

# TWO NEW SPECIES OF THE GENUS *CATAGLYPHIS* FOERSTER, 1850 (HYMENOPTERA: FORMICIDAE) FROM IRAN

ALEXANDER RADCHENKO<sup>1</sup> and OMID PAKNIA<sup>2</sup>

<sup>1</sup>*Museum and Institute of Zoology, Polish Academy of Sciences, 64, Wileza str.,  
00-679, Warsaw, Poland; e-mail: agradchenko@hotmail.com*

<sup>2</sup>*Institute of Experimental Ecology, University of Ulm, Albert-Einstein Allee 11,  
D-89069 Ulm, Germany; e-mail: omid.paknia@uni-ulm.de*

**Abstract.**— Two new species, *Cataglyphis stigmatus* sp. nov. and *C. pubescens* sp. nov. are described based on workers from Iran. The first species belongs to the *bicolor* species-group and clearly differs from all known species of this group by its yellow colour (except of *C. lunaticus*), but well distinguishes from the latter by the longer scape, by the lower propodeum, which dorsal surface is distinctly longer than the posterior one, by the less abundant standing hairs on the alitrunk and petiole, and especially by the much longer propodeal spiracles. Taxonomic position of *C. pubescens* is less clear, it shares features of the *cursor*-, *emeryi*- and *emmae*-groups, while differs from all species of these groups by the dense and long depressed pubescence on the head and alitrunk.



**Key words.**— Ants, Formicidae, Formicinae, *Cataglyphis stigmatus*, *C. pubescens*, new species, Iran.

## INTRODUCTION

*Cataglyphis* is one of the keystone ant genera in arid zones of the Old World. It is distributed mainly in Palaearctic, while several species dwell in deserts and semi-deserts of Afrotropical and Oriental Regions (India and Pakistan). More than 100 species are known in this genus till now, and even 2 social parasites were described (Agosti 1994, Radchenko 1997b, Bolton *et al.* 2007).

Members of this genus are large (up to 13 mm) ants, and all of them inhabit open dry habitats (steppes, stony mountain slopes, various types of deserts and semi-deserts, etc.), reaching in mountains up to 3500–3700 m a.s.l.

Formerly genus *Cataglyphis* has been divided to several subgenera (e.g., see Bolton 1995), but more recently subgeneric division was refused and the genus was separated into several species groups and species complexes within them (Agosti 1990, Radchenko 1997a).

18 species of the genus *Cataglyphis* have been recorded for Iran till recently (Paknia *et al.* 2008, 2009), but in the newly collected material by one of the co-authors (O. Paknia) we found specimens that belong to two new species, which are described below. One of them belongs to the *bicolor* species-group and well differs from all members of this group by its totally yellow colour, except of *C. lunaticus* Baroni Urbani described from Turkey. The second new species most probably is a member of the *cursor* species-group and has unique characteristics in its dense, rather long and coarse, silverish pubescence of the body.

## MATERIAL AND METHODS

Material was collected from arid areas of the Central and Southern Iran (Fig. 1) during two field trips in spring and summer 2007 and 2008.

Comparative materials, including type specimens of many species were analysed in the course of this work. These materials are preserved in the following Museums and Institutions: Zoological Museum of Moscow State University, Russia (ZMMU); Zoological Institute of Russian Academy of Sciences, St.-Petersburg, Russia (ZISP); Institute of Zoology of Ukrainian National Academy of Sciences, Kiev, Ukraine (IZK; including Karawajew's collection); The Natural History Museum, London, UK (BMNH); Museo Civico di Storia Naturale "G. Doria", Genoa, Italy (MCSN); Museum and Institute of Zoology of Polish Academy of Sciences, Warsaw, Poland (MIZ) and National Museum of Natural History, Tehran, Iran (MMTT).

#### Measurements and indices:

HL – maximum length of head in dorsal view, measured in a straight line from the most anterior point of clypeus to the mid-point of occipital margin,

HW – maximum visible width of head in dorsal view, measured above or below of eyes (depending from species),

SL – maximum straight-line length of scape from its apex to the articulation with condylar bulb,

FS<sub>1</sub>, FS<sub>2</sub>, FS<sub>3</sub> – length of 1<sup>st</sup> to 3<sup>rd</sup> funicular segments of antenna,

MP<sub>3</sub>, MP<sub>4</sub>, MP<sub>5</sub>, MP<sub>6</sub> – length of 3<sup>rd</sup> to 6<sup>th</sup> segments of maxillary palps,

OL – maximum diameter of eye,

GL – length of gena (seen in profile), measured

from the lower margin of eye to the articulation with mandible,

AL – diagonal length of alitrunk (seen in profile), measured from the anterior end of propodeum to the posterior margin of propodeal lobes,

PnW – maximum width of pronotum in dorsal view,

PL – maximum length of petiole (in profile),

PW – maximum width of petiole (from above),

PH – maximum height of petiole (in profile),

HTL – maximum length of hind tibia,

PSL – maximum diameter of propodeal spiracle.

#### Indices:

Cephalic index:  $CI = HW / HL$ ,

Scape indices:  $SI_1 = SL / HL$ ;  $SI_2 = SL / HW$ ,

Ocular indices:  $OI_1 = OL / HW$ ;  $OI_2 = OL / GL$ ,

Funicular segment indices:  $FSI_1 = FS_1 / FS_2$ ;  $FSI_2 = FS_1 / (FS_2 + FS_3)$ ,

Maxillary palps indices:  $MPI_1 = MP_4 / MP_5$ ;  $MPI_2 = MP_4 / (MP_5 + MP_6)$ ,

Propodeal spiracle index:  $PSL / HW$ ,

Alitrunk index:  $AL / PnW$ .

## TAXONOMY

### *Cataglyphis stigmatus* sp. nov.

**Etymology.** From the Latin word "*stigma*" – spiracle, to emphasize very long propodeal spiracles.

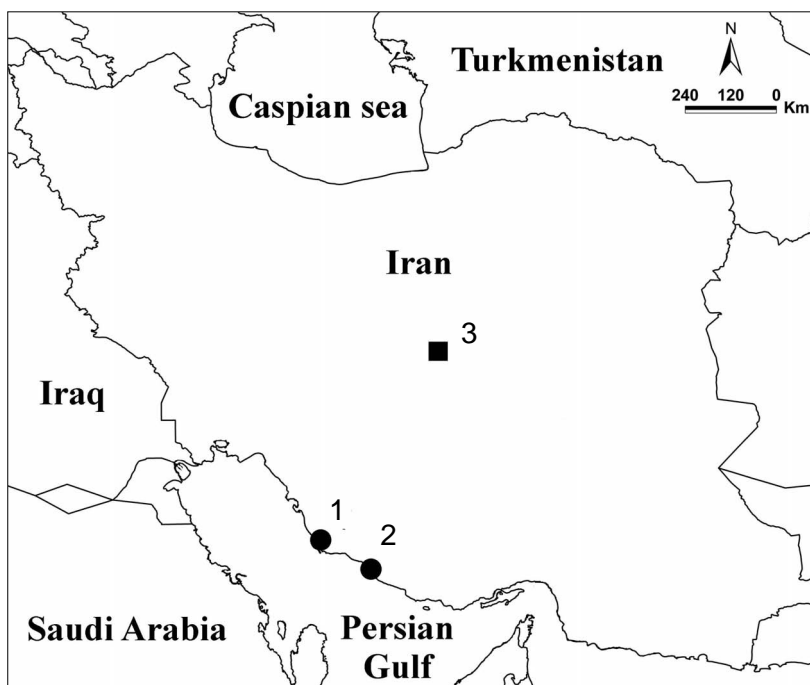


Figure 1. Map of the type localities of *Cataglyphis stigmatus* sp. nov. (black dots) and *C. pubescens* sp. nov. (black square). (1) Mond Protected Area; (2) Naiband National Park; (3) Siahkooch National Park.

**Material examined.** **Holotype** worker, Iran, Province Bushehr, Mond protected area, 28°03'N, 51°36'E, 6 m a.s.l., 15 July 2007, arid area, leg. Omid Paknia, collection code: MND-2128002 (MMTT); **paratypes**: 1 worker from the nest of holotype; 2 workers from the same site, but collected on bait traps; 3 workers, Iran, Province Bushehr, Naiband National Park, 27°18'N, 52°48'E, 19 July 2007, 6 m a.s.l., nest sample, arid area, leg. Omid Paknia (IZK, MMTT).

**Description. Workers** (Figs 2–7). Species of medium size, body length ca. 5–7 mm. Head with almost parallel sides (below the eyes) and gradually convex occipital margin, occipital corners not marked, head length subequal to its width. Anterior clypeal margin convex, without median notch. Clypeal setae distinctly shorter than length of clypeus and joined near its anterior margin. Eyes relatively small, their maximum diameter 1.2–1.5 times less than length of genae, situated distinctly beyond the midlength of head margins. Ocelli relatively big, forming equilateral triangle. Antennae 12-segmented, scape long, distinctly longer than head length, first funicular segment distinctly shorter than the length of second and third segments together. 3<sup>rd</sup> and 4<sup>th</sup> segments of maxillary palps long, subequal in length, 5<sup>th</sup> segment 1.5–1.6 times shorter than 3<sup>rd</sup> or 4<sup>th</sup> ones, 6<sup>th</sup> segment is the shortest; 3<sup>rd</sup> segment somewhat flattened, with abundant erect hairs on inner margin, length of the longest hairs equal or only a little longer than maximum diameter of the segment; 4<sup>th</sup> segment with similar pilosity, two apical segments with abundant but shorter hairs. Mandibles with long apical tooth, somewhat smaller preapical one and three small basal teeth.

Alitrunk long and slender, mesonotum not raised over pronotal level. Propodeum low, gradually arched, its dorsal surface distinctly longer than posterior one. Propodeal spiracles elongate-oval, while not distinctly slit-like, and very long: their length exceeds (or at least reaches) half of the propodeal height. Petiole obviously nodiform, with rounded node dorsum.

Surface of whole body with dense microreticulation, appears dull, although not strongly matt. Body with sparse whitish standing hairs. Occiput with 5–6 quite long erect hairs, frons with 3–4, clypeus – with 2 similar hairs. Alitrunk and petiolar node with a few sparse short hairs. Head and gaster with very sparse and short decumbent pilosity, distance between hairs longer than hairs' length; surface of alitrunk (except of mesonotal dorsum) and coxae with dense silverfish pubescence. Tibiae with depressed whitish short setae and additionally with a few yellowish bristles on inner margin. Antennae with fine, short depressed pubescence, without semi-erect hairs.

Whole body yellow to orange-yellow.

**Queens and males** are unknown.

Measurements and indices see in Tables 1 and 2.

**Ecology.** Distribution of this species is probably limited to the northern coastal plains of the Persian Gulf. This region is characterized by hot long summer and mild winter, with mean annual temperature 27°C and 236 mm precipitation. Phyto-geographically it belongs to the subtropical region. Both nest samples of *C. stigmatus* were collected in open arid areas. The nest entrance had a small mound ca. 5 cm height and ca. 15 cm in diameter. Specimens were active at the hottest time of day, between 10.00 and 16.00. Workers were attracted on baits both by tuna fish and sugar syrup.

**Comparative diagnosis.** Based on all main diagnostic feature (e.g. nodiform petiole, body sculpture, maxillary palps structure, etc.; see also Agosti 1990, Radchenko 1997a), *C. stigmatus* clearly belongs to the *bicolor* species-group. Almost all species of this group are bicoloured (with reddish head and alitrunk and black gaster) or black with the only one previously known exception – *C. lunaticus* which has entirely yellow body. Consequently, *C. stigmatus* obviously differs by colour from all known species of this group, except of *C. lunaticus*. Despite we did not investigate the type specimens of the latter species (it has been described based on 2 workers from Turkey), the detailed original description, including morphometric data and excellent drawings, provided by Baroni Urbani (1969) allow us to compare both species.

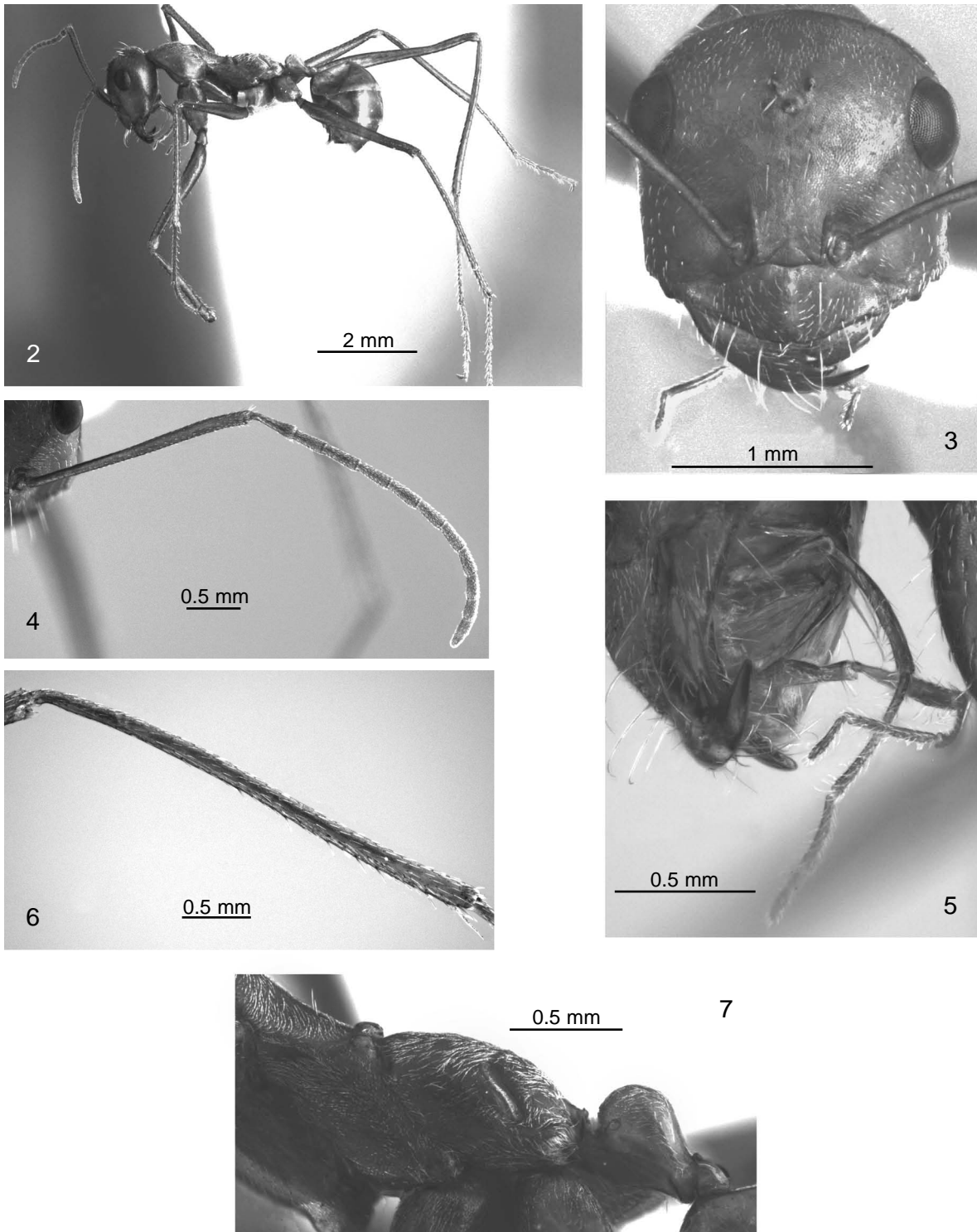
*C. stigmatus* well distinguishes from *C. lunaticus* by the longer scape ( $SI_1 > 1.20$  vs  $< 1.10$ ), by the lower propodeum with the dorsal surface being distinctly longer than the posterior one (the length of the dorsal surface of propodeum in *C. lunaticus* is subequal to the length of posterior one), by the less abundant standing hairs on the alitrunk and petiole, by the somewhat smaller size, and especially by the much longer propodeal spiracles. We examined size of propodeal spiracles in more than fifty *Cataglyphis* species, including about twenty ones from the *bicolor*-group, but could not found such big spiracles in any of the investigated specimens.

### *Cataglyphis pubescens* sp. nov.

**Etymology.** From the Latin word “*pubescens*” – pubescent, that means character of the depressed pubescence on the head and alitrunk.

**Material examined.** **Holotype** worker, Iran, province Yazd, Siahkoo National Park, 32°35'55"N, 54°13'57"E, 987 m, 23 May 2008, nest sample, arid area, leg. Omid Paknia, collection code: SIA 2459009 (MMTT); **paratypes**: 6 workers from the nest of holotype; 2 workers from the same locality but collected by pitfall traps (IZK, MMTT).

**Description. Workers** (Figs 8–13). Species of small size, body length ca. 4 mm. Head length subequal



Figures 2–7. Photos of details of structure of *Cataglyphis stigmatus* sp. nov. (holotype, worker). (2) Body, lateral view; (3) head, frontal view; (4) antenna; (5) maxillary palps, lateral view; (6) hind tibia; (7) propodeum and petiole, lateral view (photo H.-P. Katzmann).

to its width; head slightly narrowed anteriorly, with straight (not convex) sides (below the eyes), rounded occipital corners and very weakly convex occipital margin. Anterior clypeal margin almost straight, without median notch. Clypeal setae subequal to clypeal length and joined near its anterior margin. Eyes relatively small, their maximum diameter ca 1.05–1.25 times less than length of genae, situated distinctly beyond the midlength of head margins. Ocelli small, forming equilateral triangle. Antennae 12-segmented, scape relatively short, subequal or only slightly longer than head length; first funicular segment relatively long, only slightly shorter than length of second and third segments together, remainder segments distinctly longer than broad. 3<sup>rd</sup> and 4<sup>th</sup> segments of maxillary palpes rather long, subequal in length, 5<sup>th</sup> segment short, 1.5–1.9 times shorter than 4<sup>th</sup> ones, 6<sup>th</sup> segment only slightly shorter than the 5<sup>th</sup> one; 3<sup>rd</sup> segment not flattened, oval in cross-section, with not abundant erect hairs, length of the longest hairs less than twice longer than maximum diameter of the segment; 4<sup>th</sup>–6<sup>th</sup> segments with abundant but somewhat shorter pilosity. Mandibles with long apical tooth, somewhat smaller preapical one and three small basal teeth.

Alitrunk relatively short and robust, mesonotum not raised over pronotal level. Dorsal surface of propo-

deum subequal to posterior one, both meet at a rounded blunt angle. Propodeal spiracles small, slit-like. Petiole squamiform, with distinct, rather thick scale.

Surface of head and propodeum with fine but dense microreticulation, appears dull, promesonotum and gaster with very fine superficial microreticulation, appear shiny.

Body with sparse whitish standing pilosity, while it is somewhat more abundant than in the most of species of the *cursor*- and *emmae*-group. Occiput with more than 10 straight erect hairs, frons and clypeus without such hairs. Alitrunk and coxae with scattered erect hairs of different length, petiolar scale with a few short hairs. Head (especially temples and occiput), mesopleura, propodeum and coxae with dense pubescence, formed by long, very abundant silverish appressed hairs. Gaster with very sparse and short decumbent hairs. Scape and funiculus with short, quite thick, whitish subdecumbent hairs, tibiae with numerous, rather long subdecumbent to suberect setae, and additionally with less abundant yellowish bristles on inner margin. Whole body black.

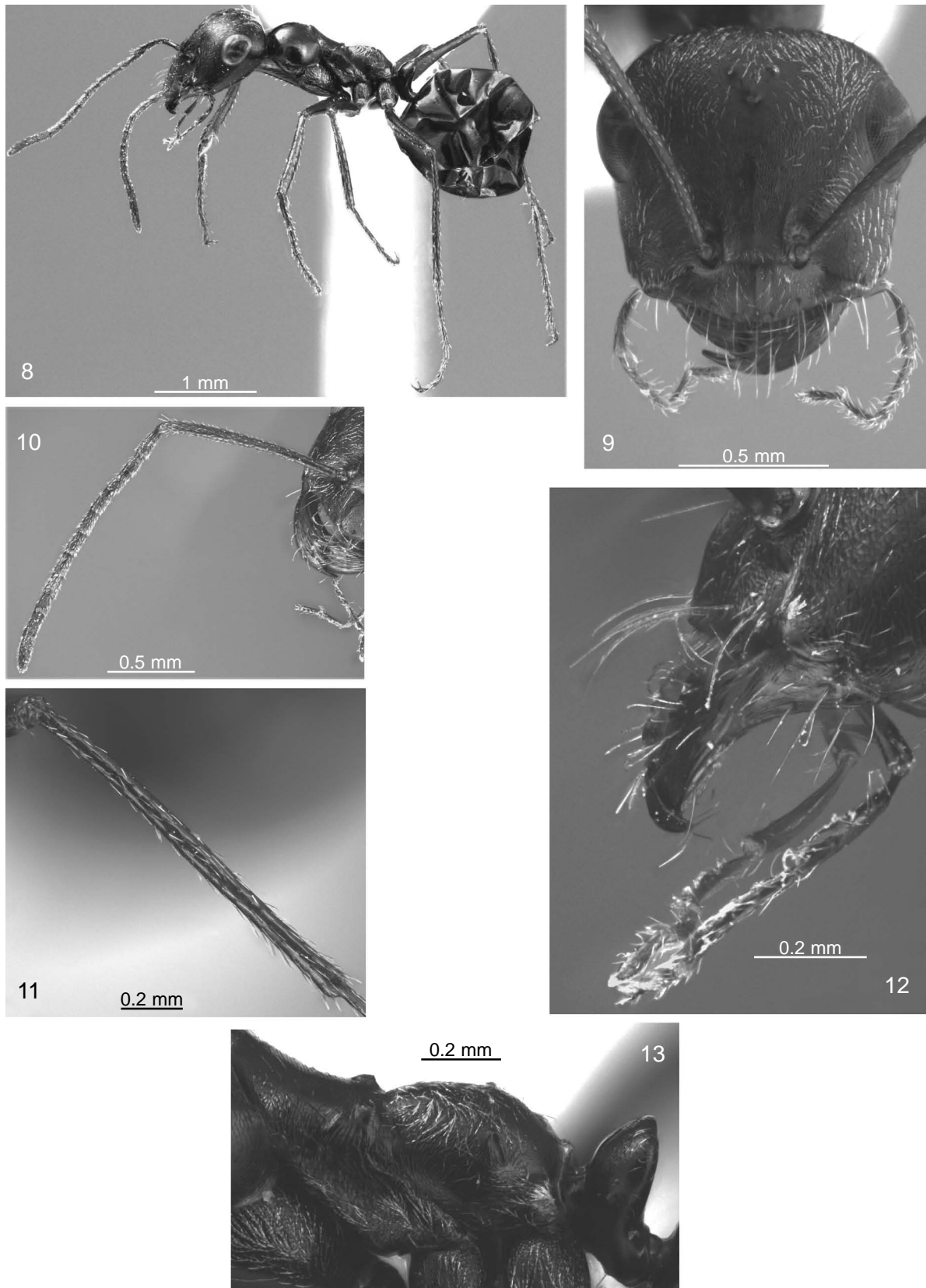
**Queens and males** are unknown.

Measurements and indices see in Tables 1 and 2.

**Ecology.** This species was collected in the interior region of the Central Persian desert basin. This area is

Table 1. Measurements (in mm) of *Cataglyphis stigmatus* sp. nov. and *C. pubescens* sp. nov.

Measurements	<i>C. stigmatus</i> (n=7)					<i>C. pubescens</i> (n=9)				
	holotype	min	max	mean	± SD	holotype	min	max	mean	± SD
HL	1.580	1.066	2.075	1.506	0.3001	1.030	0.988	1.238	1.087	0.0804
HW	1.680	1.002	2.025	1.456	0.3066	0.983	0.962	1.317	1.079	0.1090
SL	2.125	1.404	2.703	1.975	0.3681	1.085	1.050	1.333	1.141	0.0784
FS <sub>1</sub>	0.435	0.247	0.643	0.420	0.1189	0.234	0.217	0.290	0.242	0.0205
FS <sub>2</sub>	0.280	0.169	0.368	0.258	0.0578	0.121	0.122	0.170	0.137	0.0150
FS <sub>3</sub>	0.305	0.205	0.388	0.288	0.0521	0.165	0.155	0.200	0.170	0.0147
MP <sub>3</sub>	0.525	0.351	0.610	0.481	0.0796	0.269	0.243	0.318	0.286	0.0218
MP <sub>4</sub>	0.525	0.351	0.614	0.479	0.0790	0.295	0.273	0.322	0.293	0.0165
MP <sub>5</sub>	0.330	0.234	0.392	0.306	0.0449	0.186	0.143	0.200	0.176	0.0191
MP <sub>6</sub>	0.205	0.162	0.240	0.195	0.0249	0.146	0.113	0.174	0.141	0.0176
OL	0.480	0.326	0.575	0.432	0.0739	0.355	0.351	0.410	0.377	0.0194
GL	0.658	0.416	0.850	0.606	0.1182	0.401	0.390	0.494	0.431	0.0388
AL	2.781	1.885	3.560	2.577	0.4857	1.396	1.349	1.720	1.494	0.1056
PnW	1.162	0.710	1.400	1.045	0.2045	0.712	0.675	0.905	0.760	0.0731
PL	0.450	0.350	0.720	0.492	0.1215	0.340	0.320	0.391	0.350	0.0232
PW	0.317	0.247	0.460	0.328	0.0666	0.304	0.299	0.414	0.340	0.0444
PH	0.340	0.210	0.507	0.357	0.0973	0.345	0.278	0.395	0.356	0.0312
HTL	3.240	1.950	3.950	2.875	0.5728	1.381	1.339	1.610	1.447	0.0935
PSL	0.325	0.215	0.375	0.291	0.0491	0.091	0.078	0.125	0.100	0.0143



Figures 8–13. Photos of details of structure of *Cataglyphis pubescens* sp. nov. (holotype, worker). (8) Body, lateral view; (9) head, frontal view; (10) antenna; (11) hind tibia; (12) clypeus and maxillary palps, lateral view; (13) propodeum and petiole, lateral view (photo H.-P. Katzmann).

Table 2. Morphometric indices of *Cataglyphis stigmatus* sp. nov. and *C. pubescens* sp. nov.

Indices	<i>C. stigmatus</i> (n=7)					<i>C. pubescens</i> (n=9)				
	holotype	min	max	mean	± SD	holotype	min	max	mean	± SD
CI	1.063	0.938	1.064	0.991	0.0520	0.954	0.977	1.068	1.005	0.0380
SI <sub>1</sub>	1.345	1.243	1.352	1.314	0.0309	1.053	0.984	1.077	1.050	0.0326
SI <sub>2</sub>	1.265	1.265	1.422	1.363	0.0502	1.104	1.005	1.149	1.060	0.0466
OI <sub>1</sub>	0.286	0.283	0.325	0.299	0.0148	0.361	0.308	0.374	0.350	0.0179
OI <sub>2</sub>	0.729	0.664	0.839	0.719	0.0544	0.885	0.811	0.949	0.876	0.0480
FSI <sub>1</sub>	1.554	1.409	1.843	1.616	0.1453	1.934	1.622	1.954	1.777	0.1083
FSI <sub>2</sub>	0.744	0.660	0.875	0.761	0.0817	0.818	0.712	0.888	0.791	0.0541
MPI <sub>1</sub>	1.591	1.500	1.680	1.561	0.0519	1.586	1.519	1.936	1.679	0.1557
MPI <sub>2</sub>	0.981	0.886	1.024	0.954	0.0361	0.889	0.858	1.027	0.931	0.0637
PSI	0.193	0.185	0.220	0.202	0.0116	0.093	0.079	0.111	0.092	0.0099
AI	2.393	2.345	2.654	2.477	0.1018	1.961	1.754	2.183	1.973	0.1343

characterized by hot summer and cold winter with mean annual temperature 19°C, and by the very low annual precipitation – 67 mm only. This territory belongs to the Irano-Turanian phyto-geographical region. Most specimens were collected by hand from a nest. Nest was built in an open area, having a small entrance without surrounding structures.

**Comparative diagnosis.** *C. pubescens* shares several features of the *emeryi*-, *cursor*- and *emmae* species-groups of *Cataglyphis*. Thus, setae on the anterior clypeal margin are very long, subequal to or even somewhat longer than the length of clypeus, similarly to *C. emeryi* (Karawajew), but unlike the latter species these setae join close to the anterior clypeal margin, as in the species of *cursor*-group (Radchenko 1997a, 1998). The first funicular segment is quite long, about twice longer than the second one and only slightly shorter than the second and third segments together: this is one of the diagnostic features of workers of the *emmae*-group (according Agosti 1990). On the other hand, worker caste of *C. pubescens* is not dimorphic (the latter is characteristic for the *emmae*-group species); additionally, they have distinctly thicker petiole scale than *C. emeryi*. In general, workers of the species of all three groups mentioned above are superficially quite similar to one another, particularly their whole body is blackish-brown to black, they have petiole with distinct scale (i.e. it is not cuneiform or nodiform), but their males well differ by the structure of genitalia (Agosti 1990; Radchenko 1997a). Moreover, workers of *C. emmae* and *C. emeryi* move slowly, rather like *Proformica* Ruzsky species (*C. emmae* has been originally described as a member of *Proformica*) than *Cataglyphis*, while *C. pubescens* move very fast, like most of the *Cataglyphis* species. The proper taxonomic position of this species can be

definitively resolved when males will be found. Despite this little taxonomic vagueness, *C. pubescens* clearly differs from any known species of the groups mentioned above by the much more developed, dense appressed pubescence on the head and alitrunk.

## ACKNOWLEDGEMENTS

We are sincerely grateful to curators of the ant collections of all Museums and Institutions mentioned above for the assistance during our investigations. We thank Martin Pfeiffer and Elisabeth Kalko for their kind support of O. Paknia study in Germany, and to Hans-Peter Katzmann (Ulm University, Germany) for making photos of the holotype specimens. We are also grateful to the staff of Department of Environment of Iran for the assistance and help that allowed that material to be collected from natural reserves in Iran. We are also grateful to X. Espadaler (Universitat Autònoma de Barcelona, Spain) and B. Markó (Cluj University, Romania) for the available comments to the manuscript of this paper.

## REFERENCES

- Agosti, D. 1990. Review and reclassification of *Cataglyphis* (Hymenoptera, Formicidae). *Journal of Natural History*, 24: 1457–1505.
- Agosti, D. 1994. A new inquiline ant (Hymenoptera, Formicidae) in *Cataglyphis* and its phylogenetic relationship. *Journal of Natural History*, 28: 913–919.
- Baroni Urbani, C. 1969. Una nuova *Cataglyphis* dei monti dell'Anatolia. *Fragmenta entomologica*, 6(3): 213–222.

- Bolton, B. 1995. A new general catalogue of the ants of the World. Cambridge-London, Harvard University Press, 504 pp.
- Bolton, B., Alpert, G., Ward, P. S. and P. Naskrecki. 2007. Bolton's Catalogue of Ants of the World. Harvard University Press, Cambridge-London, CD-Rom.
- Paknia, O., Radchenko, A., Alipanah, H. and M. Pfeiffer. 2008. A preliminary checklist of the ants (Hymenoptera: Formicidae) of Iran. *Myrmecological News*, 11: 151–159.
- Paknia, O., Radchenko, A. and M. Pfeiffer. 2009. New records of ants (Hymenoptera, Formicidae) from Iran. *Asian Myrmecology*, 3: 29–38
- Radchenko, A. G. 1997a. A review of ants of the genus *Cataglyphis* Foerster (Hymenoptera, Formicidae) from Asia. *Entomologicheskoe obozrenie*, 76 (2): 424–442 (in Russian; English translation: *Entomological Review* (Washington), 1997, 77: 684–698).
- Radchenko, A. G. 1997b. *Cataglyphis zakharovi* sp. nov. – the second socially parasitic species in the genus *Cataglyphis* Foerster (Hymenoptera, Formicidae). *Annales Zoologici*, 46: 207–210.
- Radchenko, A. G. 1998. A Key to ants of the genus *Cataglyphis* Foerster (Hymenoptera, Formicidae) from Asia. *Entomologicheskoe obozrenie*, 77 (2): 502–508 (in Russian; English translation: *Entomological Review* (Washington), 1998, 78: 475–480).

Received: December 1, 2009

Accepted: March 9, 2010