

# A Key to Ants of the Genus *Cataglyphis* Foerster (Hymenoptera, Formicidae) from Asia

A. G. Radchenko

Institute of Zoology, Ukrainian Academy of Sciences, Kiev, Ukraine

Received August 14, 1996

**Abstract**—A key to 34 Asian species of the genus *Cataglyphis* (excluding some species known from Saudi Arabia) is given.

The genus *Cataglyphis* includes about 100 species, distributed almost exclusively in the S Palaearctic, with only few species found also in arid areas of the Afrotropical Region, India, and Pakistan. Representatives of this genus are mainly large (up to 13 mm long) ants; most of the species are clearly polymorphic, which in some cases makes identification difficult.

Although the supraspecific taxonomy of this genus was developed in detail by Agosti (1990), there exist only 3 rather complete modern keys to species of *Cataglyphis* known from Saudi Arabia (Collingwood, 1985), the Balkans (Agosti and Collingwood, 1987), and Turkmenistan (Dlusskii *et al.*, 1990). The keys provided in earlier publications (Ruzsky, 1905; Santschi, 1929) have become entirely outdated and virtually unusable.

The key provided below uses characters of workers; characters related to sex are specially indicated in all particular cases. The key includes 34 species distributed in Asia (except Saudi Arabia).

Reviews of species and notes on the synonymy will be presented in forthcoming communications.

## KEY TO ASIAN SPECIES OF THE GENUS *CATAGLYPHIS*.

### Workers

- 1(4). 3rd maxillary palpomere flattened, with very long, more than 2 times as long as maximum palpomere width, erect hairs (Fig. 1a).
- 2(3). Soldier caste present; in soldiers, mandibles long, saber-shaped, with inner margin bearing no denticles (Fig. 1b). Entire body with very dense, long, silky, appressed pubescence. Head and thorax in workers ochre-colored, in soldiers orange-

red; abdomen in soldiers brown.—N Africa, Israel ..... *C. bombycinus* (Roger).

- 3(2). Soldier caste absent. Appressed pubescence considerably sparser and shorter. Body uniformly yellow or orange-yellow, abdomen in large workers sometimes pale brown.—Israel, Sinai, and Arabia ..... *C. sabulosus* Kugler.
- 4(1). 3rd maxillary palpomere not flattened, with shorter erect hairs more than 1.5 times as long as maximum palpomere width (Fig. 3g, 3i).
- 5(16). Petiole with squamula (Fig. 1d, 1f, 1g); abdomen shining, with smooth or finely sculptured surface.
- 6(7). Body uniformly pale yellow.—Deserts of Dagestan, N Caspian Area, Kazakhstan, Middle Asia, and Afghanistan ..... *C. pallidus* (Mayr).
- 7(6). Head and thorax black to red-brown; abdomen dark brown to black.
- 8(9). Clypeal setae longer than clypeus, attached at some distance from its anterior margin (Fig. 1c). Squamula of petiole thin in lateral view (Fig. 1d). Workers small (3.5–5 mm), with weak polymorphism.—Deserts of Middle Asia, Kazakhstan, and Iran ..... *C. emeryi* (Karawajew).
- 9(8). Clypeal setae shorter than clypeus, attached at its anterior margin (Fig. 1e). Squamula of petiole thicker (Figs. 1f, 1g). Workers larger (3.5–8 mm), polymorphic.
- 10(13). Head distinctly shagreened, dull (at least in larger workers).
- 11(12). Squamula of petiole thick and low (Fig. 1g). Abdominal tergites with very sparse appressed pubescence, distance between hairs clearly ex-

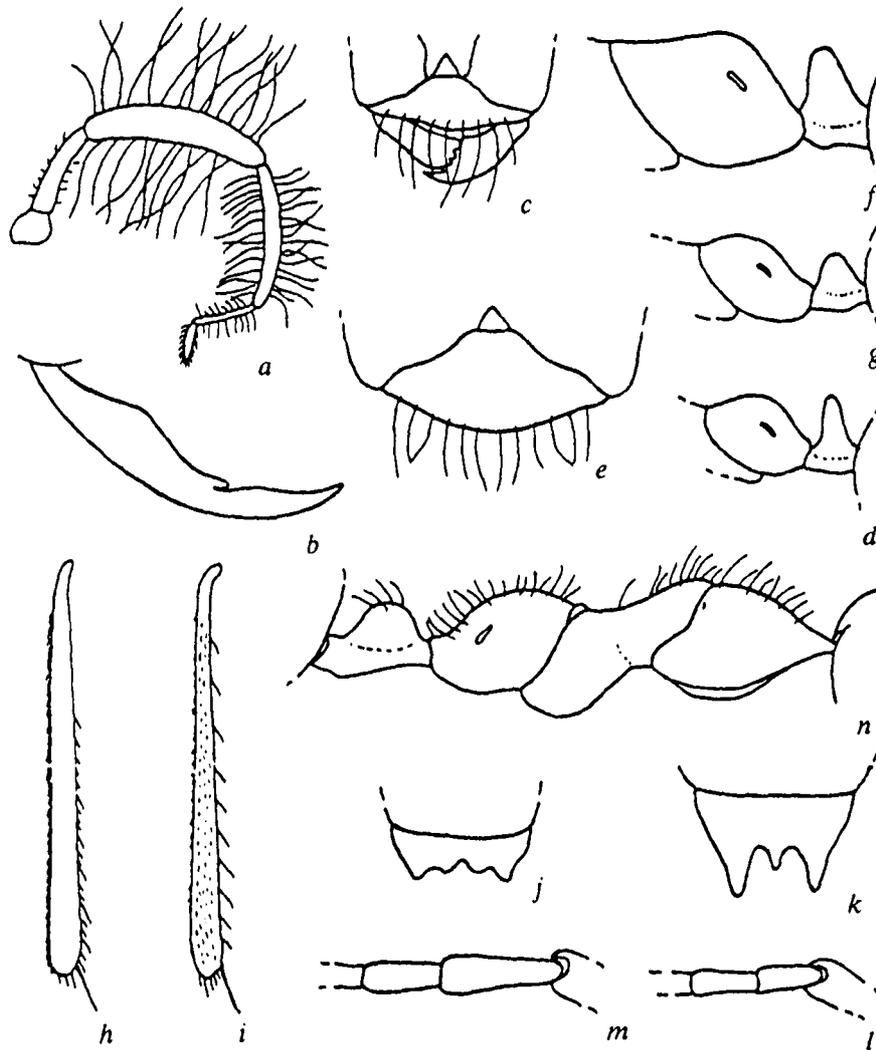
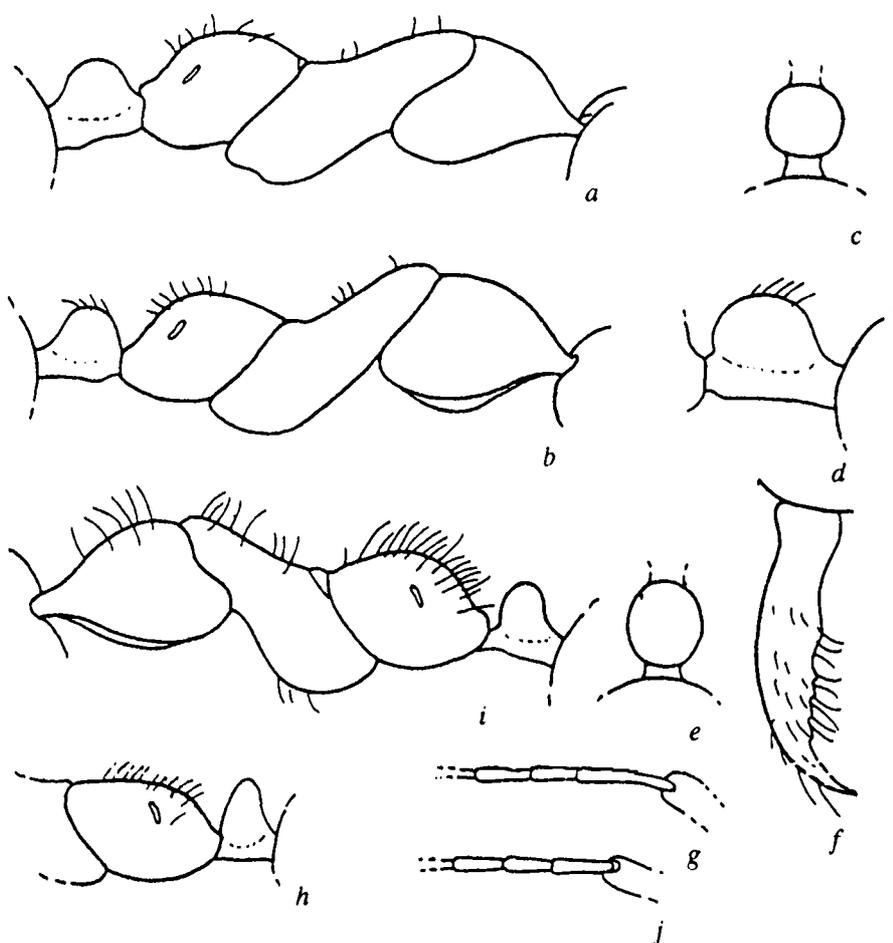


Fig. 1. *Cataglyphis* Foerster. (a, b) *C. bombycinus*; (c, d) *C. emeryi*, syntype; (e, f) *C. aenescens*; (g) *C. cugiai*; (h) *C. setipes*; (i) *C. nodus*; (j) *C. nigripes*; (k) *C. bergianus*; (l) *C. isis*; (m) *C. indicus*, holotype; (n) *C. machmal*, holotype. (a) Maxillary palps; (b) mandible; (c, e) clypeus; (d, f, g) lateral view of propodeum and petiole; (h, i) hind tibia; (j, k) subgenital plate; (l, m) 1st and 2nd flagellomeres; (n) lateral view of thorax and petiole. (a, c-i, l-n) Workers; (b) soldier; (j, k) males.

- ceeding their length.—Karakorum .....  
..... *C. cugiai* Menozzi.
- 12(11). Squamula of petiole thinner and higher (Fig. 1f). Abdominal tergites with denser appressed pubescence: distance between hairs 0.7–1 times length of hairs.—Westwards as far as Italy; eastwards as far as Tuva, Mongolia, and N China; and northwards as far as Czechia, Kiev, Kursk, Samara; also in Turkey, Caucasus, Middle and Central Asia .....  
..... *C. aenescens* (Nylander).
- 13(10). Head (at least in posterior half) smooth, shining.
- 14(15). 3rd maxillary palpomere rather short, 0.7 times as long as maximum eye diameter. Squamula of petiole comparatively thin.—Deserts of Middle Asia .....  
..... *C. takyricus* Dlussky.
- 15(14). 3rd maxillary palpomere as long as, or longer than maximum eye diameter. Squamula of petiole comparatively thick.—Syria .....  
..... *C. frigidus* (E. André).
- 16(5). Petiole cuneiform, conical, or node-shaped (Figs. 1n; 2a, 2b, 2d, 2h, 2i; 3a, 3c, 3e, 3f, 3k, 3l). If petiole with more or less distinct thick squamula, then abdomen dull, densely sculptured.
- 17(50). Abdomen dull, densely sculptured. Large: 5–13 mm.
- 18(39). Petiole node-shaped, more or less rounded in dorsal view (Figs. 1a, 2a, 2b, 2d).



**Fig. 2.** *Cataglyphis* Foerster. (a) *C. nodus*; (b, c) *C. indicus*, holotype; (d, e) *C. oasium*; (f, g) *C. kurdistanicus*, paratype; (h) *C. bucharicus*; (i) *C. piligerus*, paratype; (j) *C. foreli*, lectotype. (a, b, i) Lateral view of thorax and petiole; (c, e) dorsal view of petiolar node; (d) lateral view of petiole; (f) mandible; (g, j) 1st-3rd flagellomeres; (h) lateral view of propodeum and petiole. (a-e, g-j) Workers; (f) soldier.

- 19(20). Body yellow, only abdomen sometimes brownish.—Turkey ..... *C. lunaticus* Baroni Urbani.
- 20(19). Body of different color.
- 21(28). Outer surface of tibiae bears coarse, black or dark brown, semi-erect setae (Fig. 1h).
- 22(23). Body uniformly dark brown to black, only head sometimes with slight red tint.—Iran ..... *C. bellicosus* (Karawajew), stat. n.
- 23(22). Head and thorax of different tints of red; abdomen black-brown to black.
- 24(25). Body with rather fine, whitish, erect hairs.—Dagestan, Kazakhstan, Middle Asia, E Iran, Afghanistan, Pakistan, and India ..... *C. setipes* (Forel).
- 25(24). Erect hairs on body coarse, thick, black or brown.
- 26(27). Males: subgenital plate with medial incision and short lateral processes (Fig. 1j).—W Iran ..... *C. nigripes* Arnoldi.
- 27(26). Males: subgenital plate without incision, with long lateral and median processes (Fig. 1k).—Middle Asia, S Kazakhstan, and Afghanistan ..... *C. bergianus* Arnoldi, stat. n. = *C. karakalensis* Arnoldi, syn. n.
- 28(21). Outer surface of tibiae without setae, with or without fine whitish erect hairs (Fig. 1i).
- 29(30). 1st flagellomere short; as long as, or only slightly longer than 2nd (Fig. 1l). Body uniformly black.—Egypt, Middle East, and Arabia ..... *C. isis* Forel. = *C. protuberatus* Crawley, syn. n.
- 30(29). 1st flagellomere long, distinctly longer than 2nd (Fig. 1m).

- 31(32). Body uniformly black-brown to black.—Middle East, Arabia, and Iran ... *C. niger* (E. André).
- 32(31). Head and thorax of different tints of red; abdomen black-brown or black.
- 33(34). Entire body (including tibiae and scapus) with numerous fine erect hairs (Fig. 1*n*).—Armenia ...  
..... *C. machmal* Radtschenko et Arakelian.
- 34(33). Body with scarce erect hairs; tibiae and scapus without such hairs (Fig. 2*a*, 2*b*).
- 35(36). Mesonotum not raised above pronotum; propodeum broadly rounded (Fig. 2*a*).—Hungary, Rumania, Balkan Peninsula, Turkey, Transcaucasia, Dagestan, Iran, Iraq, and Kopet Dagh .....  
..... *C. nodus* (Brullé).
- 36(35). Mesonotum distinctly raised above pronotum; propodeum narrowly rounded, more or less angular (Fig. 2*b*).
- 37(38). Node of petiole rather short; higher than long in lateral view, rounded in dorsal view (Fig. 2*b*, 2*c*).—India ..... *C. indicus* Pisarski.
- 38(37). Node of petiole rather long; about as high as long in lateral view, oval in dorsal view (Fig. 2*b*, 2*c*).—N Africa, Middle East .....  
..... *C. oasium* Menozzi, stat. n.
- 39(18). Petiole wide-cuneiform or conical (Figs. 2*h*, 2*i*; 3*a*); if petiole slightly node-shaped (Fig. 3*c*), then eyes large, as long as, or 0.8–1 times as long as genae, and body uniformly black or black-brown.
- 40(41). 1st flagellomere very long, no shorter than 2nd and 3rd combined (Fig. 2*g*). Body with black or brown coarse erect hairs. Soldier caste present; soldiers have saber-shaped mandibles with blunt denticles along inner margin (Fig. 2*f*). Head and thorax yellowish red, abdomen red-brown to dark brown.—Turkey, Iraq .....  
..... *C. kurdistanicus* Pisarski.
- 41(40). 1st flagellomere distinctly shorter than 2nd and 3rd combined (Fig. 2*j*). Body with whitish or yellowish, fine, erect hairs. Soldier caste absent. Body of different color.
- 42(45). Thorax and margin of occiput with numerous erect hairs (Fig. 2*h*, 2*i*).
- 43(44). Horizontal part of propodeum distinctly longer than sloping one. Petiole high, narrow-cuneiform, with weakly convex anterior surface, about as high as propodeum (Fig. 2*h*). Head and thorax red to red-brown (posterior half of thorax sometimes dark brown); abdomen dark brown to black.—Mountains of Uzbekistan and Tajikistan; Afghanistan and N Iran .....  
..... *C. bucharicus* Emery, stat. n.
- 44(43). Horizontal part of propodeum as long as sloping one. Petiole cuneiform, with strongly convex anterior surface, clearly lower than propodeum (Fig. 2*i*). Body uniformly dark brown to black.—Turkmenistan and Uzbekistan .....  
..... *C. piligerus* Arnoldi.
- 45(42). Thorax and margin of occiput with or without sparse erect hairs (Fig. 3*a*–3*d*). Body black or black-brown.
- 46(49). Eyes large, 0.8–1 times as long as genae (Fig. 3*b*, 3*d*).
- 47(48). Petiole low, nearly node-shaped (Fig. 3*c*). Occipital margin of head strongly convex, rounded (Fig. 3*d*).—Deserts of Turkmenistan and Uzbekistan ..... *C. oxianus* Arnoldi.
- 48(47). Petiole comparatively higher, broad-cuneiform (Fig. 3*a*). In large workers, occipital margin of head straight or slightly concave (Fig. 3*b*).—Turkmenistan, Iran ..... *C. foreli* (Ruzsky).
- 49(46). Eyes smaller, 0.6–0.5 times length of genae.—Middle East ..... *C. altisquamis* (E. André).
- 50(17). Surface of abdomen smooth or very finely sculptured, shining. Smaller: 3.5–8 mm.
- 51(52). Body uniformly yellow or orange-yellow; abdomen sometimes partly brownish.  
—Bulgaria, Egypt, Middle East, Arabia, Iraq, Iran, Afghanistan, Turkey, and S Transcaucasia ..  
..... *C. lividus* (E. André).  
—Middle East ..... *C. viaticoides* (E. André).<sup>1</sup>
- 52(51). Body of different coloration.
- 53(56). Thorax and head orange-red; abdomen black.
- 54(55). Petiole low; in lateral view node longer than high (Fig. 3*e*). Occipital margin of head bears 6–10 straight, erect hairs.—N Africa, Middle East, Asia Minor, Arabia, S Transcaucasia, and Iran .....  
..... *C. ruber* (Forel).

<sup>1</sup>The problems concerning taxonomy of *C. viaticoides* and *C. lividus* were considered by Agosti (1990) and will be dealt with in my communications to follow.

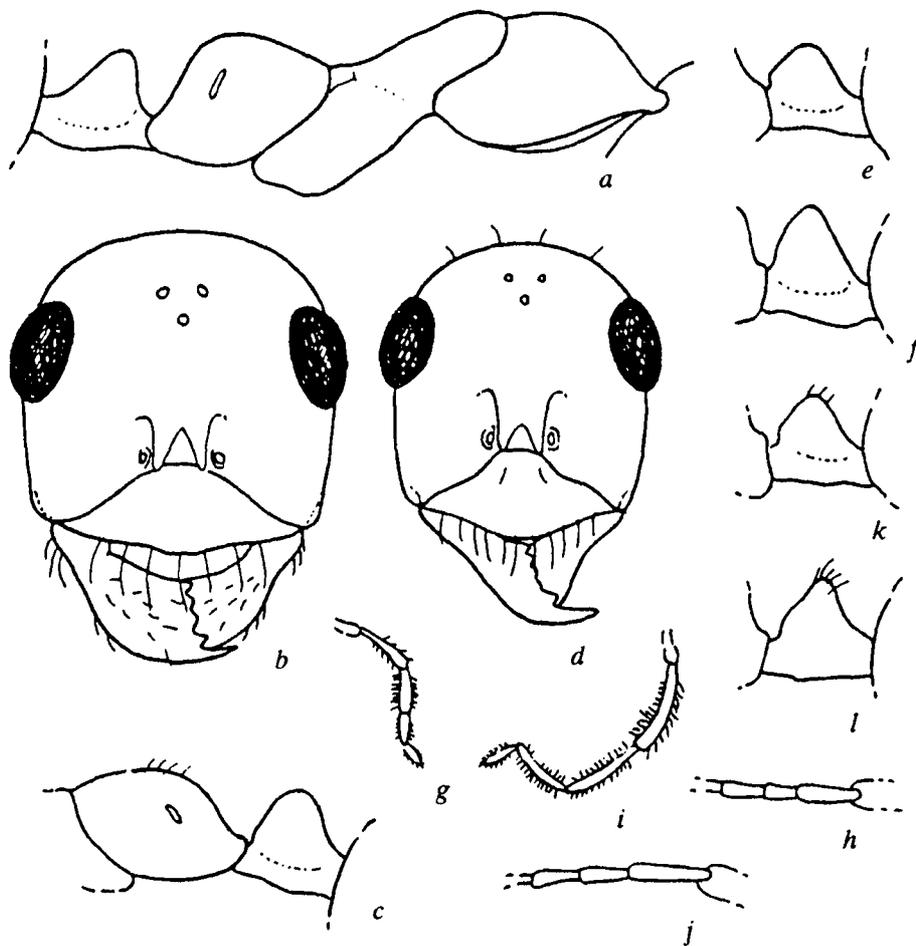


Fig. 3. *Cataglyphis* Foerster. (a, b) *C. foreli*, lectotype; (c, d) *C. oxianus*, paratype; (e) *C. ruber*; (f) *C. cuneinodis*; (g, h) *C. cinnamomeus*, syntype; (i-k) *C. albicans*; (l) *C. alibabae*, paratype. (a) Lateral view of thorax and petiole; (b, d) frontal view of head; (c) lateral view of propodeum and petiole; (e, f, k, l) lateral view of petiole; (g, i) 3rd-6th maxillary palpomeres; (h, j) 1st-3rd flagellomeres. All figures related to workers.

55(54). Petiole rather high, cuneiform; in lateral view, node higher than long (Fig. 3f). Occipital margin of head without erect hairs.—S Transcaucasia, Iran ..... *C. cuneinodis* Arnoldi, stat. n.

56(53). Body uniformly brown to black.

57(60). Maxillary palps short; 6th palpomere nearly as long as 5th (Fig. 3g). 2nd flagellomere distinctly shorter than 3rd and 2-2.3 times as long as wide (Fig. 3h).

58(59). Head and large part of thorax completely smooth, strongly shining. Node of petiole longer than high (in lateral view).—Kopet Dagh ..... *C. elegantissimus* Arnoldi.

59(58). Body with fine but distinct superficial sculpture, weakly shining. Node of petiole as high as, or higher than long (in lateral view).—Middle

Asia, S Kazakhstan, Afghanistan .....  
..... *C. cinnamomeus* (Karawajew).

60(57). Maxillary palps long; 6th palpomere 0.6-0.7 times as long as 5th (Fig. 3i). 2nd flagellomere as long as 3rd and 3 times as long as wide (Fig. 3j).

61(62). Head and thorax more coarsely sculptured, semi-dull.—N Africa, Lebanon, Arabia .....  
..... *C. semitonsus* Santschi.

62(61). Head and thorax with smoothed sculpture; integument at least weakly shining.

63(64). Petiole low, broadly rounded or slightly flattened at apex (Fig. 3k).—Spain, N Africa, Sudan, Ethiopia, Middle East, Arabia, Transcaucasia, Afghanistan ..... *C. albicans* (Röger).

64(63). Petiole high, narrowly rounded at apex (Fig. 3l).—Iraq ..... *C. alibabae* Pisarski.

#### REFERENCES

1. Agosti, D., Review and Reclassification of *Cataglyphis* (Hymenoptera, Formicidae), *J. Nat. Hist.*, 1990, vol. 24, pp. 1457–1505.
2. Agosti, D. and Collingwood, C.A., A Provisional List of the Balkan Ants (Hymenoptera, Formicidae) and a Key of the Worker Caste. II. Key of the Worker Caste, Including the European Species without the Iberian, *Mitt. Schweiz. Ent. Ges.*, 1987, vol. 60, nos. 3–4, pp. 261–293.
3. Collingwood, C.A., Hymenoptera: Fam. Formicidae of Saudi Arabia, *Fauna of Saudi Arabia*, 1985, vol. 7, pp. 230–302.
4. Dlusskii, G.M., Soyunov, O.S., and Zabelin, S.I., *Murav'i Turkmenistana* (Ants of Turkmenistan), Ashkhabad: Ylym, 1990.
5. Ruzsky, M.D., *Murav'i Rossii* (Ants of Russia), Kazan, 1905.
6. Santschi, F., Etudes sur le *Cataglyphis*, *Rev. Suisse Zool.*, 1929, vol. 36, pp. 25–70.