	0.03	0.11	0.10	1.80	1.60	0.90	1.50	1.60	2.00	2.00	3.00	2.00	2.00	2.00	3.00	3.00	5.00	5.00
A	F	0.38	9.59	0.21	0.47	0.07	0.00	0.14	0.00	0.49	1.45	0.29	4.90	0.26	0.09	0.04	0.85		2.07	0.35	1.29	0.03	2.59	1.46	2.40	1.03
	dF	7	7	1	1	7	7	7	7	7	7	7	6	7	7	7	6		7	7	7	7	7	7	7	7
	P	0.55	0.01	0.72	0.61	0.78	0.94	0.71	1.00	0.50	0.26	0.60	0.06	0.62	0.77	0.83	0.39		0.19	0.57	0.29	0.85	0.15	0.26	0.16	0.34
	DM	1.75	3.68	5.25	0.12	0.37	0.05	0.25	0.00	0.01	0.02	0.21	0.60	0.11	0.10	0.07	0.50	7.40	0.80	0.25	0.50	0.10	1.00	0.80	1.55	1.10
	DD	M < F	M < F	M > F	M > F	M < F	M = F	M > F	M = F	M > F	M > F	M > F	M < F	M > F	M < F	M < F	M > F	M > F	M < F	M < F	M > F	M > F	M < F	M < F	M < F	M < F

Fig. 9. Type locality of *Hemidactylus sassanidianus* **sp.n.**, Tangestan, Bushehr, southern Iran.

dorsolaterals are uniformly without pattern, pattern only present on middle part of dorsum (longitudinal) of all specimens, various patterns are visible on dorsum such as: spots (small or large), bars (irregular and regular); ZFMK 98574: 1st bar is full and wide, 2nd as well as 3rd are X-shaped, and usually 4th bar as well; ZFMK 98575: narrow longitudinal stripe on middle part of dorsum, two bars (usually X-shaped) on neck; FTHM005029: six bars on dorsum, five regular and one irregular, one irregular bar on neck; FTHM005029: one longitudinal stripe from neck to tail; upper head and between eyes of most specimens covered by small spots. More data on the variations are shown in Table 3.

Sexual dimorphism is evident. In general, 12 characters are larger in females and 11 characters larger in males. Females (26.5 ± 0.74) have significantly (P = 0.01, f = 9.59) larger trunk length than males (22.8 ± 0.87), as the result of fecundity selection (e.g., Andersson 1994; Torki 2012), and females have a larger trunk for the development of two large eggs. The lamellae in females (1st: 9; 4th: 13.7) number more than in males (1st: 8; 4th: 12.2), which may be the result of natural selection, because during development of the two large eggs females must have more ability to move (Torki 2012); also, females have minimal variability of number of lamellae (1st: 0; 4th: 1) in contrast to males (1st: 3; 4th: 5); greater number lamellae and minimal variability in females are important positive results of natural selection for survival of *H. sassanidianus* **sp.n.** under natural conditions (personal assumption of author). In general, all characters (except dorsal tubercles rows), especially body size (range: males: 15; females: 2.9) have more variability in males. More data on the dimorphism and variability are shown in Table 3.

Habitat and Ecology (Fig. 9)

The Tangestan region is at the end of the southern part of the Zagros Mountains, and has palm trees. *Hemidactylus sassanidianus* **sp.n.** is distributed in a mountainous area. This mountain is one of the Zagros Mountains and its structure is sedimentary. Shelter sites of the new *Hemidactylus* species are limited to the clefts and caves in this mountain, with many specimens found and collected in one cave in this locality. This cave is deep—the author was able to reach a depth of more than 50 m, though the depth of this cave is said to be even more than 200 m. This cave is an important habitat for this new *Hemidactylus* and the largest population was seen only in this cave. Other species of gecko were also seen in this cave, such as *Asaccus tangestanensis*. Of the three new species described here, only *H. sassanidianus* **sp.n.** was seen in this cave, but *H. sassanidianus* **sp.n.** was not seen outside of the cave or elsewhere in the entire region. This cave probably opens into other regions, and further investigation of this cave is needed. This cave is dark during both day and night. Conditions inside the cave are moist, in contrast to the conditions outside the cave.

Distribution

Hemidactylus sassanidianus **sp.n.** is distributed only at the type locality, in Khaiiz, Tangestan City, Bushehr Province, southern Iran. The type locality is situated at the end of the southern Zagros Mountains, approximately 150 km from the Persian Gulf.

Sympatric Lizards and Snakes

Several lizard and snake species were observed in the type locality, including *Asaccus tangestanensis, Laudakia nupta, Trapelus agilis*, *Tropiocolotes persicus, Coluber* (*sensu lato*) sp., *Macrovipera lebetina*, and *Echis carinatus*.

Etymology

The species name "*sassanidianus*" refers to "The Sasanian Empire," also known as Sassanian, Sasanid, Sassanid or Neo-Persian Empire, which was known to its inhabitants as Ērānshahr in the Middle Persian language.

Comparisons

Hemidactylus sassanidianus **sp.n.** differs from *H. persicus* (based on original description by Anderon 1872) by: (1) Dorsal tubercles in *H. sassanidianus* **sp.n.** are not strongly keeled and in some parts tubercles are not keeled, in contrast they are strongly keeled in *H.*

Table 4. Sexual dimorphism among *Hemidactylus persicus*, *H. sassanidianus* **sp.n.**, and *H. achaemenidicus* **sp.n.** Abbreviations: HL: head length; HW: head width; HH: head height; IO1: anterior interorbital distance; IO2: posterior interorbital distance; SL: number of supralabial; IL: number of infralabial scales (all data are means). F: female, M: male, sig: significant (Carranza and Arnold 2012).

Characters	Sex	HL	HW	HH	IO1	IO2	SL	IL	HL/ SVL	HW/ HL	HH/ HL
H. persicus	M	14.6	11.8	7.2	5.4	7.4	11.6	9.1	0.24	0.81	0.49
	F	12.4	9.7	6	4.6	6	10.8	10	0.24	0.78	0.49
	sig.	0.03	0.02	0.03	0.03	0.01	0.03	0.01	0.49	0.46	0.87
		M > F	M > F	M > F	M > F	M > F	M > F	M < F	M = F	M > F	M = F
H. sassanidianus **sp.n.**	M	16.7	10.9	6.9	4.8	6.8	11.6	8.8	0.30	0.65	0.41
	F	17.0	10.9	6.6	4.9	6.8	12.1	8.5	0.30	0.63	0.38
	sig.	0.78	0.94	0.71	0.77	0.83	0.19	0.29	1.00	0.50	0.26
		M < F	M = F	M = F	M < F	M = F	M < F	M > F	M = F	M > F	M > F
H. achaemenidicus **sp.n.**	M	10.9	6.91	4.68	3.32	4.70	9.57	7.92	0.29	0.62	0.42
	F	9.95	6.30	4.25	2.90	4.22	9.50	7.75	0.29	0.62	0.42
	sig.	0.08	0.15	0.18	0.06	0.03	0.80	0.24	0.81	0.98	0.88
		M > F	M > F	M > F	M > F	M > F	M > F	M > F	M = F	M = F	M = F

persicus. (2) Heterogeneity of dorsal tubercles occurred in all specimens of *H. sassanidianus* **sp.n.**, in contrast to original description of *H. persicus*. (3) Size of tubercles in *H. sassanidianus* **sp.n.** is smaller than *H. persicus*, about 0.4 of ear opening vs. 0.5 ear opening. (4) Five or six tubercles in each row of the tail in *H. sassanidianus* **sp.n.**, and in contrast *H. persicus* have seven tubercles in each row of the tail. (5) Dorsal body of *H. sassanidianus* **sp.n.** covered by spots (not bars), in contrast dorsal body in *H. persicus* is covered by transverse narrow band. More differences between *H. sassanidianus* **sp.n.** and *H. persicus* (based on original description and Anderson 1999): (6) *H. persicus* only has two postmentals (in all populations; there are no records in the literature), in contrast *H. sassanidianus* **sp.n.** has 2–4 postmentals. (7) In Anderson's work on *H. persicus* inhabiting Iran, he reported 9–11 preanal pores, which is clearly more than *H. sassanidianus* **sp.n.** (6–8). (8) Tail sharp in *H. sassanidianus* **sp.n.**, and not sharp in *H. persicus*. Additional differences with *H. persicus* include: number of postmentals (2–4 vs. 2), mental trihedral (vs. pentagonal); relatively fewer precloacal pores in males (6–8 vs. 9–11); number of lamellae under the first digit of the pes (6–9 vs. 8–9); body size of *H. sassanidianus* **sp.n.** males (54.7) smaller than females (56.4), this is in contrast to *H. persicus* (males: 59; females: 51.4); head longer (HL/SVL: 0.3 vs. 0.24), elongated (HW/HL: 0.64 vs. 0.8), and more flattened (HH/HL: 0.4 vs. 0.49) [Carranza and Arnold 2012]; sexual dimorphism in head size (HL, HW, and HD) occurs for *H. persicus* (males significantly larger than females), this is in contrast to *H. sassanidianus* **sp.n.**, and this is true for more characters (Table 4). Easily differentiated from *H. romeshkanicus* by number of precloacal pores (6–8 vs. 12), other differences: smaller body size, number of supralabials, and dorsal tubercle shape (not trihedral vs. enlarged trihedral). It is different from *H. robustus* by larger body size in both sexes combined (48–63 vs. 32–50) and in males (54.7 vs. 41.8) and females (56.4 vs. 43.6); more lamellae under the 1st (8.5 vs. 6.1) and 4th (12.8 vs. 10.1) digits of the pes; more supralabials (11.8 vs. 9.4); and greater number of precloacal pores (7.4 vs. 6.1) [Carranza and Arnold 2012; Šmíd et al. 2013a, 2015] (Table 2). Different from *H. achaemenidicus* **sp.n.** by larger body size (48–63 vs. 28–39), tail, dorsal tubercle rows, number of lamellae under digits of pes, labials, and postmentals (see Table 2). Different from *H. flaviviridis* by presence of dorsal tubercles and without femoral pores. More comparisons are shown in Table 2.

In this section *H. sassanidianus* **sp.n.** is briefly compared with other *Hemidactylus* species outside of Iran. Different from *H. dawudazraqi* and *H. shihraensis* by body size (48–63 vs. 40–49 and less than 49, respectively). Different from *H. asirensis* by larger body size (48.3–63.3 mm vs. 43–48.5 in males, 54.5–57.4 mm vs. 38.3–51.1 in females) and HL/SVL (28–31% vs. 23–28%). Different from *H. alfarraji* by precloacal pores (6–8 vs. 4) [Šmíd et al. 2016]. Different from *H. kurdicus* by postmentals (2–4 vs. 1) [Safaei-Mahroo et al. 2017]. Different from *H. lavadeserticus* by enlarged keeled tubercles on back (vs. not so enlarged). Different from *H. foudaii* by precloacal pores (6–8 vs. 9) and well developed dorsal and tail tubercles (vs. less developed and protuberant dorsal, and particularly, tail tubercles). Different from *H. homoeolepis*, *H. masirahensis*, and *H. paucituberculatus* by having keeled tubercles on dorsum (vs. without tubercles on dorsum). Different from *H. inexpectatus*, *H. endophis*, *H. hajarensis*, *H. yerburii*, *H. shugraensis*, *H. yerburii yerburii*, *H. montanus*, *H. awashensis H. minutus*, *H. homoeolepis*, *H. mindiae*, *H. lemurinus*, and *H. granosus* by number of precloacal pores (6–8 vs. 4, 14, 4–6, 12.8, 5, 13.7, 11.2, 4.5, 5.8, 4.3, 4, 6, 5.6, respectively) [Šmíd et al. 2013a, 2015, 2016; Vasconcelos and Carranza 2014; Carranza and Arnold 2012]. Different from *H. luqueorum* and *H. homoeolepis* by body size (55.4 vs. 76.8, 31.8) [Carranza and Arnold 2012]. Different from *H. turcicus* by postmentals (2–4 vs. 2), more longitudinal tubercles on dorsum (15.5 vs.

Fig. 10. Dorsal and ventral view of **(a, b)** holotype and **(c, d)** paratype specimens of *H. pseudoromeshkanicus* **sp.n.**

13.8), more lamellae under the 1st (8.5 vs. 6.5) and 4th (12.8 vs. 9.7) digits of the pes, and more supralabials (11.8 vs. 8.2) and infralabials (8.6 vs. 6.7) [Šmíd et al. 2013a]. Different from *H. sinaitus* by larger body size in males (54.7 vs. 39.5) and females (56.4 vs. 45.6), more lamellae under the 1st (8.5 vs. 5.7) and 4th (12.8 vs. 9.7) digits of the pes, and more supralabials (11.8 vs. 8.7) [Carranza and Arnold 2012]. Different from *H. jumailiae* by more supralabials (11.8 vs. 9.8), more lamellae under the 1st (8.5 vs. 6.9) and 4th (12.8 vs. 10.9) digits of the pes (Šmíd et al. 2013a). Different from *H. festivus*, *H. alkiyumii*, and *H. saba* by more longitudinal tubercles on dorsum (15.5 vs. 13.3, 12.9, 14) [Šmíd et al. 2013a; Carranza and Arnold 2012]. Different from *H. ulii*, *H. mandebensis*, and *H. adensis* by larger body size in males (54.7 vs. 38.6, 41.5, 34) and females (56.4 vs. 40.1, 35, 36.7), and more longitudinal tubercles on dorsum (15.5 vs. 14.1, 13.3, 14) [Šmíd et al. 2013]. Different from *H. lemurinus*, *H. masirahensis*, *H. inexpectatus*, *H. paucituberculatus*, *H. homoeolepis*, *H. leschenaultii*, and *H. flaviviridis* by having numerous enlarged tubercles on upper surface of body (vs. no enlarged tubercles on upper surface of body).

***Hemidactylus pseudoromeshkanicus* sp.n.** (Figs. 10–12)

urn:lsid:zoobank.org:act:ACECB18C-9C39-4270-A404-BCD88DFCAA52

Holotype

ZFMK 98578, adult male, collected on the western slope of central Zagros Mountains, Kole-Saat region Andimeshk, Khuzestan Province, western Iran on 14 June 2010 (32º52'N, 48º43'E, altitude 607 m asl) by Farhang Torki.

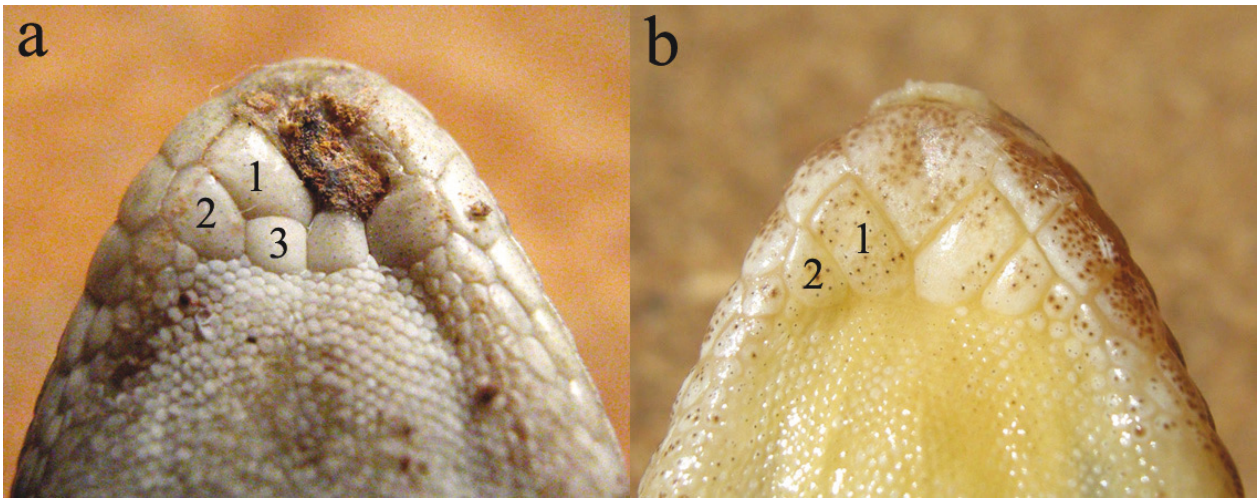

Fig. 11. Comparison of postmentals (PM). **(a)** Three well developed PM in *H. romeshkanicus* (Holotype, ZMB 75020) and **(b)** two postmentals of *H. pseudoromeshkanicus* **sp.n.** (Paratype, ZFMK 97757).

Paratype

ZFMK 97757, adult female, same data as for holotype.

Diagnosis

A medium sized *Hemidactylus*, snout-vent length at least 74 mm; tubercles distributed all over the dorsum (except for arms); back with enlarged trihedral keeled tubercles; granules (rather than scales) cover head and extend to neck, and rarely to forelimbs; without femoral pores; precloacal pores present; tubercular heterogeneity present on dorsum (proximal and distal parts), limbs, neck, head, and dorsolateral; six tubercles in all whorls of tail; two postmentals; more lamellae under fingers; subcaudal scale enlarged; ventral scales not imbricate, and the ends of ventral scales are simple (cycloid at mid-part; weakly denticulate at distal and proximal parts of ventral); enlarged scansors beneath fingers, scansors are mostly divided, terminal scansor is single; intermixed color pattern on dorsal body; sexual dichromatism (in both dorsal and ventral body) occurs between male (holotype) and female (paratype).

Description of Holotype (Fig. 10a–b)

Measurements (in mm): body size: 75.2; tail length: 88.7; interlimbs: 30.8; head width: 15.2; head length: 23.4; head depth: 8.7; eye-eye: 8.8; ear opening: 3.2; eye diameter: 5.4; forelimbs length: 29.9; hind limbs length: 33.3.

Body depressed; body, as well as head flattened; tail more or less flattened; head triangular-shaped; two postmentals, the first postmentals are enlarged and are in contact, the 2nd postmentals behind the 1st enlarged postmentals; the 1st postmentals are in contact with the 1st infralabials, the 2nd postmentals are in contact with the 1st and the 2nd infralabials, nine scales between 2nd postmentals; infralabials: nine; supralabials: 11; nostril surrounded by five scales (the 1st infralabial, rostral, three postnasals); nasals not in contact and separated by one small scale; ear openings are falcate-shaped, and horizontal; 19 scales between nostril and eye; 20 scales between eye and ear; rostrum covered by large granules; between eyes covered by small granules, and small tubercles (simple and rarely pointed) distributed among them; upper head covered by smallest granules and small pointed tubercles distributed among them; tubercles above ears pointed; tubercles on occipital mostly pointed and less keeled (heterogeneous); tubercles on neck pointed and keeled (heterogeneous); from rostrum to neck covered by granules; tubercles distributed on dorsum, head, and limbs; tubercles not found on arms; most body tubercles are keeled; dorsal tubercles are enlarged, mostly trihedral and strongly keeled, some of them pointed especially between limbs (cross view); keeled tubercles between hindlimbs (cross view: proximal dorsum) intermixed with small and moderate pointed tubercles, tubercles heterogeneous (small, large, keeled, pointed, simple) obvious on distal dorsum (near tail); tubercles on femur mostly trihedral and keeled (mostly scale-like, different from tubercles on dorsum); tubercles on forearm are keeled (scale-shape, different shape from tubercles on dorsum), pointed and simple (heterogeneous in size and shape); size of the forearm tubercles smaller than hindlimb tubercles; scales on palm and sole are granule-like; 16 regular rows of tubercles on back; 11–13 small tubercles (simple or pointed) between interorbits; 23 enlarged interlimb tubercles; 16–17 scales surround each dorsal tubercle; 4–5 scales between dorsal tubercles; tail is original; 53 enlarged imbricate scales on subcaudal; last part of tail cycloid-shape and covered by raised scales; 22 crossbars on dorsum of tail, 1–3 crossbars are irregular and other crossbars are regular; tubercle whorls only found in first part of tail, five scales between each whorl, six tubercles in 1st whorl, six tubercles in the 2nd, six tubercles in 3rd, and six tubercles in the 4th whorl, after the 5th whorl tubercles become very small (six in each whorl); ventral scales are not imbricate and their size at mid-body are larger than in other regions, the ends of ventral scales are

Fig. 12. Type locality of *H. pseudoromeshkanicus* **sp.n.** in Kole-Saat, Andimeshk, Khuzestan province.

simple (mostly cycloid, not denticulate); 12 precloacal pores; without any femoral pores; enlarged scansors are plate-like, terminal scansor is unique (not paired); 1st scansor in most fingers is unique; lamellae on fingers as follows: 1st: 11 (1–3 undivided), 2nd: 11, 3rd: 12, 4th: 13, 5th: 13 (1–3 undivided); lamellae on pes as follows: 1st: 11 (1–3 undivided), 2nd: 12, 3rd: 13, 4th: 15, 5th: 15; claws in front of scansors; palm and sole covered by granule-like scales.

Coloration: irregular grayish pattern covers most of dorsum extending onto dorsolaterals; occipital covered by one spotted-bar that extends into eyes; snout is light grayish; neck region covered by one great grayish spotted-bar; forearm covered by small gray spots; hindlimbs covered by light irregular bars that are in contact with one another; proximal tail covered by irregular bars that are in contact together, black bars cover distal tail; arm is without spots; dorsal view of hindlimb digits darker than forelimb digits; chin is yellowish and light red; color of ventrum more or less yellowish, without any spots or bars; palms of digits (hindlimbs and forelimbs) are ashy. Pattern is similar to the live specimen and all spots and bars are obvious in preserved specimens; the preserved specimen is colorless.

Description of Paratype (Figs. 2c–d, 11b)

Measurements (in mm): body size: 74.2; tail length: not original; interlimbs: 31.7; head width: 14.6; head length: 22.8; head depth: 9.1; eye-eye: 9.8; ear opening: 3.2; eye diameter: 5.1; forelimbs length: 27.4; hind limbs length: 32.4.

Most data are similar to holotype, but some small differences as follows: 11 scales between 2nd postmentals; between eyes covered by small granules, and small tubercles (simple, pointed, and rarely keeled) distributed among them; upper head covered by smallest granules and small pointed (rarely keeled) tubercles distributed among them; tubercles on neck are less pointed and mostly keeled (heterogeneous); 17 regular rows of tubercles on back; 18 enlarged tubercles between fore- and hindlimbs; 16–18 scales surround each dorsum tubercle; tail is missing (most part), zigzag form (without any crossbars), tubercle whorls only found in first part of tail, six tubercles in all whorls, 6–7 scales between each whorl, whorl tubercles distinct by 1–3 scales; ventral scales are not imbricate and their sizes at mid-body are larger than in other regions, the ends of ventral scales are simple (cycloid at mid-part; weakly denticulate at distal and proximal parts of ventral); without precloacal pores; without any femoral pores; enlarged scansors are plate-like, terminal scansor is unique (not paired); first scansors of most fingers are unique; lamellae on fingers as follows: 1st and 2nd: 11, 3rd: 12, 4th and 5th: 13; lamellae on pes as follows: 1st: 11, 2nd: 13, 3rd: 14, 4th and 5th: 15.

Color pattern: intermixed irregular (in contact) black and grayish pattern covers most parts of dorsum that extend onto dorsolaterals; bar and inter-bar cover proximal and distal dorsum; an irregular black stripe extends to eyes; neck region covered by one great black bar; one narrow black stripe between eyes and nostrils; one wide black stripe between eye and ear which extends to occipital region; forearm covered by small gray spots, hindlimbs covered by irregular bars that are in contact with one another; tail covered by irregular bars that are in contact (without crossbar on tail); arm is without spots; in dorsal view hindlimb digits strongly darker than forelimb digits; chin is yellowish, color of ventrum is light, without any spots or bars; palms of digits (hindlimbs and forelimbs) are white or less ashy. Pattern is similar to the live specimen and all spots and bands are obvious in preserved specimen. The preserved specimen is colorless.

Habitat and Ecology (Fig. 12)

Specimens belonging to *Hemidactylus pseudoromeshkanicus* **sp.n.** were collected from the Kol-e-Saat region, Andimeshk, Khuzestan province. Kol-e-Saat Region is located between Lorestan-Khuzestan Provinces and has warm climatic conditions; it is located between the central Zagros Mountains and Khuzestan Plain. Oak (*Quercus brantii*) forest is distributed in the mountains of this region. The new *Hemidactylus* specimens show nocturnal activity, and feed on small insects and insect larvae occurring in the habitat. Individuals of the new species actively climb on rocks, and specimens were collected on rocks during the middle of the night.

Distribution

Presently, this new species is only recorded from the type locality at Kol-e-Saat region, Andimeshk, Khuzestan Province, Iran. In spite of several field trips to areas adjacent to the type locality, no specimens belonging to this new taxon were found. But based on geomorphological patterns of the folded mountains of the western slope of Zagros Mountains, the main distribution of *H. pseudoromeshkanicus* **sp.n.** is expected to extend towards the mountains of northern Khuzestan province.

Sympatric Lizards and Snakes

From the type locality the following additional reptile species were recorded: *Asaccus nasrullahi*, *Cyrtopodion scabrum*, and *Pseudocerastes fieldi*.

Etymology

The name "*pseudoromeshkanicus*" is an allusion to its similarity to *H. romeshkanicus*. The color pattern of this new species appears similar to *H. romeshkanicus*, but morphological characters do not match this species, therefore the prefix "*pseudo*" is used for the new species.

Comparison with *Hemidactylus romeshkanicus*

Hemidactylus pseudoromeshkanicus **sp.n.** is significantly different from *H. romeshkanicus* by several characters as follows: two postmentals (instead of three developed in *H. romeshkanicus*, Fig. 11); *H. pseudoromeshkanicus* **sp.n.** has more lamellae under 4th digit of pes (13 instead of nine), 1st digit (11 instead of eight), and 4th digit (15 instead of 12) than *H. romeshkanicus* (which is slightly true for other fingers); whorl tubercles on tail (number, size, and arrangement) as follows: number of tubercles in each whorl in *H. pseudoromeshkanicus* **sp.n.** from 1st to 4th is unique (6-6-6-6), in contrast in *H. romeshkanicus* decreasing number of tubercles from 1st to 4th whorl (7-6-5-4), scales between each whorl in *H. pseudoromeshkanicus* **sp.n.** more than *H. romeshkanicus* (5–7 instead of four); supralabials in *H. pseudoromeshkanicus* **sp.n.** significantly less than *H. romeshkanicus* (11 instead of 15); tubercle rugosity (in general) on dorsum of body of *H. romeshkanicus* is stronger than *H. pseudoromeshkanicus* **sp.n.** (one significant example: three views of trihedral tubercles show rugosity, that rarely occurs for *H. pseudoromeshkanicus* **sp.n.**), tubercular heterogeneity (small and large trihedral, pointed) occurs on proximal and distal part of dorsum of *H. pseudoromeshkanicus* **sp.n.**, in contrast to *H. romeshkanicus*. Nasals separated by one small scale in *H. pseudoromeshkanicus* **sp.n.**, in contrast, one large scale separates nasals in *H. romeshkanicus*.

Comparisons with other *Hemidactylus*

In general, *H. pseudoromeshkanicus* **sp.n.** is significantly different from *H. robustus*, *H. persicus*, *H. sassanidianus* **sp.n.**, and *H. achaemenidicus* **sp.n.** by having mostly enlarged trihedral tubercles on dorsal body. Differs from *H. robustus* in body size (than less 50 vs. at least 74 mm) and tail with more precloacal pores (12 vs. 6–8), tail tuberculation (keeled and raised instead pointed), and different dorsal color patterns (irregular bands vs. spotted). Differs from *H. persicus* by larger body size and stronger tubercle rugosity on entire dorsal body and limbs, head shape and size, and dorsal tubercle rows (Table 2). Differs from *H. flaviviridis* by having enlarged tubercles on dorsum, and without femoral pores. For more comparisons see Table 2. Differs from *H. sassanidianus* **sp.n.** and *H. achaemenidicus* **sp.n.** by having more precloacal pores (12 vs. 6–8, 6–8, respectively), larger body size, tail with more dorsal tubercle rows, dorsal tubercle shape and size (more rugosity and larger in size for *H. pseudoromeshkanicus* **sp.n.**), and more lamellae under fingers (Table 2).

Brief comparisons show differences of *H. pseudoromeshkanicus* **sp.n.** from other *Hemidactylus* spp. outside of Iran. Differs from *H. dawudazraqi*, *H. hajarensis*, *H. homoeolepis*, *H. jumailiae*, *H. shihraensis*, *H. alfarraji*, *H. asirensis*, and *H. foudaii* by precloacal pores (12 vs. 6–8, 4–6, 3–6, 6–9, 6, 4, 6, 8–10, respectively). Differs from *H. kurdicus* by postmentals (2 vs. 1) and precloacal pores (12 vs. 10) [Safaei-Mahroo et al. 2017]. Differs from *H. montanus* by more lamellae beneath 4th digit of pes (15 vs. 9–12). Differs from *H. endophis* by large body size (74–75 vs. 59), strongly keeled dorsal tubercles (vs. relatively weakly keeled), and without femoral pores (vs. 14 pores). Differs from *H. lemurinus* by presence of well-developed dorsal tubercles (vs. none). Differs from *H. luqueorum*, *H. festivus*, *H. paucituberculatus*, *H. lavadeserticus*, *H. masirahensis*, and *H. inexpectatus* by more precloacal pores (12 vs. 5–6, 6, 6, 6, 4, and 4, respectively). Differs from *H. turcicus* by larger body size and tail, more lamellae beneath 4th digit of pes (13 vs. 8–11), more precloacal pores (12 vs. 6–10), stronger tubercular rugosity, and different body color patterns. Differs from *H. mindiae*, *H. granosus*, *H. mandebensis*, *H. awashensis*, *H. adensis*, *H. minutus*, *H. ulii*, *H. saba*, *H. jumailiae*, and *H. yerburii*, by having larger body size. Differs from *H. alkiyumii* by having more rows of tubercles (16–17 vs. 11–14), more lamellae under the 4th digit of pes (15 vs. 10–12), and more precloacal pores (12 vs. 6–10). Body size in *H. pseudoromeshkanicus* **sp.n.** is smaller than in *H. aaronbaueri*, dorsal tubercles in *H. pseudoromeshkanicus* **sp.n.** are much larger than in *H. aaronbaueri*; also, color pattern is different from *H. aaronbaueri*. By having enlarged, trihedral, and regular dorsal tubercles *H. pseudoromeshkanicus* **sp.n.** is easily distinguished from several species of *Hemidactylus* including: *H. aaronbaueri*, *H. bowringii*, *H. brookii*, *H. flaviviridis*, *H. garnotii*, *H. karenorum*, *H. leschenaultii*, *H. maculatus*, *H. persicus*, *H. prashad*, *H. subtriedrus*, and *H. triedrus*. Digits are relatively slender in *H. scabriceps*, but in *H. pseudoromeshkanicus* **sp.n.** they are broadly dilated. *H. sinaitus* (from Sudan to Northern Somalia, and Arabia) has smaller and more widely separated dorsal tubercles, but *H. pseudoromeshkanicus* **sp.n.** has mostly trihedral tubercles.

Note on *Hemidactylus* Inhabitants from Iran

Hemidactylus inhabitants of the Iranian plateau have a complicated history. Anderson (1999) reported three *Hemidactylus* (*H. flaviviridis*, *H. persicus*, and *H. turcicus*) from Iran. Anderson (1974) had recorded *H. garnotii* in the fauna of Iran, but in 1999 he excluded

it from Iran due to incomplete data from I. Darevsky; and he then diagnosed this species as *H. flaviviridis* (Anderson 1999). Anderson collected some *Hemidactylus* sp. specimens from southwest Iran that do not to match *H. flaviviridis*, *H. persicus*, or *H. turcicus* (Anderson 1999). Anderson was concerned that *H. brookii* might be distributed in southern Iran, but this species has not been collected inside Iran. Therefore, based on Anderson's studies (1999), four species occur in Iran: *H. flaviviridis*, *H. persicus*, *H. turcicus*, and *Hemidactylus* sp. A molecular study (Bauer et al. 2006a) confirmed the distribution of *H. robustus* in southwestern Iran; and, little difference exists between *H. robustus* from Iran on the one hand and from the United Arab Emirates and Egypt on the other. Firouz (2000) has cited *H. flaviviridis*, *H. persicus*, and *H. turcicus* for the fauna of Iran. Torki et al. (2011) showed five *Hemidactylus* species to occur in Iran, viz: *H. flaviviridis*, *H. persicus*, *H. turcicus*, *H. robustus*, and *H. romeshkanicus*. Due to this author's revision of the gecko fauna of Iran (2016–2020 FTE program), one previous occurrence of *Hemidactylus* was identified as *H. turcicus* (FTHM005100–5110 in Torki et al. 2011); however, new morphological evidence shows that it is completely different from *H. turcicus* as well as from *H. robustus*. As described here, this population (*H. achaemenidicus* **sp.n.**) shows differences in important taxonomic characters from other *Hemidactylus* species both inside and outside of Iran (as well as the arid clade). Hosseinzadeh et al. (2014) worked on the morphology of *Hemidactylus* species of Iran, and their work showed four *Hemidactylus* species from Iran: *H. flaviviridis*, *H. persicus*, *H. robustus*, and *H. romeshkanicus*, as they rejected *H. turcicus* from the Iranian gecko fauna. Based on recent phylogenetic studies on *Hemidactylus*, particularly *H. turcicus* and *H. robustus* (Carranza and Arnold 2012; Šmíd et al. 2013b, 2015), I suggest that the *H. robustus* specimens which were examined by Hosseinzadeh et al. (2014) do match with both *H. turcicus* and *H. robustus*. They do not show the important taxonomical characters that are important for diagnosis of *H. turcicus* and *H. robustus* from several of those populations.

Based on recent molecular studies (Carranza and Arnold 2012; Šmíd et al. 2013b, 2015), *H. persicus* from Iran shows characteristics of being a separate clade from Arabian *Hemidactylus*. This clade shows three distinguishable species, and one of them (FTHM005110) is the new *Hemidactylus achaemenidicus* **sp.n.** described here. The locality of FTHM005110 cited in that phylogenetic study is incorrect and must be changed to the type locality of *H. achaemenidicus* **sp.n.** given here. On the other hand, three specimens of *H. persicus* (JS103–5) among the Iranian *persicus* clade (Šmíd et al. 2013) showed more differences from other *H. persicus*, but the localities of these specimens were not cited in that paper, and are nearest to the type locality of *H. sassanidianus* **sp.n.** (see Fig. 4 in Šmíd et al. 2013). On the other hand, *H. robustus* from the coastal Persian Gulf (Bandar-e-Lenge) is a match with the Arabian *H. robustus* clade (Šmíd et al. 2013b, 2015). The oldest reported dispersal from Arabia occurred 13.1 Ma, when the ancestor of *H. persicus* colonized Iran (Šmíd et al. 2013b). This time-frame (13.1 Ma) is perfect for speciation among the *Hemidactylus* inhabiting the Iranian plateau as well as the Zagros Fold-Thrust Belt. A few collections from the southern part of Iran (mostly coastal Persian Gulf) show three clades in the phylogenetic tree of Šmíd et al. (2013b). Based on the distribution of *Hemidactylus* inside the Iranian plateau, here I suggest that *Hemidactylus* has several monophyletic clades as well as more species which remain unknown.

Although some works **exclude** *H. turcicus* (e.g., Hosseinzadeh et al. 2014, Šmíd et al. 2014) from the fauna of Iran, Šmíd et al. (2014) did not explicitly **reject** *H. turcicus* from Iran (see Map 46), and Šmíd et al. concluded that *H. turcicus* is not distributed in Iran. I disagree with those assessments, and do not exclude this widespread species from the fauna of Iran until more comprehensive data about the *Hemidactylus* inhabiting Iran (especially from phylogenetic studies) are available. One important reason supporting the acceptability of *H. turcicus* for the fauna of the Iranian Plateau is its wide distribution in adjacent areas to the west (e.g., Turkey) and east (e.g., Pakistan) of Iran (e.g., Turgay and Atat 1994; Khan 2006).

Bauer et al. (2006a) identified all populations of small *Hemidactylus* as a *H. robustus*. Some authors (e.g., Gholamifard and Rastegar-Pouyani 2011; Hosseinzadeh et al. 2014) followed that assessment. Based on phylogenetic analysis, *H. achaemenidicus* **sp.n.** is completely distinguishable from *H. robustus* (e.g., Šmíd et al. 2013, 2015). Therefore, there are at least three distinct species of small *Hemidactylus* in Iran including: *H. robustus*, *H. turcicus*, and *H. achaemenidicus* **sp.n.**

Based on all the studies cited above, all *Hemidactylus* species of Iran (except *H. flaviviridis*) show much complexity and I classify them here in three groups as follows: *H. persicus*-complex (including *H. persicus*, *H. sassanidianus* **sp.n.**, and *H. achaemenidicus* **sp.n.**); *H. robustus*-complex; and *H. romeshkanicus*-complex (*H. romeshkanicus* and *H. pseudoromeshkanicus* **sp.n.**).

In summary, at least eight species of *Hemidactylus* are distributed on the Iranian Plateau: *H. flaviviridis*, *H. persicus*, *H. robustus*, *H. turcicus*, *H. romeshkanicus*, *H. sassanidianus* **sp.n.**, *H. achaemenidicus* **sp.n.**, and *H. pseudoromeshkanicus* **sp.n.**

Note on *Hemidactylus parkeri* Loveridge 1936

H. parkeri was described by Loveridge (1936), but this species was downgraded or rejected from subsequent species lists of *Hemidactylus* (e.g., Arnold 1980; Šmíd et al. 2015) and replaced by *H. turcicus* and *H. robustus*. Based on the following reasons, I do not agree with

this decision. (i) Type locality: The type locality of *H. parkeri* is very far from the type localities of *H. turcicus* (Asiatic Turkey, by Moravec et al. 2011) and *H. robustus* ("Egypten, Arabien, und Abyssinien" restricted to "the Red Sea coast of the State of Eritrea" by Šmíd et al. 2015). (ii) Ecology and climate: Loveridge (1936) described his new species in Zanzibar Island (Tanzania), and this island may have an important role in the speciation of these geckos. Additionally, Zanzibar Island is located near the equator, with special ecological and climatic conditions; and the ecological and climatic conditions of the type locality of *H. parkeri* are completely different from the type localities of *H. turcicus* and *H. robustus*. (iii) New methods and insights: Based on phylogenetic studies, most *Hemidactylus* species described long ago have been split into several species, such as *H. persicus*, *H. yerburii*, *H. turcicus*, and *H. robustus* (e.g., Carranza and Arnold 2012; Šmíd et al. 2013, 2015). Therefore, additional phylogenetic studies on the equatorial *Hemidactylus* species are necessary to resolve this problem. (iv) Six species of *Hemidactylus* are distributed in Tanzania, and *H. parkeri* is not synonymous with all of them (Uetz 2019). On the other hand, only one species is endemic to Tanzania (*H. tanganicus*). Based on the above reasons, there is not a logical and scientific basis for the rejection of *H. parkeri*. Therefore, in this study I am in agreement with Lazza (1978, 1983) on the validity of *H. parkeri*.

Note on Gecko Conservation in Iran

Based on observations during 20 years, two main threats for the geckos of Iran are apparent: (i) Rumor: People in this region believe that geckos are poisonous and fear them, especially in cities and less so in villages. This rumor applies to all geckos inhabiting human homes. (ii) Trade: Among geckos, the fat-tailed gecko (*Eublepharis*) is an important species that is sold. *Eublepharis* is considered attractive and some people find it interesting as a pet. During recent years, trade of this gecko has increased among the Iranian people. Although 47% of geckos inhabiting Iran belong to the Red List, the IUCN category (http://www.iucn.org/) of most is LC (or Least Concern). The geckos in Iran have the best conservation situation compared to other amphibians and reptiles, and their nocturnal activity may have an important role.

Key to *Hemidactylus* Species Distributed in Iran

1a: Dorsal tubercles absent, femoral pores present …… *H. flaviviridis*
1b: Dorsal tubercles present, femoral pores absent….2

2a: 5–8 precloacal pores……..……..….3
2b: 9–11 precloacal pores…….....…..*H. persicus*
2c: 12 precloacal pores……5

3a: 2–4 postmentals, not small *Hemidactylus* (body size is more than 48 mm)……*H. sassanidianus* **sp.n.**
3b: Two postmentals, small *Hemidactylus* (less than 50 mm)……4

4a: Females have less rugosity than males, subcaudals covered by small scales and/or plate-like scales (few in number: 0–22)…….*H. achaemenidicus* **sp.n.**
4b: Sexual rugosity does not occur (females have approximately full rugosity), subcaudal scales enlarged (no small scales)……*H. robustus*

5a: Two postmentals…..*H. pseudoromeshkanicus* **sp.n.**
5b: Three postmentals……..*H. romeshkanicus*

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