

Description of the queen caste in *Messor maroccanus* SANTSCHI, 1927 (Hymenoptera: Formicidae)

Kiko GÓMEZ & Xavier ESPADALER

Abstract

The queen caste of *Messor maroccanus* is described, and the current published and new records in the Iberian Peninsula are presented. A key for queens of Iberian species of *Messor* is proposed.

Key words: *Messor maroccanus*, description of female, distribution

Kiko Gómez (contact author) & Prof. Dr. Xavier Espadaler, Ecology Unit and CREAM, Universitat Autònoma de Barcelona, 08193 Bellaterra (Barcelona), Spain. E-mail: kiko@hormigas.org

Introduction

The ant genus *Messor* comprises ten species in the Iberian Peninsula and more than one hundred species in the world (BOLTON 1995a, 1995b, AGOSTI & JOHNSON 2005), mainly in the Mediterranean zone.

Messor maroccanus SANTSCHI, 1927 was first described by Emery in 1908 as a variety of *Messor barbarus* ssp. *meridionalis* (EMERY 1908: 451). Santschi redescribed the worker caste in a key as *Messor minor* st. *maroccanus* (SANTSCHI 1927: 248), and it was raised to species by COLLINGWOOD & YARROW (1969: 64) but no arguments were given to adopt this decision. The male was recently described in the revision of the genus in Morocco (CAGNIANT & ESPADALER 1998: 426). Here we describe the queen caste.

Messor maroccanus can be easily distinguished in the worker caste from the other taxa in the Iberian Peninsula by its red coloured mesosoma contrasting with black head and gaster.

Material and Methods

Acronyms of morphometric characteristics:

AL (Mesosoma Length): In lateral view, mesosoma diagonal length measured from the caudalmost portion of the propodeum to the frontalmost point of the anterior pronotal slope.

CI: $HW * 100 / HL$

EL (Eye Length): Maximum diameter of the eye.

FWL (Forewing Length): Maximum length of the forewing measured from the wing insertion to the apical tip.

HL (Head Length): in frontal view, distance from the anterior clypeal margin to the occiput, measured in the median line.

HW (Head Width): in frontal view, maximum width of the head, measured behind the eyes and not including them.

MW (Mesosoma Width): Maximum width of mesosoma in dorsal view.

PW (Petiole Width): Maximum width of petiole in dorsal view.

PPW (Postpetiole Width): Maximum width of postpetiole in dorsal view.

SL (Scape Length): Maximum length of scape, measured as the average of both scapes.

Sculpture terms as in EADY (1968). Wing measurements as in REYES-LÓPEZ & PORRAS-CASTILLO (1985). All measurements given in mm (minimum, mean, maximum). Measurements were done with a binocular microscope, Leica MZ16, at ranges varying from 25× to 100×.

Acronyms of repositories of specimens:

KGC: Kiko Gómez Collection, Bellaterra, Spain

MCN Madrid: Museo Natural de Ciencias Naturales de Madrid, Spain

NHM Vienna: Natural History Museum in Vienna, Austria

XEC: Xavier Espadaler Collection, Bellaterra, Spain

Examined material: Spain: Puerto de Santa María, Cádiz, 6.X.2003, leg. R. Huertas, 4 queens (3 XEC, 1 NHM Vienna); 4.III.2004, 1 queen (KGC); 17.III.2004, 1 queen (KGC); El Rocío, Huelva, 20.V.2000, leg. X. Espadaler, 1 queen (XEC). All of the specimens captured in pine wood forests in South Spain.

Description of queen of *Messor maroccanus* (Figs. 1 - 5)

Measurements [$n = 7$]: HL: 2.12, 2.17, 2.24; HW: 2.28, 2.34, 2.43; SL: 1.77, 1.82, 1.88; EL: 0.60, 0.63, 0.65; AL: 4.50, 4.53, 4.58; FWL: 13.29, 13.77, 13.94; PW: 0.76, 0.81, 0.85; PPW: 1.01, 1.13, 1.22; CI: 106, 108, 111; EL / HL = 0.27, 0.29, 0.31; SL / HW = 0.77, 0.78, 0.79.

Wing measurements [$n = 6$]: ACD: 1.11, 1.22, 1.50; CUA: 0.51, 0.56, 0.65; LCD: 1.39, 1.52, 1.71; LRM: 0.63, 0.67, 0.75; LSC: 2.05, 2.10, 2.24; LSR: 0.46, 0.53, 0.58; MCA: 1.57, 1.80, 2.05; MCU: 0.91, 1.04, 1.15; MF3: 0.47, 0.59, 0.77; RSF: 0.37, 0.45, 0.52.

Head black, with mandibles, genae close to mandibular insertions, scape and funiculus red to dark brown. Subrectangular ($HL / HW = 90, 93, 95$), with sides subparallel. Clypeus with a reddish tinge. Frontal lobes clearly demarcated, striated. Frontal carinae short, subparallel and diverging in its posteriormost end. Ocelli clearly visible.

Big eyes (EL / HL = 0.27, 0.29, 0.31) centred in the sides of the head. Some very small hairs visible between the ommatidia at high magnifications (80×). General surface appearance punctulated with hairs, with the surface between the fovea shining. Frontal triangle and centre of clypeus smooth, surrounded by some vertical-longitudinal striae. Frons vertically striated with the striae clearly demarcated. Striae reaching from the frontal lobes to the ocelli. Genae striated, with striae increasing its width the closer to the frontal lobes and to the mandibles. These striae are circle-shaped, parallel to the antennal sockets, in its lower section and longitudinal, parallel to the frons' striae, in the upper section. Some very weak striae can appear bordering the eyes. Gula smooth and upper third of the head smooth. Mandibles brown to dark brown, with 10 - 11 teeth, well defined, decreasing in size from apical to basal, the first three much bigger than the 7 - 8 following subequal ones. The teeth are sharp and well defined in the Cádiz samples, captured during a nuptial flight, but blunt in the old queen of the Huelva sample. Sculpture longitudinally strigose (striated with smaller striae between the more marked ones). Mandibles very hairy, with yellow decumbent hairs all over the mandible surface becoming subdecumbent close to the apical margin. Antennae 12-segmented. Scapes slightly surpassing the occipital border (SL / HW = 0.77, 0.78, 0.79), with regular ovoid shape thickening to the apical tip, smoothly curved in caudal view. No lobes, ridges or flanges observed. Funicular segments cylindrical, subequal, thickening to the apical. Scape and funiculus very hairy, covered with yellow appressed to subdecumbent pilosity, becoming suberect close to the tip of scape. Yellow hairs, appressed and relatively small in size (0.05 - 0.1 mm), distributed sparsely all over the head surface. These hairs become erect in the median line of the occipital margin and gradually tends to become appressed the closer to the mandibular insertions, being erect to subdecumbent on the occipital line and reaching the eye, and subdecumbent to appressed in the genae and sides of the head. Two parallel lines of 10 - 15 long (0.3 - 0.6 mm) erect and suberect yellow hairs appear from the clypeus to the ocelli following the frontal ridges, with some smaller (0.05 - 0.1 mm) erect to subdecumbent hairs between them. Anteriormost border of clypeus with row of long unpaired hairs (~ 17 - 19) oriented ventrad and reaching half the length of the mandibles. Gula with psammophore, formed by very long "J" shaped hairs converging over the mouth, and placed around it (down the genae, perimeter of the gula and mandibles). Rest of gula bare except for some small appressed hairs close to the head insertion.

Mesosoma shiny black. Surface punctulated with hairs. Scutum and pre-scutum completely covering pronotum, with notauli present and clearly defined. Scutum smooth, with some very weak striae appearing in the junctions to the rest of the mesosoma. Scutellum weakly and longitudinally striated, the striae becoming stronger the closer to the mesonotum. Lateral sides of scutellum symmetrically striated. Mesonotum vertically striated dorsally and horizontally in the lateral portions. Pronotum longitudinally and horizontally striated, with the striae weakening from the upper and lower sections to the centre. Anepisternum and katapisternum longitudinally, horizontally and very weakly striated, creating an almost smooth surface

in the 2/3 anteriormost portion, becoming notoriously striated in the junction to the propodeum and metanotum. Propodeum canaliculated with a pair of triangular short spines clearly defined. Pronotum anterior border with numerous short, erect yellow hairs. Long (0.3 - 0.5 mm), erect hairs in the lateral sides of scutum and scutellum, but dorsal centre of the mesosoma always bare. Another layer of smaller (0.1 - 0.2 mm) appressed to decumbent hairs sparsely covering the same surface. Pronotum bare, except for some very sparse decumbent to suberect hairs, and some longer hairs in the lateral borders. Anepisternum and katapisternum with appressed to suberect medium to long hairs, becoming more dense in the antero-lateral half portion of the katapisternum. Propodeum bare except for some (2 - 10) erect bristles on its upper area, and some very short and very sparse appressed hairs.

Petiole black, slightly pedunculated, triangular, high, reaching the level of the metapleural gland when tilted horizontally. Hexagonal and clearly emarginated in frontal view. Rectangular petiolar process covering the 2/3 posterior portion, stepping abruptly before the junction to the mesosoma. Surface reticulated with the inner surface micropunctuated, and some clearly demarcated longitudinal striae laterally and ventrally. Some of them continue over the crest and just behind it forming parallel lines, the first almost forming a transverse carina. The whole dorsal and the ventral surface in the junction to the mesosoma covered by an decumbent to appressed, long, white pilosity, contrasting against the black surface. This pilosity gives the petiole a woolly appearance, specially in lateral view. Lateral and dorsal rear part bare, except for some isolated long hairs in the declivous zone. Pospetiole black, semispherical. Surface weakly reticulated with the inner surface micropunctuated and some notorious striae laterodorsally, weakly striated to smooth centrodorsally. Straight declivous zone in lateral view. Whole surface with 15 - 25 suberect bristles dorsally and 15 - 25 erect hairs ventrally. Pubescence formed by very sparse, appressed hairs.

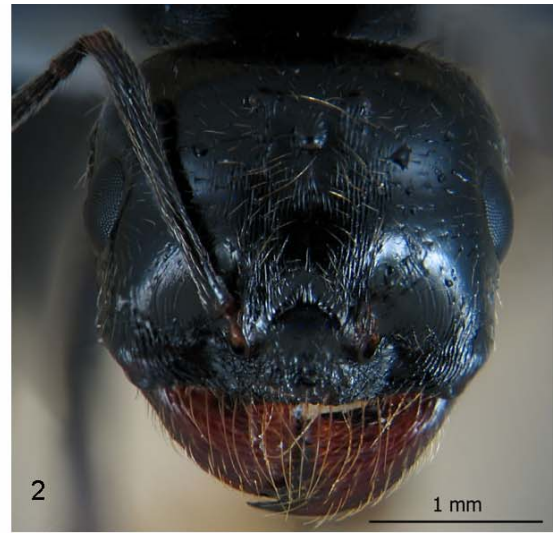
Gaster black, sometimes with the rearmost part of each segment dark brown. In some specimens the whole gaster dark brown. Surface sculpture alutaceous. General appearance hairy, with the whole surface covered with a very sparse pubescence formed by short, appressed hairs and pilosity formed by subdecumbent long hairs.

Legs: coxae reticulated, black to dark brown in some specimens, pilosity formed by long suberect hairs. Rest of the legs red to dark brown, micropunctuated, densely covered by appressed-decumbent pilosity, becoming longer and suberect in the inner surfaces of the femorae.

Wings: Venation as typical in the genus, with one closed discoidal cell and two closed cubital cells. Radial cell open.

Distribution of *Messor maroccanus* (Fig. 6)

Its distribution range stretches from North Africa (Morocco, between the Atlas Massif and the coast; CAGNIANT & ESPADALER 1998) to the Southwest of the Iberian Peninsula without surpassing 39° N and 5° W. See Figure 6 for known records of this species for the Iberian Peninsula (COLLINGWOOD & YARROW 1969, DE HARO & COLLINGWOOD 1977, MARTÍNEZ IBÁÑEZ & ESPADALER 1986, TINAUT 1989, TINAUT 1991, DE HARO & COLLINGWOOD 1992), and unpublished data from XEC, KSC, and MCN Madrid collections (red dots in the map).



Figs. 1 - 5: *Messor maroccanus*, queen: (1) Full lateral view; (2) head, frontal view; left antenna removed to leave sculpture exposed; (3) petiole and post-petiole, lateral view; (4) same, posterolateral view; (5) forewing.

Unpublished data. **Spain:** Cádiz: Conil, 26.IV.1998, leg. et det. X. Espadaler (XEC); Punta Palomas (Algeciras), 28.III.1983, leg. et det. A. Tinaut (MCN Madrid); Puerto de Santa María, 25.III.2003, leg. R. Huertas, det. K. Gómez (KGC). **Huelva:** Mazagón, 11.IV.1977, leg. F.J. Acosta, det. X. Espadaler (XEC). **Sevilla:** Hato Ratón (Villamanrique), 19.X.1982, leg. P. Jordano, det. X. Espadaler (XEC); Paradas, 07.V.1893, leg. et det. M.D. Martínez Ibáñez & X. Espadaler (MCN Madrid). **Portugal:** Lisboa, V.1957, leg. L. Weatherhill, det. X. Espadaler (XEC).

Key to queens of Iberian *Messor*

The queen of *M. celiae* is unknown; its characteristics in the key are hypothesized from worker and male morphology.

- 1 Base of scape with a broad rounded lobe produced anteriorly. Lower profile of petiole with an arcuate shape; petiole node acutely triangular in side view. *M. lobicornis* FOREL, 1894
- Without such a lobed scape. 2

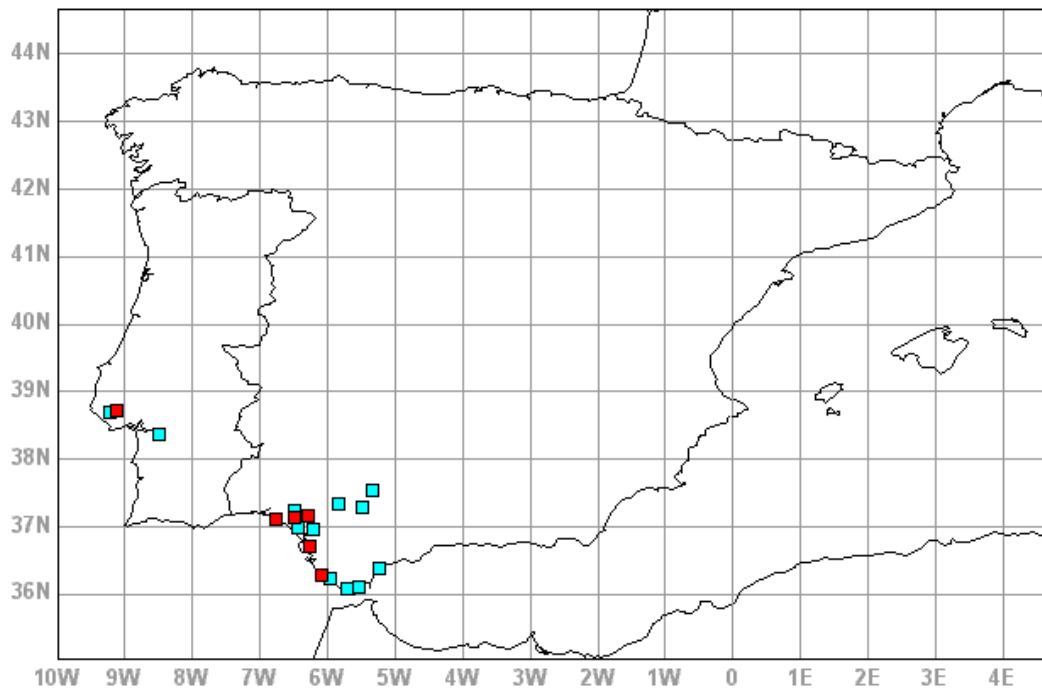


Fig. 6: Distribution of *M. maroccanus* on the Iberian Peninsula. Blue dots: published records; red dots: unpublished records.

- | | |
|--|--|
| <p>2 Underside of head with arrangement of long hairs curving sharply antieriad (psammophore). 3</p> <p>– Underside of head with scattered moderately curved or straight hairs. 8</p> <p>3 Size very small (6 - 7 mm). Petiole node with 2 - 4 hairs directed posteriad. ... <i>M. celiae</i> REYES, 1985</p> <p>– Size bigger (> 8.5 mm). 4</p> <p>4 Mesopleurae with longitudinal striature. Back of head in dorsal view with 20 - 40 curved hairs. Size up to 10 mm. 5</p> <p>– Mesopleurae with extended smooth and shining surface. Back of head at most with 18 curved hairs. Size > 10.5 mm. 6</p> <p>5 Pilosity of scape and tibia decumbent. Back of head in dorsal view with 28 - 40 curved hairs. Propodeum in side view simply angled. <i>M. hispanicus</i> SANTSCHI, 1919</p> <p>– Pilosity of scape and tibia appressed. Back of head in dorsal view with 20 - 25 curved hairs Propodeum in side view with short but well defined spines. <i>lusitanicus</i> TINAUT, 1985</p> <p>6 Dorsal profile of petiole level, without an indentation. <i>M. bouvieri</i> BONDROIT, 1918</p> <p>– Dorsal profile of petiole with a medial indentation. 7</p> <p>7 Propodeum with small but well defined triangular spines. <i>M. maroccanus</i></p> | <p>– Propodeum with two rounded angles.....
..... <i>M. timidus</i> ESPADALER, 1997</p> <p>8 Whole body very hairy. Head strongly striated longitudinally. Pronotum entirely striate. Petiole and postpetiole node transversely rugose; propodeum with two broad tubercles; colour brownish to deep brown. Size < 11 mm.
..... <i>M. structor</i> LATREILLE, 1798</p> <p>– Body with much less developed pilosity. Head and pronotum partly smooth, with a superficial striature. Petiole and postpetiole not strongly striated transversely. Thorax and gaster black. Size > 11 mm. 9</p> <p>9 Head reddish in part. Vein joining discoidal cell and cubital cell 2 as long as half the length of cubital cell 2. ... <i>M. barbarus</i> (LINNAEUS, 1767)</p> <p>– Head totally black. Vein joining discoidal cell and cubital cell 2 much shorter than half the length of cubital cell 2.
..... <i>M. capitatus</i> (LATREILLE, 1798)</p> |
|--|--|

Acknowledgements

Special thanks to Roberto Huertas, who loaned all of the specimens from Cádiz and is supplying the authors with a lot of interesting material. To Alan Hadley, designer of the CombineZ software, used for the photo automontage, who allowed us the free use of his software. To Carolina Martín and Isabel Izquierdo, who allowed us to revise the MCN Madrid collection. Two referees made constructive criticisms.

Zusammenfassung

Die Gyne von *Messor marocanus* wird beschrieben. Die publizierten und bisher unveröffentlichte Daten zur Verbreitung auf der Iberischen Halbinsel werden zusammengefasst. Ein Bestimmungsschlüssel für die Gynen der Iberischen *Messor*-Arten wird präsentiert.

References

- AGOSTI, D. & JOHNSON, N.F. 2005: Antbase. – <http://atbi.biosci.ohiostate.edu:210/hymenoptera/db_entry.by_taxon?module=list_children2_html&text_entry=Messor>, retrieved on 14 March 2005.
- BOLTON, B. 1995a: A taxonomic and zoogeographical census of the extant ant taxa (Hymenoptera: Formicidae). – *Journal of Natural History* 29: 1037-1056.
- BOLTON, B. 1995b: A new general catalogue of the ants of the world. – Harvard University Press, Cambridge, MA, 504 pp.
- CAGNIANT, H. & ESPADALER, X. 1998 [1997]: Le genre *Messor* au Maroc. – *Annales de la Société Entomologique de France* (N.S.) 33: 419-434.
- COLLINGWOOD, C.A. & YARROW, I.H.H. 1969: A survey of Iberian Formicidae (Hymenoptera) – *EOS* (Revista española de entomología) 44: 53-101.
- DE HARO, A. & COLLINGWOOD, C.A. 1977: Prospección mirmecológica por Andalucía. – *Boletín de la Estación Central de Ecología* 6: 85-90.
- DE HARO, A. & COLLINGWOOD, C.A. 1992: Prospección mirmecológica por Extremadura (España) y Sao Brás-Almodovar, Alcácer do Sal, Serra da Estrela (Portugal). – *Boletim da Sociedade Portuguesa de Entomologia* Suplemento 3: 95-104.
- EADY, R.D. 1968: Some illustrations of microsculpture in the Hymenoptera. – *Proceedings of the Royal Entomological Society of London, Series A, General Entomology* 43: 66-72.
- EMERY, C. 1908: Beiträge zur Monographie der Formiciden des paläarktischen Faunengebietes. (Hym.) Teil III. *Messor*, *Goniomma*, *Oxyopomyrmex*. – *Deutsche Entomologische Zeitschrift* 1908: 437-465.
- MARTÍNEZ IBÁÑEZ, M.D. & ESPADALER, X. 1986: Revisión de las hormigas ibéricas de la colección M. Medina y nuevos datos de distribución. – *Actas de las VIII Jornadas de la Asociación Española de Entomología*: 1022-1034.
- REYES-LÓPEZ, J.L. & PORRAS-CASTILLO, A. 1985 [1984]: Alar biometry in the taxonomy of the species *Goniomma hispanicum* and *G. baeticum*. – *Insectes Sociaux* 31: 473-475.
- SANTSCHI, F. 1927: Revision des *Messor* du groupe *instabilis* Sm. (Hymenopt.). – *Boletín de la Real Sociedad española de Historia natural* (Madrid) 27: 225-250.
- TINAUT, A. 1989: Contribución al estudio de los formícidos de la región del estrecho de Gibraltar y su interés biogeográfico. – *Graellsia* 45: 19-29.
- TINAUT, A. 1991: Contribución al conocimiento de los formícidos del Parque Nacional de Doñana. – *Boletín de la Asociación Española de Entomología* 15: 57-63.