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Two new species of ants of the genus *Cataglyphis* Foerster, 1850 (Hymenoptera: Formicidae) from Iran

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This paper enhances our understanding of the diversity of Iranian desert ants. It introduces two new species: *Cataglyphis shahrekordensis* sp. nov., a member of the *C. altisquamis* species-group, and *Cataglyphis lirabiensis* sp. nov., which belongs to the *C. cursor* species-group. These species were discovered in south-western Iran, specifically in Chaharmahal va Bakhtiari and Khoozestan Provinces. With these additions, the total number of *Cataglyphis* Foerster species known in Iran has now reached 37.

<http://www.zoobank.org/urn:lsid:zoobank.org:pub:725AF7DF-BB0E-4833-BAE7-A5983F952E1E>

Keywords: Ants; Middle East; taxonomy; species-group

Introduction

Cataglyphis Foerster, 1850 is a moderately large ant genus comprising 100 valid species and 18 valid subspecies divided into several species-groups (Agosti, 1990; Bolton, 2023). So far, there are as many as 35 species of this genus recorded from Iran, and the number constitutes 35% of all known *Cataglyphis* species (Khalili-Moghadam et al., 2021).

The distribution of *Cataglyphis* is limited to the Old World and its species are commonly found in arid habitats such as semideserts and deserts, but can also be found in mountain steppes or steppic forests, and sandy patches inside forests (Agosti, 1990; Brown, 2000). These ants usually build nests directly in the ground, often in the form of a crater, and sometimes under flat rocks. The genus exhibits the greatest diversity in arid ecosystems located in North Africa, the Arabian Peninsula, and Central Asia (Agosti, 1990; Collingwood & Agosti, 1996; Brown, 2000).

The taxonomy of Iranian *Cataglyphis* was recently reviewed (Khalili-Moghadam et al., 2021) and one species was added to the Iranian list (Salata et al., 2021). So far, 35 species of this genus have been reported from the country, but some records seem dubious and need verification and confirmation (Paknia et al., 2008, 2009; Moradloo et al., 2015; Pashaei Rad et al., 2018). In this study, we describe one new species belonging to the species-group *C. altisquamis* and one species belonging to the *C. cursor* species-group.

Material and Methods

Study area. The specimens were collected from several sites in the Chaharmahal va Bakhtiari Province and one site in the Khoozestan Province of Iran. The sites were placed at altitudes from 20 to 2500 m a.s.l. Chaharmahal Va Bakhtiari and Khoozestan Provinces are located in the southwestern part of Iran. Shahrekord and Ben counties lie in the northern and Ardal county in the

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western part of the Chaharmahal Va Bakhtiari Province, respectively. Ardal County (Gandomakar olia, Firooz abad, Eslam abad, Lirabi, Holoosad, Qorab and Karoon) is predominantly covered by oak forests and only small parts are transformed into agricultural sites (mostly cultivations of wheat, corn, alfalfa, barley, bean, rice and other). Contrary, most of the territory of Shahrekord and Ben counties are agricultural and grazing sites.

Sampling. The dominant sampling method was direct sampling (hand collecting); specimens were collected foraging on the ground or directly from nests usually located under stones. All specimens were preserved in 75% EtOH. Photos were taken using a Nikon SMZ 1500 stereomicroscope, Nikon D5200 photo camera, and Helicon Focus software.

Nomenclature. The nomenclature for describing the pilosity inclination degree follows Wilson (1955). Appressed ($0\text{--}5^\circ$) hairs run parallel or nearly parallel to the body surface. Decumbent hairs stand $5\text{--}20^\circ$, subdecumbent hair stands $20\text{--}60^\circ$, suberect $60\text{--}80^\circ$, and erect $80\text{--}90^\circ$ from the surface (see fig. 3 in Wilson 1955). All measurements are given in mm.

Abbreviations

EPAS	Entomological Laboratory, Plant Protection Department, Agriculture College, Shahrekord University, Iran
MNHW	Museum of Natural History, University of Wrocław, Poland
MHNG	Muséum d'Historie Naturelle, Genève, Switzerland
USMB	Upper Silesian Museum, Bytom, Poland
HL	Head length; measured in a straight line from mid-point of anterior clypeal margin to mid-point of posterior margin in full-face view
HW	Head width; measured in full-face view directly behind the eyes
SL	Scape length; maximum straight-line length of scape excluding the basal condylar bulb
PW	Pronotum width; maximum width of pronotum in dorsal view
PRL	Propodeum length; measured in lateral view, from metanotal groove to posterior-most point of propodeum
PRW	Propodeal width; maximum width of propodeum in dorsal view
PTH	Petiole height; the chord of ventral petiolar profile at node level is the reference line perpendicular to which the maximum height of petiole is measured, measured in lateral view
PTW	Petiole width; maximum width of the petiolar node in lateral view
WL	Weber's length; measured as diagonal length from the anterior end of the neck shield to the posterior margin of the propodeal lobe
HFL	Hind femur length; measured on dorsal side from trochanter to apex of femur
CI	Cephalic index, HL/HW
PI	Petiole index, PTH/PTW
FI	Femur index, HFL/WL
SI	Scape index, SL/HL

Species Accounts

Cataglyphis shahrekordensis **sp. nov.** (Figures 1A, 1B, 2A, 2B, 3A, 3B, 4A–D)

Cataglyphis kurdistanica Pisarski, 1965 (partim): Khalili-Moghadam et al. (2019): 168 (misidentification).

Material (all material from Iran). *Holotype*: Major worker: Chaharmahal Va Bakhtiari, Shahrekord, Mellat Park, 2230 m, 32.3344°N , 50.86526°E , 29.iv.2021, Nazari leg. (MNHW). – *Paratypes*: Major worker: the same data as holotype (MNHW); 4 major workers: Chaharmahal Va Bakhtiari, Shahrekord, 2100 m, 32.36774°N , 50.76194°E leg. A. Khalili-Moghadam (MNHW, MHNG); 5 major, 1 medium workers:

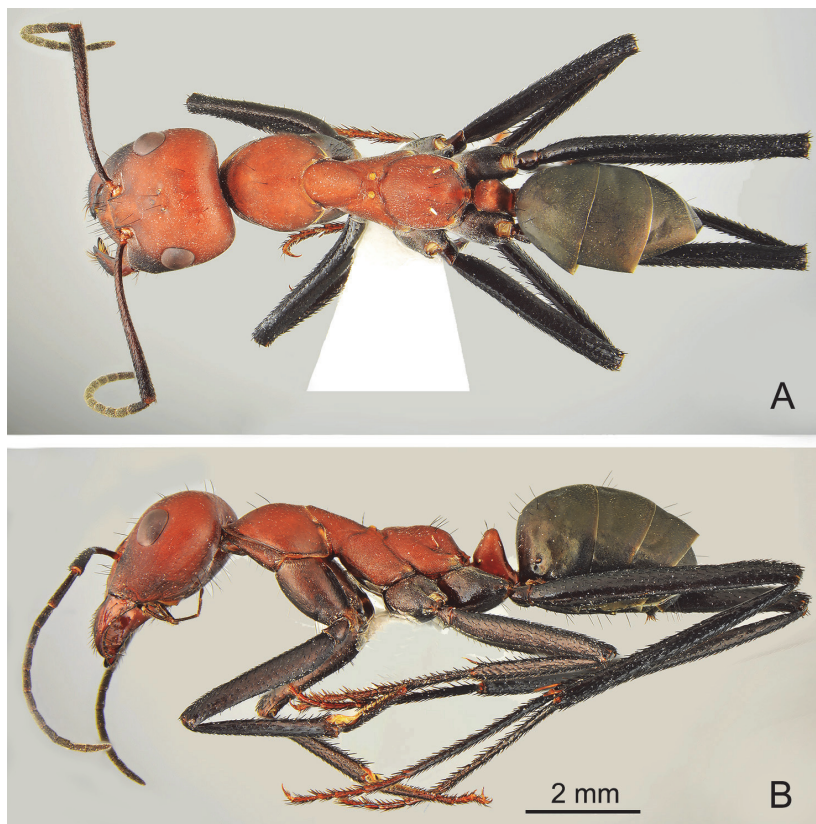


Figure 1. Major worker of *Cataglyphis shahrekordensis* sp. nov. A dorsal, B lateral view.

Chaharmahal Va Bakhtiari, Ardal, Qorab, 2061 m, 32.02748°N, 50.39471°E, 10.i.2021, A. Khalili-Moghadam leg. (MNHW, USMB); 2 medium, 1 minor workers: Chaharmahal Va Bakhtiari, Ardal suburb, 1873 m, 31.97054°N 50.57194°E, 16.viii.2021, A. Khalili-Moghada leg. (MNHW); major worker: Chaharmahal Va Bakhtiari, Ardal, Gandomakar olia, 1941 m, 31.80498°N, 50.56416°E 9.x.2021, A. Khalili-Moghadam leg. (MNHW); major worker: Chaharmahal Va Bakhtiari, Kiar, Firooz abad, 2030 m, 31.8697°N, 50.59029°E, 26.viii.2021, A. Khalili-Moghadam leg. (MNHW); major worker: Chaharmahal Va Bakhtiari, Kiar, Eslam abad, 1898 m, 32.09775°N, 50.54994°E, 17.viii.2021, A. Khalili-Moghadam leg. (MNHW); major worker: Chaharmahal Va Bakhtiari, Ardal, Karoon 4, 1789 m, 31.72443°N, 50.54499°E, 9.x.2021, A. Khalili-Moghadam leg. (MNHW); 2 major workers: Chaharmahal Va Bakhtiari, Ardal, Lirabi, 1948 m, 31.95653°N, 50.48747°E, 9.x.2021, A. Khalili-Moghadam leg. (MNHW); 3 major workers: Chaharmahal Va Bakhtiari, Ben, 2190 m, 32.53993°N, 50.73113°E, 15.v.2019, leg. students (MNHW); 2 medium, 5 minor workers: Chaharmahal Va Bakhtiari, Ben (Karsenak), 13.vii.2017, 2500 m, leg. Khalili-Moghadam, 32.52444°N, 50.47305°E, Collection L. Borowiec, LBC-IR00072 (MNHW, MHNG); 2 major workers: Chaharmahal Va Bakhtiari, Ben (Karsenak), 13.vii.2017, 2476 m, leg. Khalili-Moghadam, 32.53222°N, 50.46777°E, Coll. L. Borowiec (LBC-IR00080) (MNHW); 4 major workers: Khoozestan Pr., Ahvaz, 20 m, 31.47478°N, 48.72496°E, 2.iv.2014, leg. students (MNHW).

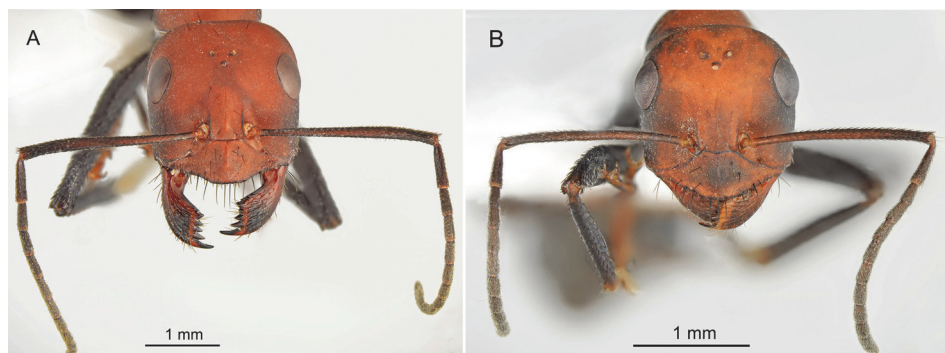


Figure 2. Head and antennae of *Cataglyphis shahrekordensis* sp. nov. A major worker, 2 minor worker.

Etymology. Named after the Shahrekord county of the Chaharmahal Va Bakhtiari Province, the type locality for this new species.

Diagnosis. A large size, thick, dense, black and decumbent setae that cover the femora and tibiae, and cubical node cluster this species within the *C. altisquamis* group. *Cataglyphis shahrekordensis* sp. nov., along with *C. bazoftensis* and *C. kurdistanica*, form a complex of species sharing a reddish head and mesosoma colouration in major workers. However, there are distinctions between these species: *Cataglyphis kurdistanica* differs in the presence of the major soldier caste and reddish to reddish brown legs (*C. shahrekordensis* sp. nov. has no soldier caste and legs black or dark brown); major workers of *C. bazoftensis* differ in stouter and triangular in profile petiole (CI 1.077 (1.056-1.124)) (see figure 4 in Khalili-Moghadam et al., 2021), while in *C. shahrekordensis* sp. nov. the petiolar node is slimmer and rounded (CI: 1.165 (1.117-1.197)) (Figures 4A, 4B). Additionally, *C. bazoftensis* is less setose, with the dorsal mesosoma often lacking erected setae or with only 1-2 black setae on propodeum (*C. shahrekordensis* sp. nov. has promesosoma usually with at least a pair of long, black erect setae, and the propodeum has up to five long, black erect setae). Minor workers of *C. bazoftensis* have the whole body mostly brown with only small reddish patches (Figures 7, 8 in Khalili-Moghadam et al., 2021), while minor workers of *C. shahrekordensis* sp. nov. have head and mesosoma predominantly red, like in major workers, with smaller or larger indistinct brown patches of diffused borders on sides of head and mesosoma.

Description. Major worker (n=10): *Measurements.* HL: 2.536 (2.42-2.82); HW: 2.180 (2.03-2.45); SL: 2.814 (2.57-3.27); PW: 1.650 (1.56-1.83); PRL: 1.514 (1.44-1.74); PRW: 1.254 (1.18-1.40); PTH: 0.859 (0.73-1.13); PTW: 0.738 (0.67-0.78); WL: 4.130 (3.78-4.56); HFL: 4.471 (3.98-5.40); HL/HW: 1.165 (1.117-1.197); SL/HL: 1.305 (1.189-1.366); PTH/PTW: 1.170 (0.936-1.449); HFL/WL: 1.081 (1.012-1.184). – *Colouration.* Head, mesosoma and petiolar node red, gena usually with obscure red to brown spot of diffused borders. Legs in the darkest specimens completely black, with only distal tarsal segment yellowish brown, in the palest specimens brown, with coxae at base yellowish to yellowish brown and whole tarsi yellowish brown, but dark colored specimens predominate. Antenna dark brown to black, scapus sometimes partly reddish brown (Figures 1A, 1B, 2A). – *Head.* Subrectangular, approximately 1.16 x as long as wide, sides below eyes almost parallel, above eyes gently convex, posterior margin almost straight (Figure 2A). Anterior clypeal margin convex, without central

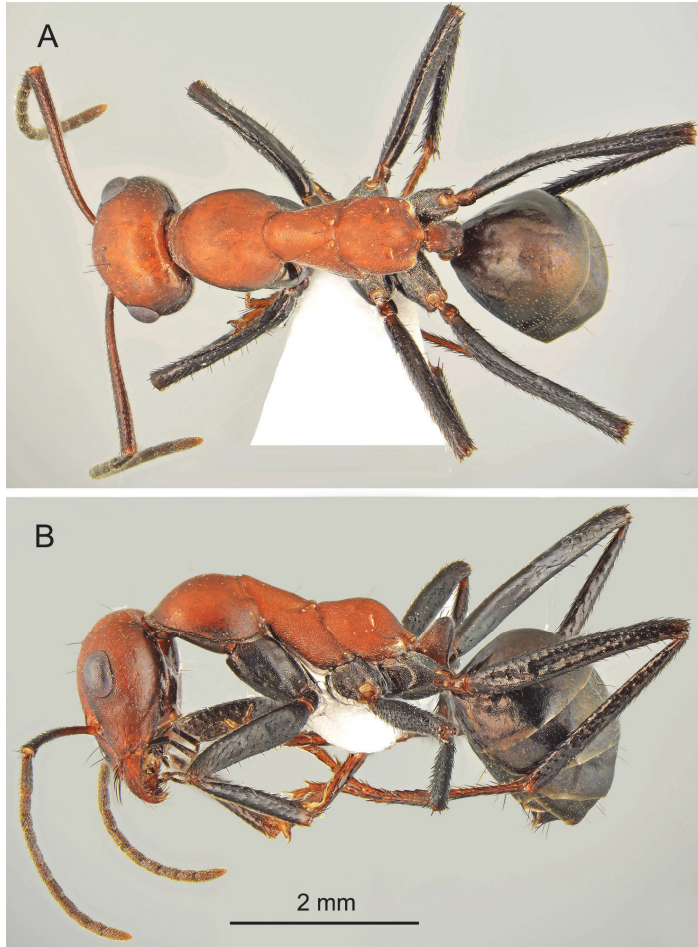


Figure 3. Minor worker of *Cataglyphis shahrekordensis* sp. nov. A dorsal, B lateral view.

impression; central clypeal plate with 8-10 long black setae; anterior margin with a row of short black setae, and 8-10 long black setae. Clypeus densely microreticulate, anteriorly slightly shiny, posteriorly opaque, covered with sparse and short, hardly visible appressed pubescence. Eyes large and oval, approximately 1.3-1.4 x as long as wide and 0.7 x as long as gena. Frontal carinae short, not extending beyond frontal lobes, interocular area with thin shiny line and a pair of long black setae. Antennal fossa shallow, opalescent, densely microreticulated and covered with short and sparse, hardly visible pubescence. Head densely microreticulate, dull, mostly without appressed pubescence, only occipital and gular parts covered with sparse, short, hardly visible appressed pubescence. Long, black erected setae behind frons 2-4, ocellar area with 2-4 moderately long and black setae; occipital area centrally with 0-4 black setae, occipital corners without black setae; ventral side with a dozen of brown to black setae. Antennal scape long; in frontal view almost straight, 1.2-1.3 x as long as width of the head; base without tooth; apex slightly and gradually widened; funiculus longer than scape, pedicel elongated, approximately 0.88 x as long as segments 2 and 3 combined and 1.7 x as long as segment 2 (Figure 2A). Surface of scape densely microsculptured, from shiny to

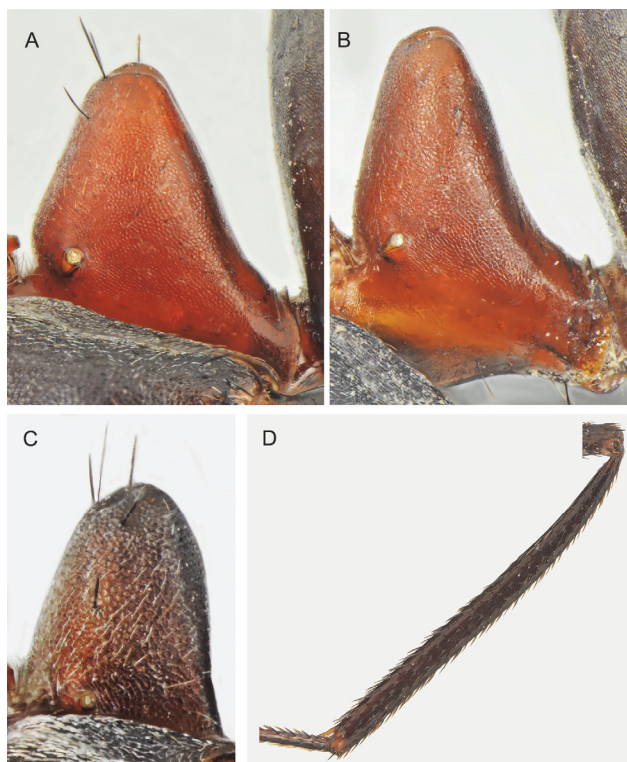


Figure 4. *Cataglyphis shahrekordensis* sp. nov. A, B: major worker, shape variation of petiole. C: minor worker, petiole. D: major worker, hind tibia (not in scale).

dull, covered with thick, moderately dense, and decumbent black setae. Mandibles rounded, basally smooth and shiny, apical $\frac{3}{4}$ length with deep grooves, surface shiny with several long, yellow to brown setae, cutting edge with 4 large teeth. – *Mesosoma*. Long, 2.5 x as long as wide, metanotal groove shallow (Figure 1B). Pronotum convex on sides (Figure 1A). In lateral view promesonotum regularly arched, propodeum positioned lower than promesonotum, dorsal propodeum flat in anterior half then rapidly rounded posteriorly (Figure 1B). Surface of mesosoma densely microreticulated, slightly dull, covered with sparse and short appressed pubescence. Pronotum without or with 1-3 long, black erect setae and occasionally with 1-2 short white setae, mesonotum usually with a pair of moderately long, black setae and often anteriorly with additional pair of short black setae, propodeum in posterior half with 1-5 short, black erect setae, as long as setae on pronotum. – *Petiole*. Cuneiform, variable, in some populations stout in other more elongate (Figures 4A, 4B), with short pedicel. Anterior face in front of spiracle distinctly convex, posterior face almost flat, top of petiole in lateral view rounded with shallow apical depression, usually with a pair of long and a pair of short, black erect setae (Figure 4A); sometimes apex without erected setae (Figure 4B). Surface of petiole distinctly microreticulated, shiny to slightly opalescent. – *Gaster*. Dull and distinctly microreticulate. Whole surface of gaster with indistinct, short and sparse appressed pubescence, distance between hair usually longer than length of hair; top of first tergite anteriorly with 1-5 long, black erect setae, tergite 2 anteriorly with a pair of long black setae, tergite 3 anteriorly with a row of long, black erect setae and usually

with 2-3 similar setae posteriorly (Figure 1B). Each of gastral sternites with 3-4 long, black, and erect setae. – *Legs*. Elongate, hind femora slightly longer than mesosoma (mean FI 1.081). Dorsal and lateral surfaces of femora and tibiae covered with thick, dense, black and decumbent setae, usually with only few short, white appressed setae on surface between black setae. Ventral surfaces of femora and tibiae with numerous long and black suberect to erect spiniform setae.

Minor worker (n=6): *Measurements*. HL: 1.610 (1.48-1.74); HW: 1.207 (1.00-1.36); SL: 1.612 (1.43-1.79); PW: 0.983 (0.93-1.05); PRL: 0.925 (0.88-0.97); PRW: 0.727 (0.67-0.75); PTH: 0.522 (0.48-0.55); PTW: 0.405 (0.36-0.46); WL: 2.395 (2.20-2.48); HFL: 2.257 (2.00-2.38); HL/HW: 1.343 (1.233-1.600); SL/HL: 1.342 (1.192-1.377); PTH/PTW: 1.298 (1.090-1.472); HFL/WL: 0.942 (0.909-0.979). – *Colouration*. In the palest specimens head and mesosoma mostly red, petiole mostly brown with reddish bases of frontals and posterior face, gaster dark brown with obscure reddish anterior slope of first tergite; in the darkest specimens head and mesosoma reddish-brown with brownish gena and lateral sides of mesosoma; petiole mostly brown except reddish ventral side; gaster black. The boundaries between the dark and light parts of head and mesosoma blurred and gradually fade out. Coxae, femora and tibiae dark brown to black, only trochanters and tarsi partly yellow-brown. Antenna brown to black (Figures 2B, 3A, 3B). – *Head*. Slightly more elongated than in major workers, 1.3-1.4 x as long as wide, below eyes parallel sided, behind eyes regularly rounded, occipital margin of head convex. Anterior clypeal margin convex without median impression, central plate of clypeus with short median keel. Eyes large and oval, 1.3 x as long as wide and 0.73 x as long as gena. Sculpture and setation of head and legs similar to major worker. – *Mesosoma*. Same as in major worker. – *Petiole*. More cylindrical than cuneiform, apex rounded with shallow depression, anterior face only slightly convex (Figure 4C). – *Gaster*. Strongly microreticulated and dull. Tergites 1-2 anteriorly with a pair of black erect setae, tergite 3 with only a pair of black setae centrally, tergite 4 in juvenile specimens with two long, and two short black setae (Figure 3B). Each of gastral sternites with 2-4 long, black, and erect setae. Legs shorter than in major workers, FI below 1.0.

Biology. *Cataglyphis shahrekordensis* sp. nov. was predominantly collected in high altitude locations placed from 1406 to 2500 m a.s.l. characterized by cold climate. Its nests were located most often in open and anthropogenic sites such as farming facilities (i.e., Qorab (2061 m), Gandomakar olia (1941 m), Ardal (1873 m), Eslam Abad (1898 m), Holoosad (1406 m), Chaleshtor (2100 m), Ben (2190 m)) or grazing sites (Karsenak (2476–2500 m)). The only known lowland site (corn farm near Ahvaz, 20 m) is also associated with anthropogenic environment. In natural habitats the species was found in oak forest (Firooz Abad (2030 m), Karoon 4 (1789 m) and Lirabi (1948 m)) and meadows (Mellat Park, 2230 m).

Notes. Khalili-Moghadam et al. (2019), based on medium and minor workers, recorded this species under the name *Cataglyphis kurdistanica*. According to Radchenko's (1998) key, *C. kurdistanica* was the only known species of the *C. altisquamis* species-group characterized by red head and mesosoma and presence of the soldier caste. The authors assumed that the collected samples were missing the soldier workers and additional field work will supplement the material with the missing caste and confirm their conclusions. Subsequent studies, however, revealed that the diversity of the *altisquamis* species-group was underestimated and two years later Khalili-Moghadam et al. (2021) described *C. bazoftensis*, another bicoloured member of the *altisquamis* species-group missing soldier caste. Several additional new nest samples of bicoloured species belonging to the abovementioned group revealed that the taxon preliminary determined as

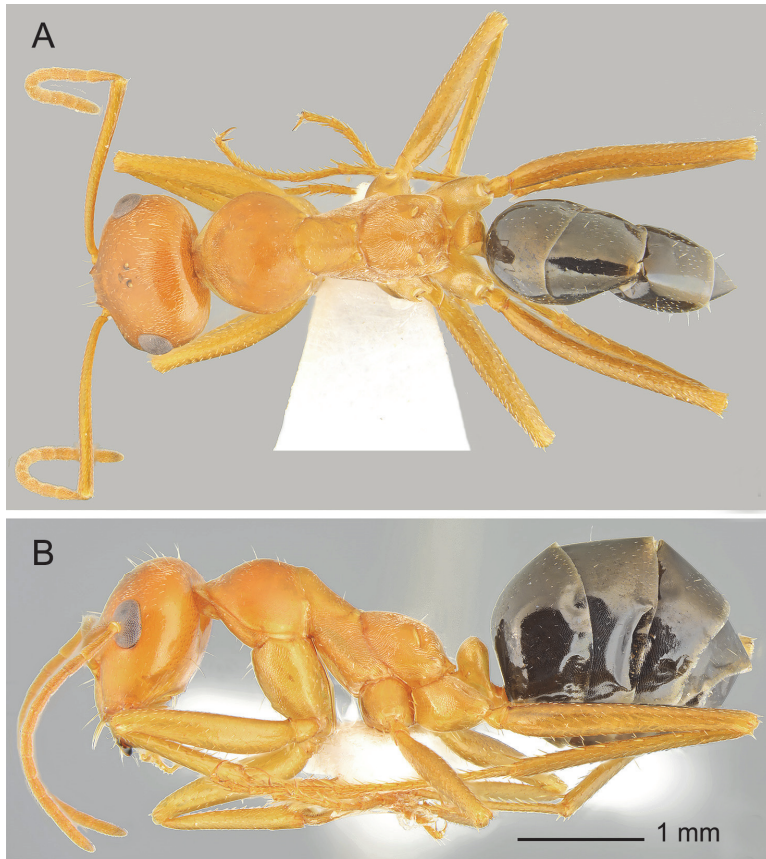


Figure 5. *Cataglyphis lirabiensis* sp. nov. A dorsal, B lateral view.

C. kurdistanica does not have soldier caste and morphologically differs from both *C. kurdistanica* and *C. bazofstensis*. Thus, we decided to describe it as a new species.

Cataglyphis lirabiensis sp. nov. (Figures 5A, 5B, 6A, 6B)

Material. Holotype: Worker: IRAN, Chaharmahal Va Bakhtiari, Ardal, Lirabi 1948 m (31.95653N, 50.48747°E), 15.ix.2021, leg. A. Khalili-Moghadam (MNHW). – *Paratypes:* 3 workers (one of them partly damaged: right antenna missing, left antenna only scapus and basal three funicle segments, right foreleg missing): IRAN, Chaharmahal Va Bakhtiari, Ardal, Holoosad, 1406 m (31.72942°N, 50.54444°E), 10.x.2021, leg. A. Khalili-Moghadam (MNHW, EPAS).

Etymology. Named after the Lirabi Village of Ardal County of the Chaharmahal Va Bakhtiari Province, the type locality for this new species.

Diagnosis. *Cataglyphis lirabiensis* sp. nov. is a member of the *C. cursor* species-group characterized by petiole in the shape of a thick squama and by monomorphic or with monophasic size variation of worker caste (Agosti, 1990). The group comprises in Asia six species of small to medium sized ants and head and gaster from finely shagreened, dull to mostly smooth and shiny. *Cataglyphis lirabiensis* sp. nov. differs from all spe-

cies of this group in a distinctly bicoloured body with head, mesosoma and petiole yellow and gaster dark brown to black, while other taxa have body predominantly brown to black, if bicoloured then head reddish to reddish brown and mesosoma and gaster dark brown to black. The poorly known *C. frigida persica* appears the most similar taxon to due to the dark yellow head and mesosoma and yellowish brown gaster (bright yellow head and mesosoma and dark brown to black gaster in *C. lirabiensis* sp. nov.). It also differs in well visible and slightly longer and denser appressed pubescence on occipital part of head (short and sparse, hardly visible in *C. lirabiensis* sp. nov.). The unusual body colouration of *C. lirabiensis* sp. nov. could also associate this species with members of the *C. pallida* species-group. The most similar is *Cataglyphis pallida* Mayr, 1877 – the only Asian species with squamiform petiole and head, mesosoma and petiole yellow. However, *C. pallida* differs in completely yellow gaster and occipital part of head covered with dense and long appressed pubescence. *C. lirabiensis* sp. nov. has gaster predominantly dark brown to black and hardly visible, short, and sparse appressed pubescence on head.

Description. Worker (n=2): *Measurements*. HL: 1.530 (1.43-1.63); HW: 1.330 (1.22-1.44); SL: 1.585 (1.50-1.67); PW: 1.050 (1.02-1.08); PRL: 0.910 (0.87-0.95); PRW: 0.730 (0.69-0.77); PTH: 0.565 (0.56-0.57); PTW: 0.405 (0.40-0.41); WL: 2.265 (2.13-2.40); HFL: 2.170 (2.03-2.31); HL/HW: 1.152 (1.132-1.172); SL/HL: 1.195 (1.160-1.229); PTH/PTW: 1.396 (1.366-1.425); HFL/WL: 0.958 (0.953-0.963). – *Colour*. Head, mesosoma and petiolar node yellow, dorsal half of head and pronotum with slight orange-yellow tint. Legs and antenna yellow. Gaster dark brown to almost black, only basal tergite close to petiole with slightly paler, yellow to yellowish-brown patch, also posterior margins of tergites narrowly yellowish (Figures 5A, 5B). – *Head*. Subrectangular, approximately 1.15 x as long as wide, sides almost parallel, occipital corners broadly rounded (Figure 6A). Anterior clypeal margin convex, without central impression; anterior clypeal margin with 4-5 long and 3-4 short yellow setae, the longest setae as long as 0.6 length of clypeus along median line. Clypeus surface microreticulate but slightly shining, covered with sparse and short, yellow appressed pubescence. Eyes large and oval, approximately 1.4 x as long as wide and 0.8 x as long as gena. Frontal carinae short, not extending beyond frontal lobes, frons in the narrowest part 0.3 times as wide as head width, interocular triangle with diffused microreticulation, shiny, frontal surface distinctly microreticulate, slightly opaque, without shiny line and without erected setae. Antennal fossa shallow, finely microreticulated, slightly opalescent and covered with short and sparse yellow pubescence. Rest of head surface mostly densely microreticulate but only slightly opalescent, only postocular and occipital area with diffused microreticulation and shiny, with short and sparse appressed, hardly visible pubescence, only occipital and gular parts covered with visible hairs. Area above frons and area above ocelli with a pair of moderately long, yellow setae; occipital area with 3-4 such setae, the longest with length 0.127; rest of frontal and lateral faces of head without erect setae; ventral side on sides with one long and one short, yellow seta. Antennal scape moderately long; in frontal view almost straight, approximately 1.2 x as long as width of the head; base without tooth; apex only slightly and gradually widened; funiculus longer than scape, pedicel elongated, approximately 0.86 x as long as segments 2 and 3 combined and twice as long as segment 2 (Figure 6A). Surface of scape diffusely microsculptured, shiny, covered with short and sparse hairs, in basal part of scape appressed, in apical half slightly decumbent, without erected setae. Mandibles rounded, basally smooth and shiny, apical $\frac{3}{4}$ length with deep grooves, surface shiny with few long and short yellow setae, cutting edge with 4 large teeth. – *Mesosoma*. Long,

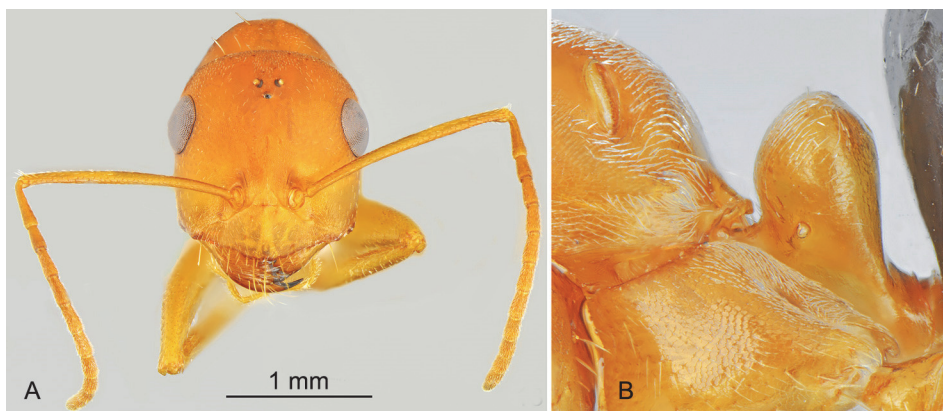


Figure 6. *Cataglyphis lirabiensis* sp. nov. A: Head and antennae. B Petiole.

approximately 2.2 x as long as wide, metanotal groove shallow (Figure 5B). Pronotum convex on sides (Figure 5A). In lateral view mesonotum placed slightly higher than pronotum, propodeum positioned lower than promesonotum, moderately convex in lateral view (Figure 5B). Mesosoma densely microreticulated but only slightly opalescent, on top of promesonotum covered with sparse and short, hardly visible appressed pubescence. Pronotum two pairs of moderately long yellow setae, the longest with length 0.159, mesonotum in posterior half with a pair of moderately long erect setae, sometimes also in anterior part with a pair of short erect setae, propodeum without or posteriorly with 1–2 moderately long, yellow erect setae. – *Petiole*. Squamiform, thick, PI approximately 1.4, anterior face strongly convex, posterior face almost flat, top of petiole in lateral view obtusely angulate, surface diffusely microreticulate, covered with short, sparse, yellow appressed pubescence, apex without or with single erect seta (Figure 6B). – *Gaster*. With diffused microreticulation tending to form transverse striation, surface appears smooth and shiny. Whole surface of gaster with short and sparse appressed pubescence, distance between hair mostly longer than length of hair; tergites 1–2 in front of the middle with a pair of short, yellow erect setae, tergite 2 sometime with 2–3 additional short setae posteriorly, tergites 3 and 4 with transverse row of moderately long erect setae across middle and a row of similar setae posteriorly. Each of gastral sternites with 3–4 long, yellow erect setae. – *Legs*. Moderately elongate, FI approximately 0.96. Dorsal and lateral surfaces of femora and tibiae covered with thin, sparse, mostly appressed or only slightly decumbent yellow setae. Ventral surfaces of femora and tibiae with sparse, moderately long and yellow suberect to erect spiniform setae.

Biology. In Lirabi, a specimen was found within an oak forest, while in Holoosad, a specimen was found in a bean and rice farm. The collecting sites were in the mountain zone, at altitudes of 1406 and 1948 m a.s.l.

The *Cataglyphis altisquamis* and the *Cataglyphis cursor* species-groups in Iran

The new species belong to the *Cataglyphis altisquamis* and the *C. cursor* species-groups.

The following members of the *Cataglyphis altisquamis* species-group have been recorded in Iran:

Cataglyphis altisquamis (André, 1881)

Cataglyphis bazoftensis Khalili-Moghadam, Salata & Borowiec, 2021
Cataglyphis bucharica Emery, 1925
Cataglyphis dejdaranensis Khalili-Moghadam, Salata & Borowiec, 2021
Cataglyphis fritillariae Khalili-Moghadam, Salata & Borowiec, 2021
Cataglyphis foreli (Ruzsky, 1903)
Cataglyphis kurdistanica Pisarski, 1965
Cataglyphis shahrekordensis sp. nov.

In the key to the Iranian members of the *altisquamis* species-group presented by Khalili-Moghadam et al. (2021) the new species runs to couplet 4, and the key is modified as follows:

- 4 Mesonotum in major workers distinctly bicolored, head, mesosoma and petiole reddish, petiole in major workers conical, in minor workers conical to cylindrical 5
 – Mesonotum in both major and minor workers uniformly brown to black, petiole in major workers trapezoidal or knob-shaped, in minor workers in the form of a thick squama 6 [5 in Khalili-Moghadam et al. (2021)]
- 5 Petiole in profile stout and triangular (fig. 4 in Khalili-Moghadam et al., 2021), dorsal mesosoma often without erected setae or with only 1-2 black setae on propodeum; in minor workers entire body mostly brown with only small reddish patches (figs. 7, 8 in Khalili-Moghadam et al., 2021) .. *C. bazoftensis*
 – Petiole in profile slim and rounded (Figures 4A, 4B); promesosoma usually with at least a pair of long, black erect setae and propodeum with up to five long, black erect setae. Minor workers with head and mesosoma predominantly red with indistinct brown patches of diffused borders on sides of head and mesosoma *C. shahrekordensis* sp. nov.

The following members of the *Cataglyphis cursor* species-group have been recorded in Iran:

Cataglyphis aenescens (Nylander, 1849)
Cataglyphis cugiai Menozzi, 1939
Cataglyphis frigida (André, 1881)
Cataglyphis frigida persica (Emery, 1906)
Cataglyphis lirabiensis sp. nov.
Cataglyphis pubescens Radchenko & Paknia, 2010

In order to incorporate the newly described species, the key provided by Radchenko (1998) needs to be modified as follows:

- 1 [5 in Radchenko, 1998]. Petiole with squamula; abdomen shining, with smooth or finely sculptured surface 2
 – Petiole cuneiform, conical, or node-shaped. If petiole with distinct thick squamula, then abdomen dull, densely sculptured 16 [in Radchenko, 1998]
- 2 Head and mesosoma with dense and long appressed pubescence *C. pubescens*
 – Head and mesosoma without dense and long appressed pubescence 3
- 3 Head distinctly shagreened, dull (at least in larger workers) 4
 – Head (at least in posterior half) smooth and shining 5
- 4 Thick and low petiolar squamula (fig. 1g in Radchenko, 1998); gastral tergites with appressed and sparse pubescence (distance between hairs longer than their length) *C. cugiai*

- Petiolar squamula thinner and higher (fig. 1j in Radchenko, 1998); gastral tergites with denser appressed pubescence (distance between hairs shorter or as long as the length of hairs) *C. aenescens*
- 5 Body distinctly bicoloured: head, mesosoma and petiole yellow and gaster dark brown to black *C. lirabiensis* sp. nov.
- Body predominantly brown to black; if bicolored, then head reddish to reddish brown and mesosoma and gaster dark brown to black 6
- 6 Body yellowish brown *C. frigida persica*
- Body dark brown to black *C. frigida frigida*

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