

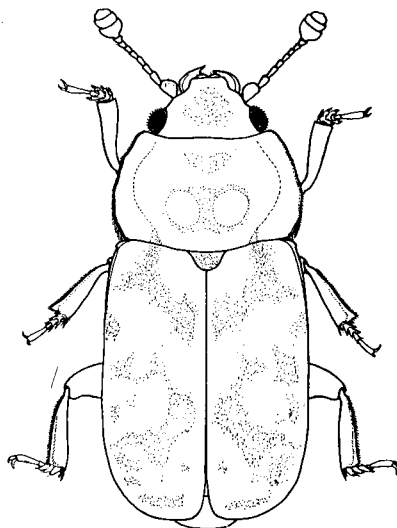
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With my best wishes: 33  
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# Eos

Eos 66 (1), Diciembre 1990

**separata**



**MUSEO NACIONAL DE CIENCIAS NATURALES**

**MADRID**

EOS 66 (1), 1990: 1-77, EOSMAW, I.S.S.N.: 0013-9440



**TAXONOMIC SITUATION OF THE GENUS *CATAGLYPHIS* FÖRSTER, 1850 IN THE IBERIAN PENINSULA II. NEW POSITION FOR *C. VIATICA* (FABRICIUS, 1787) AND REDESCRIPTION OF *C. VELOX* SANTSCHI, 1929 STAT. N. (HYMENOPTERA, FORMICIDAE) \***

A. Tinaut \*\*

**ABSTRACT**

*Cataglyphis viatica* (Fabricius, 1787) is included in the subgenus *Cataglyphis* and excluded from the myrmecofauna of the Iberian Peninsula. *Cataglyphis velox* Santschi, 1929, **stat. nov.** is considered to be a valid species and not a variety of the former, this being the name for the Iberian individuals, previously identified as *C. viatica*. In addition, the distribution of *C. velox* and the implied factors are discussed.

**Key words:** *Cataglyphis*, *systematics*, *Formicidae*, *Iberian Peninsula*.

**RESUMEN**

**Situación taxonómica del género *Cataglyphis* Förster, 1850 en la Península Ibérica II. Nueva posición de *C. viatica* (Fabricius, 1787) y redescrípción de *C. velox* Santschi, 1929 stat. n. (Hymenoptera, Formicidae).**

Se incluye *Cataglyphis viatica* (Fabricius, 1787) dentro del subgénero *Cataglyphis*, excluyéndola de la mirmecofauna de la Península Ibérica. *Cataglyphis velox* Santschi, 1929, **stat. nov.** es elevada a la categoría de especie y se le designa como el nombre válido para los ejemplares ibéricos conocidos anteriormente como *C. viatica*. Además se analiza la distribución de *C. velox* y se esbozan los factores que pueden ser responsables de ésta.

**Palabras clave:** *Cataglyphis*, *sistemática*, *Formicidae*, *Península Ibérica*.

**INTRODUCTION**

*C. viatica* (Fabricius, 1787) was the first species described for this genus, although originally it was included in the genus *Formica* Linneus, 1758.

Its description as was common practice at the time was exceedingly brief: «F. ferruginea, abdomine ovato nigro. Habitat in Hispaniae viis velocissime cursitans Dom. Vahl. Media. Caput magnum cum antennis ferrugineum maxillis apice nigricantibus. Thorax compressus, ferrugineus, immaculatus petiolo nodo unico. Abdomen glabrum, atrum, immaculatum. Pedes ferruginei, postici elongati tibiis fuscis.» (FABRICIUS, 1787).

This species was again cited by FABRICIUS (1793, 1804) but these works did not provide anything new concerning its morphological characteristics.

Since then, surely conditioned by the fact that

Spain was given as the type locality, and by the simple description, this species was cited by numerous authors for the Iberian Peninsula which will be pointed out later, and was considered endemic to this region (EMERY, 1906, 1925 and others). Furthermore, it was considered as the type species for the subgenus *Monocombus* Mayr, 1855, characterized for its scale-like petiole and the similarity between articles V and VI of the maxillary palps in contrast to the subgenus *Cataglyphis* Förster, 1850, characterized by a nodiform petiole and clear difference between articles V and VI of the maxillary palps (SANTSCHI, 1929).

Given that within the Iberian individuals identified as this species there is a wide margin of chromatic variability, it was of great interest to determine which of the colour types could correspond to the Fabricius's types. For this reason, I decided to study the

\* Part of this work was financed by the projects sponsored by: CAICYT n.º 1366/82 and PB87-0397.

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type material deposited in the Fabricius's collection of the Zoological Institute of Copenhagen.

This research led me to prove that the individuals of the Iberian Peninsula denominated as *C. viatica* (Fabricius) do not correspond to the type of this species.

## MEASUREMENTS AND INDEXES

For the morphological study of the specimens used in this work, the following indexes and parameters are used:

**Alitrunk Length (AL).** The diagonal length of the alitrunk in profile from the point at which the pronotum meets the cervical shield to the posterior base of the metapleuron.

**Head Length (HL).** The length of the head proper, excluding the mandibles, measured from the mid-point of the anterior clypeal margin to the mid-point of the occipital margin, in full-face view.

**Head Width (HW).** The maximum width of the head in full-face view, measured below the eyes.

**Cephalic Index (CI).**  $HW \times 100 / HL$ .

**Scape Length (SL).** The maximum straight line length of the antennal scape excluding the basal constriction or neck to the condylar bulb.

**Scape Index (SI).**  $SL \times 100 / HW$ .

## DEPOSITORIES

I have studied material from the following collections:

**CCAC:** C.A. Collingwood's collection, Skipton, U.K.

**CAT:** Author's collection, Granada, Spain.

**CUCM:** Collection of Universidad Complutense, Madrid, Spain.

**CXE:** X. Espadaler's collection, Bellaterra, Spain.

**IZPAN:** Instytut Zoologiczny, Polska Akademia Nauk, Warszawa, Poland.

**MHNG:** Muséum d'Histoire Naturelle, Geneva, Switzerland.

**MZL:** Musée Zoologique, Lausanne, Switzerland.

**NMB:** Naturhistorisches Museum, Basel, Switzerland.

**ZMK:** Zoologisk Museum, Copenhagen, Denmark.

## *Cataglyphis viatica* (Fabricius, 1787)

*Formica viatica* Fabricius, 1787: 308. Lectotype worker (here designated), Locality unknown (either North Africa or Spain) (M. Vahl) (ZMK) [examined]. [Later combinations: *Monocom-*

*bus viatica*, MAYR, 1855: 382; *Myrmecocystus viatica*, EMERY and FOREL, 1879: 449; *Myrmecocystus viaticus*, ANDRE, 1882: 167; *Cataglyphis (Monocombus) viatica*, SANTSCHI, 1929: 29]. *Formica cephalotes* ssp. *europaea* Christ, 1791: 511. [Synonymy by EMERY, 1892: 161.]

Two further names have been synonymized with *C. viatica* and have later been re-erected as species: *C. bicolor* (Fabricius) [Synonymy by SMITH, 1861: 32; re-erected as species by MAYR, 1863: 402] and *C. nodus* (Brullé). [Synonymy by MAYR, 1861: 44; synonymy confirmed, WEHNER, HARKNESS and SCHMID-HEMPEL, 1983: 7; re-erected as species by AGOSTI and COLLINGWOOD, 1987: 59.]

Apart from the placement within the *C. bicolor*-group a proper synonymy with other species cannot be established because, at the moment, it is impossible to relate *C. viatica* to any forms named up to now.

In the Fabricius's collection (ZMK), three specimens are conserved under the name *F. viatica*. Two are badly damaged, but can be diagnosed as *C. viatica* by their maxillary palps and the nodiform petiole respectively. A third specimen, in good condition, is labeled: *viatica*, Mus: S: & T. L. [corresponding to Sehestedt and Tonder Lund Museum (ZIMSEN, 1964; Petersen, pers. com.)] and the name Vahl that corresponds to Martin Vahl, a danish botanist, who gave Fabricius insects from North Africa and Spain; unfortunately, the material was often not labelled appropriately and the localities have thus been confused (ZIMSEN, 1964; PETERSEN, pers. com.). The choice of Spain as the type-locality has therefore been arbitrary and could as easily be North Africa. The later seems to be more reasonable, because up to now, no ants of the *C. bicolor*-group have been recorded in Spain.

## Description of the worker chosen as Type (fig. 1 A, B)

Bicoloured, black gaster, reddish head, trunk and petiole, third pair of legs with a darker trochanter, femur and tibia, the second pair of legs is similar to the third pair and the first shows a coloration similar to the alitrunk.

Rectangular head, typical microreticulation, without shine. Uniformly coloured except three dark spots on the vertex, one on each side of the corresponding ocelli. Surface with numerous small adpressed hairs. Funiculus segment one is somewhat longer than each of the remaining ones, and these are practically the same within themselves. Maxillary palps with the fourth article being equal or longer than the fifth and sixth together.

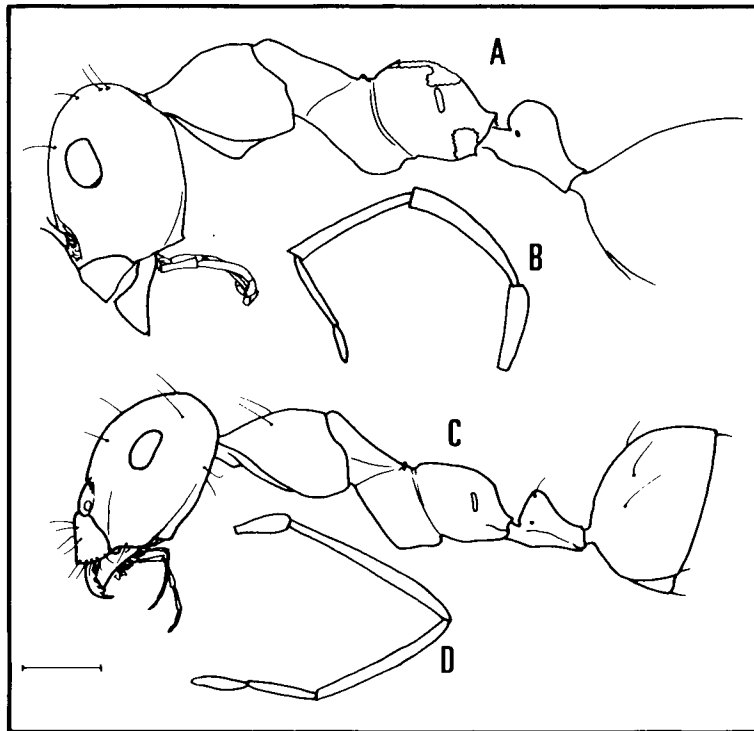


Fig. 1.—Type of *Cataglyphis viatica* (Fabricius): A: profile; B: maxillary palps; Lectotype of *C. velox* (Santschi): C: profile; D: five last articles of maxillary palps. (Scale = 1 mm for A & C; B without scale and 2 mm for D).

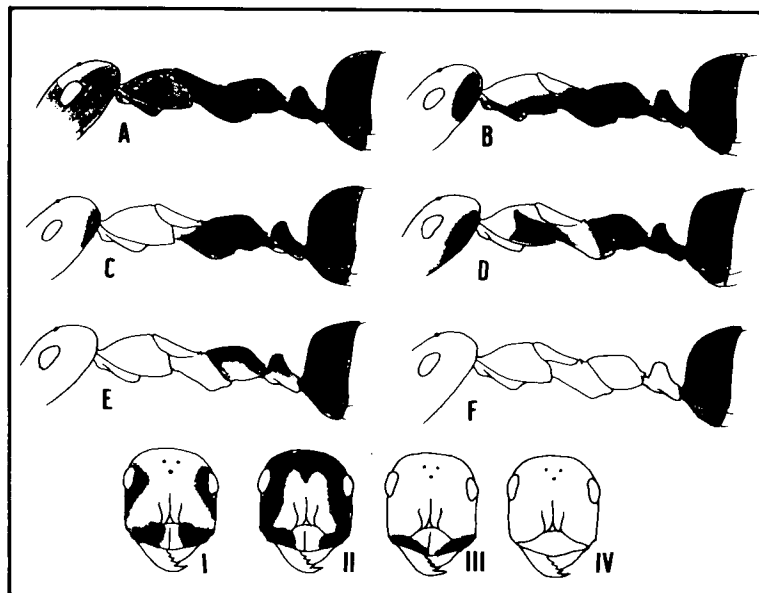


Fig. 2.—Models of cephalic and thoracic colouration of *Cataglyphis velox* (Santschi).

Table I  
*Cataglyphis velox*: measurements in mm and statistics  
of the workers (A), females (B) and males (C).

Table A

	$\bar{X}$	STD.DEV.	MIN.	MAX.
AL .....	3.3850	.6730	1.9375	4.3125
HL .....	2.0525	.3899	1.2500	2.5625
HW .....	1.7650	.3841	1.0000	2.3125
SL .....	2.4388	.5012	1.3750	3.0625
SI .....	138.6595	6.6949	120.0000	154.1667
CI .....	85.547	4.4521	67.7419	94.5946

Table B

	$\bar{X}$	STD.DEV.	MIN.	MAX.
AL .....	3.6339	.5184	2.5000	4.0000
HL .....	2.2589	.1220	2.0625	2.3750
HW .....	2.0893	.3122	1.8125	2.7500
SL .....	2.6875	.5874	2.3125	4.0000
SI .....	127.8441	8.8939	121.2121	145.4545
CI .....	92.3784	11.7640	86.1111	118.9189

Table C

	$\bar{X}$	STD.DEV.	MIN.	MAX.
AL .....	4.1771	.1448	4.0000	4.3750
HL .....	1.9063	.0656	1.8125	2.0000
HW .....	1.6250	.0884	1.5000	1.7500
SL .....	2.6667	.0941	2.5000	2.7500
SI .....	164.3820	8.0259	153.5714	175.0000
CI .....	85.2236	2.8585	80.0000	87.5000

Typical alitrunk of the genus, microsculptured and dull. Epinotum softly rounded.

Petiole rounded.

Gaster black and shining.

According to the characteristics separating the subgenus from *Cataglyphis* Förster, it is certain that these individuals pertain to the subgenus *Cataglyphis* by the nodiform petiole and by the obvious dissimilarity between articles V and VI of the maxillary palps. From this I conclude that:

1. *C. viatica* is excluded from the Iberian peninsula and from the subgenus *Monocombus*, and included in the subgenus *Cataglyphis*.

2. The individuals of the Iberian Peninsula identified as *C. viatica* acquire the name *C. velox* Santschi, 1929 which was considered until now a variety of *C. viatica*.

*Cataglyphis velox* Santschi, 1929, *stat. n.*

*Cataglyphis viatica* var. *velox* Santschi, 1929: 30. Lectotype worker (here designated), SPAIN: Sevilla (20-5-1892) (NMB) [exa-

mined]. Paralectotype workers (here designated): SPAIN: Sevilla (20-5-1892; De la Fuente) (NMB) [examined]; SPAIN: Sevilla (5-1917; Dusmet) (NMB) [examined].  
*Myrmecocystus altisquamis* Forel, 1895: 228. SPAIN: Sevilla (Cabrera) (NMB) [examined].

Worker «major» (fig 1 C, D):

Bicoloured, black gaster, orangish-red petiole, trunk, and first pair of legs, dark brown second and third pair of legs and mandibles. Gaster slightly shining, the rest of the body is dull. Some long hairs subdecumbent on the gaster, pronotum, and head.

Head almost square, (CI = 0.88: lectotype) rounded occipital margins, arched clypeus with a small keel, hardly marked near the clypeal suture, anterior margin comparatively small and not too salient. Antennae with the scape exceeding more than one-third the length of the occipital margin. First article of the funiculus longer than any of the other ten whose length gradually decreases. Strong mandibles with the apical tooth specially developed and sharp, maxillary palps of six articles with V and VI of the same length and together almost as long as IV. Labial palps of three articles, each one somewhat smaller than the fifth maxillary and practically the same within them.

Trunk with a smoothly curved pronotum, almost flat, epinotum somewhat elevated above the pronotum, elevated spiracles and in the anterior margin of the meso-metanotal suture. Epinotum with a rounded vertex and flat dorsal and posterior sides. Petiole with a triangular petiolar scale, sinuous ventrally. Gaster somewhat flattened laterally.

Worker «minor»:

I am going to describe the «minor» worker given that it presents some important differences with respect to the «major» caste.

Bicoloured, reddish head, antennae, pronotum and part of the mesonotum, the remaining parts including the legs dark brown with the exception of the black gaster. Some hairs on the gaster and head. Slightly shining.

Head, longer than wide, rounded occipital margin, straight lateral margins. Clypeal margin with four long hairs, the clypeal keel remains reduced to a slight bulk near the frontal triangle, frontal aristae short and hardly marked, the keel that begins at the frontal triangle is hardly marked and disappears before reaching the central ocelli. Voluminous compound eyes situated in the middle of the posterior half. Small ocelli and visible mostly because of a black spot situated at the base of each one. Very long antennae, similar in proportion to the «major» worker. The palps of this paralectotype series not can be seen well.

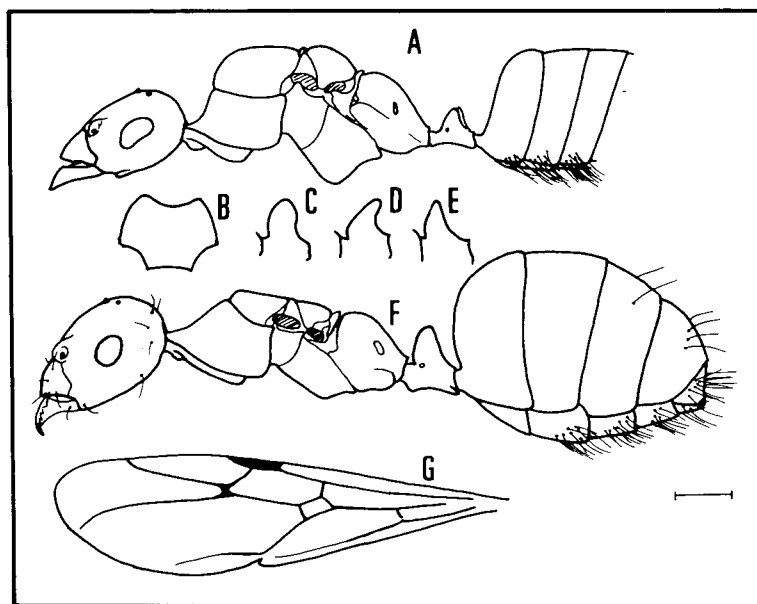


Fig. 3.—*Cataglyphis velox* (Santschi): A: profile of the male; B: front view of the petiolar scale of the male; C, D, E: variability of the petiolar scale of the female; F: profile of the female; G: hind wing of the male (scale = 0.5 mm for B and 1 mm for the rest).

Trunk very similar to the «major» worker.

Petiole not triangular but cylindrical and with the apex rounded.

#### Worker variability

I have studied a total of seventy-four series from the provinces of Albacete, Cádiz, Ciudad Real, Córdoba, Granada, Jaen, Málaga, Sevilla and Toledo and more than 600 workers with a size variation between 5.5 mm of the «minor» workers and 9.7 mm of the «major» workers. This variation is typical of this and other species of *Cataglyphis* and it is not bound by geographical variations and so we will not consider this in this paper.

I have found the variation in colour and its possible relation to the abiotic conditions of the environment interesting. To study this relationship, I have delimited the different classes or types of coloration that could be found as seen in figure 2 and correspond to the designs for both the «major» and «minor» workers. Before going into detail, I will list a series of estimations about these types of colours. First, it must be stated that among all of them there exists continuity and so, on some occasions, to adjudicate a specific individual to the B or C type can be somewhat subjective but not so when differentiating

between types A and B or A and D, for example. Secondly, it is seen that the trunk types are usually closely related with the cephalic ones, and there exists a clear relationship between types A and II; B, C, D with I and III and finally E and F with III and IV, and for this reason it is sufficient to allude only to the colour of the trunk.

The petiole also has an important variation, oscillating between a more or less rectangular shape and a cylindrical shape. All this variation is seen in figure 2 (C-F).

Finally, the «major» caste is more variable with respect to colour since here we find all the described types. The «minor» caste is basically uniform, being in general dark ants and so I will use only the former for studying the distribution of the different types of colouration.

If we observe graph 1, it can be seen that in general the reddest coloration is found mainly below 800 m, while the darkest (A-C types) is found principally in mountainous zones above 1000 m.

However, there are some exceptions like the Sierra de Cazorla, Sierra Harana and eastern offsets of the Sierra Nevada. In these locations, the reddish types rise a little more in altitude than in other mountains like Sierra de la Almijara or Sierra de Baza.

In my opinion, even though some zones still remain to be studied, the distribution of the types of

coloration are conditioned by the rivers. The redder types can be found along the two most important fluvial valleys of the Penibetic: Guadalquivir and Genil, arriving to the Sierra de Cazorla or to the Vega de Granada by these, invading the slopes that border both rivers. The darkest types would remain relegated not only to the highest areas but also to the mountains situated in the background of those rivers.

I consider that the appearance of each type of colouration is influenced by altitude, favouring the darkest colours but I also think that the rainfall and maximum and minimum temperatures must be responsible for the appearance of one or another type of colouration.

WEHNER *et al.* (1983) indicate for Tunisia a gradation in the North-South direction of both types of colouration indicated by them for *C. bicolor*, specifically a clear form for the northern part of Tunisia and a dark form for the southern half but we don't find any similarity in the pattern of *C. velox*.

The variation in size is seen in table I-a.

#### Female (fig. 3)

[Sierra Harana (Granada), 11-7-81 (A. Tinaut leg.)]

Bicoloured, dark or almost black gaster, epinotum, and pleuron, the rest is of a reddish color. Legs predominantly black, antennae and palps reddish. Practically without hairs and with the micropunctuated tegument which makes it specially shiny.

Head very similar in all aspects to the workers except that the ocelli are somewhat more developed, for this reason, it is not necessary to give a detailed description.

Trunk with the meso and metanotum very reduced, occupying approximately one third of the whole trunk. Pronotum very developed, as much as that of the worker, scutum somewhat swollen in the anterior margin, scutellum very little developed, flat in profile. Metanotum cylindrical and narrow, epinotum very developed and swollen.

Petiole slightly scalelike, triangular seen in profile, with the anterior side slightly convex and the posterior flat and somewhat concave. Gaster voluminous.

#### Female variability

Seven individuals from different parts of the Sierra Harana and the Sierra Nevada have been studied. Again colouration is the most variable characteristic, making thus the same observation for the workers; however, due to the scarce number of individuals studied, it is not prudent to generalize. The petiole can

vary from practically scalelike and thin to almost cylindrical (fig. 3).

The variation in size is seen in table I-b.

#### Male (figs. 3, 4.I)

[Sierra Harana (Granada) 11-7-81 (A. Tinaut leg.)]

Dark brown colour, practically black except the last segments of the gaster, tibiae, mandibles and antennae which are yellowish brown. Transparent wings, somewhat darker in the center, black nerves. Body surface micropunctuated and specially shiny.

Head with the occipital margin slightly rounded, lateral margins straight, anterior margin of the clypeus arched. Mandibles smooth and shiny with two teeth one basal and the other apical. Compound eyes not too big, ocelli visible but not as developed as would be expected in the males. Scape fine and long, funiculus of eleven or twelve articles, long and narrow, decreasing in size towards the tip. Maxillary palps similar to those of the workers.

Trunk with the meso and metanotum well developed. Epinotum smoothly rounded. Without hairs. Petiole very concave at apex, with triangular profile. First segment of the gaster quite short. Sternite with numerous hairs.

Genitalia with various typical structures that can serve as a guide in identifying this species, such as: subgenital plate with three long spiniform processes in the extreme, the lateral ones longer than the central. The sagitta has the anterior margin in the form of a tooth, slightly recurved and further along the margin it is somewhat sinuous and with a line of small teeth. The volsella looks like the parameres but has fewer hairs and one small tooth quite thin and cylindrical. The parameres have a small median appendix.

#### Male variability

Amongst the material of the Complutense University of Madrid (CUCM) there is a male (Sabiote [Jaen], 28-7-78; Acosta leg.) very small (AL = 2.81; HL = 1.31; HW = 0.75; SL = 1.81; CI = 57.25; SI = 241.33) that can be considered as the first example of micraner for the genus *Cataglyphis* (AGOSTI & HAUSCHTEK-JUNGEN, 1987). The other six males examined are of normal size. I have found a variation in the number of funiculus segments oscillating between eleven and twelve. This variation can be found between eleven and twelve. This variation can be found between different specimens or between the left or the right antenna of a specimen. In other way there are not any special variations (table 3), but one of them from Las Empanadas (Sierra del Segura) (30-7-83) Espadaler leg. (CXE) has the gaster red-

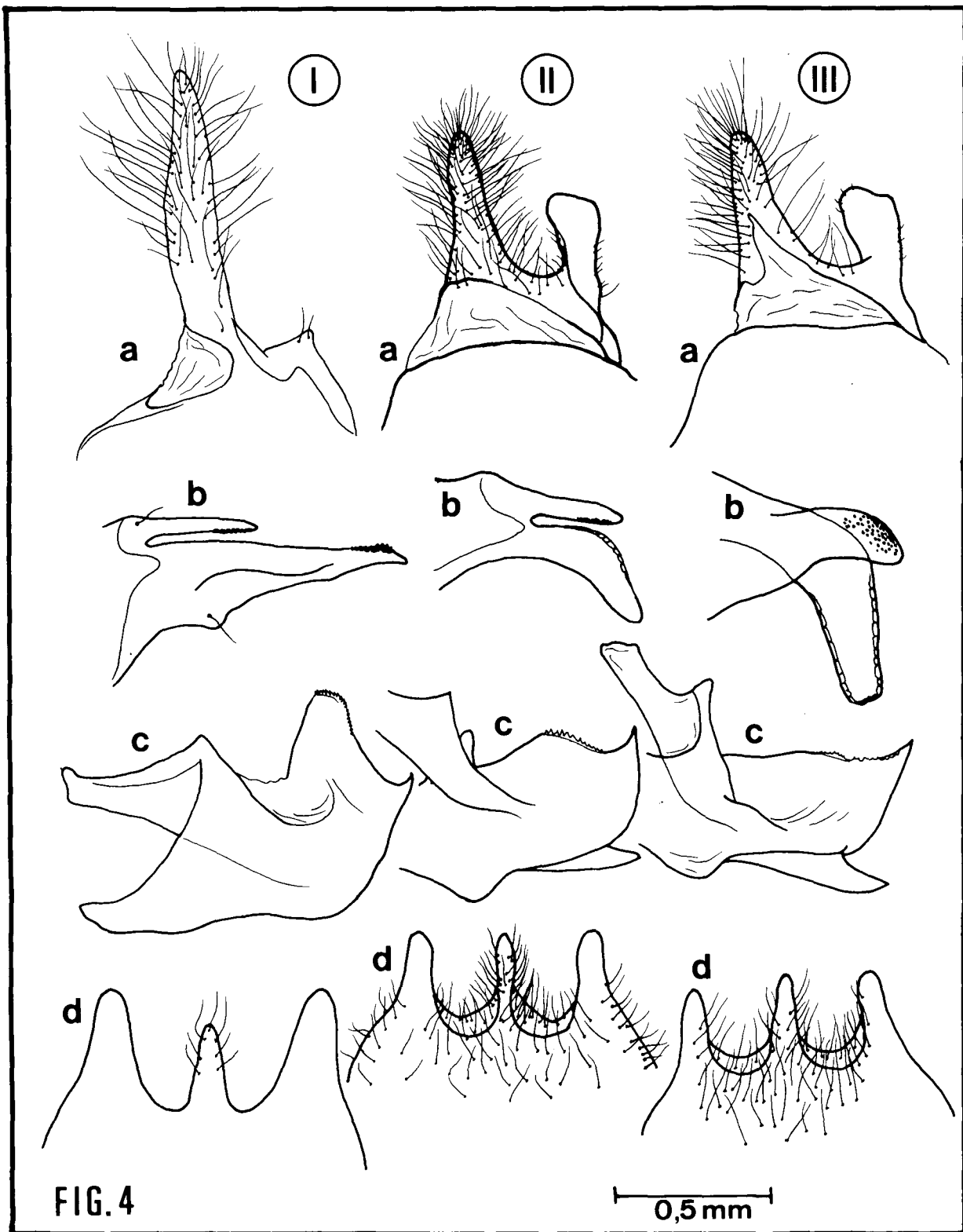


Fig. 4.—Male genital pieces: I: *Cataglyphis velox* (Santschi); II: *C. nodus* (Brullé) (Greece); III: *C. nigripes* (Santschi) (Turkey).  
A: Squamula; B: volsella and lacinia; C: sagitta; D: subgenital plate.



der than described, the mandibles have only one apical tooth and the petiole is less concave.

The variation in size is seen in table 1-c.

### DIFFERENCES WITH OTHER SPECIES

Most important differences between *C. velox* and the species of the groups *C. viatica*, *C. nodus* or *C. bicolor*, as the petiolar profile and the maxillary articles proportions, has been shown. Such good differences appear in all the pieces of genital apparatus (fig. 4), but mainly in the parameres, volsella and sagitta.

Among the species known in the Iberian Peninsula, the closest to *C. velox* is *C. hispanica* (Forel, 1903) from which it can be differentiated at first sight by the pubescence, much more abundant in this last one, and by the uniform black colouring. Other differences between these ones and other species near to *C. velox* will be the subject of a paper with this main purpose.

### DISTRIBUTION

This species, as has been commented throughout this paper, is considered endemic of the Iberian Peninsula. According to the records that appear in the bibliography on *C. viatica* as well as *C. viatica velox*, this species would be distributed in the following provinces: Badajoz (COLLINGWOOD and YARROW, 1969), Cádiz (COLLINGWOOD and YARROW, 1969; SANTSCHI, 1932), Ciudad Real (MEDINA, 1892; MARTÍNEZ and ESPADALER, 1986), Córdoba (COLLINGWOOD and YARROW, 1969; MEDINA, 1891), Granada (ROSENHAUER, 1856; MEDINA, 1891; FOREL, 1909; GOETSCH, 1942; COLLINGWOOD and YARROW, 1969; TINAUT, 1981; PASCUAL, 1986); Huelva (MEDINA, 1891); Jaén (COLLINGWOOD and YARROW, 1969; ACOSTA, 1978) y Sevilla (MEDINA, 1891; FOREL, 1895; SANTSCHI, 1925, 1929 and 1932; COLLINGWOOD and YARROW, 1969; REYES, 1985; MARTÍNEZ and ESPADALER, 1986).

To do this work, such as the revision that I am performing on this genus, I have not only studied the indicated collections but also have been covered many places, mainly the South of the Peninsula, to confirm some doubtful records or to know better the area of distribution of the species of the genus. These localities are shown in fig. 5.

The studied material notes some workers of this species from Pozuelo de Calatrava (De la Fuente leg.) (NMB) and one worker from Puerto de Santa María (Cádiz) (Dusmet leg.) (NMB), localities in which I have not collected specimens of this species

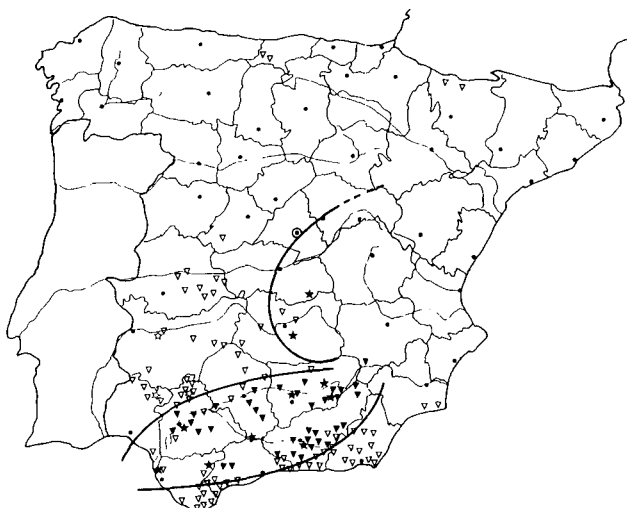


Fig. 5.—Distribution of *C. velox*: ▽ = sampling locations; ▼ = locations where this species has been found; ★ = material from other collections; ☆ = records of this species not confirmed.

but where their presence is confirmed. I did not think the same about some citations, concretely: Arcena (Huelva), Pedroso y Guadalcanal (Sevilla) y Merida (Badajoz) since I have take samples in those places, and I only found *C. hispanica*, a species that I think is the only one that lives in Sierra Morena and Extremadura.

According to the data, the distribution of *C. velox* would be limited to La Mancha and to the Guadalquivir Depression including the Betic mountains and excluding the Sierra Morena; furthermore, I think that they can be found in some mountains in the central-east Peninsula.

Observing with more detail the distribution of this species in the Guadalquivir Depression (fig. 7), it can be appreciated a series of aspects that I consider of interest; on one hand, we can see that the right margin of the Guadalquivir, or more specifically the zone of contact between Sierra Morena and the sedimentary material from the Guadalquivir constitutes an area where *C. velox* and *C. hispanica* occur, but neither *C. velox* goes north, nor *C. hispanica* goes south of this area. These aspects are confirmed in different transects conducted along the North-South direction (fig. 7).

On the other hand, if we observe the East-West transect (fig. 6), we can see that this species tends to rise in altitude as we displace towards the East, being present above 900 m in the extreme orient of the Sierra Nevada, but not appearing in the region of Tabernas nor in the Sierra de Alhamilla (Almería). This could mean that it is a species that eludes the areas of scarce precipitation but on the other hand its absence in the mountains of the Gibraltar Strait

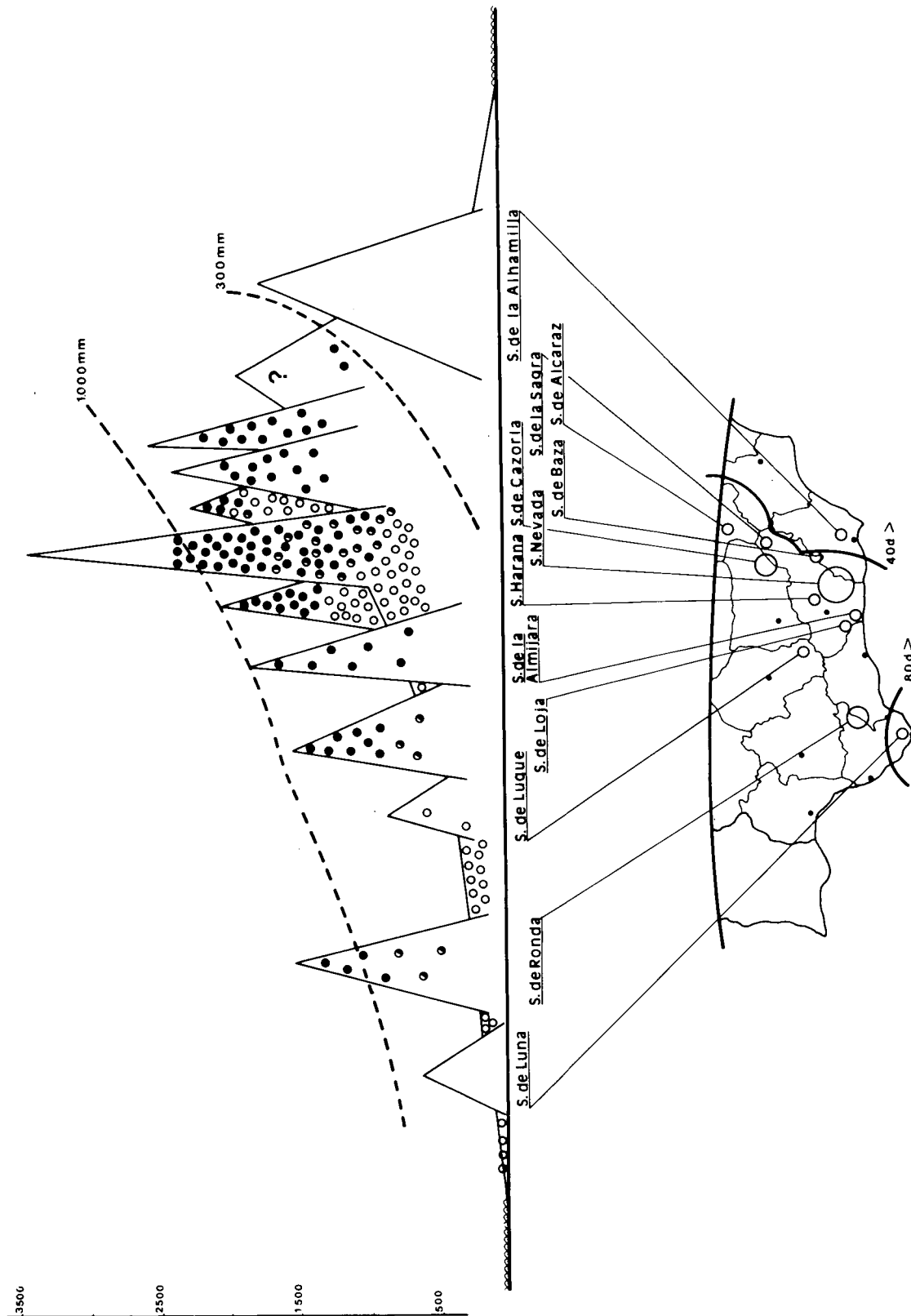


Fig. 6.—West-East transect showing the distribution of the different types of coloration (● = V-VI; ○ = IV-V; ◐ = I-II-III; --- = rainfall in mm; — = rainy days).

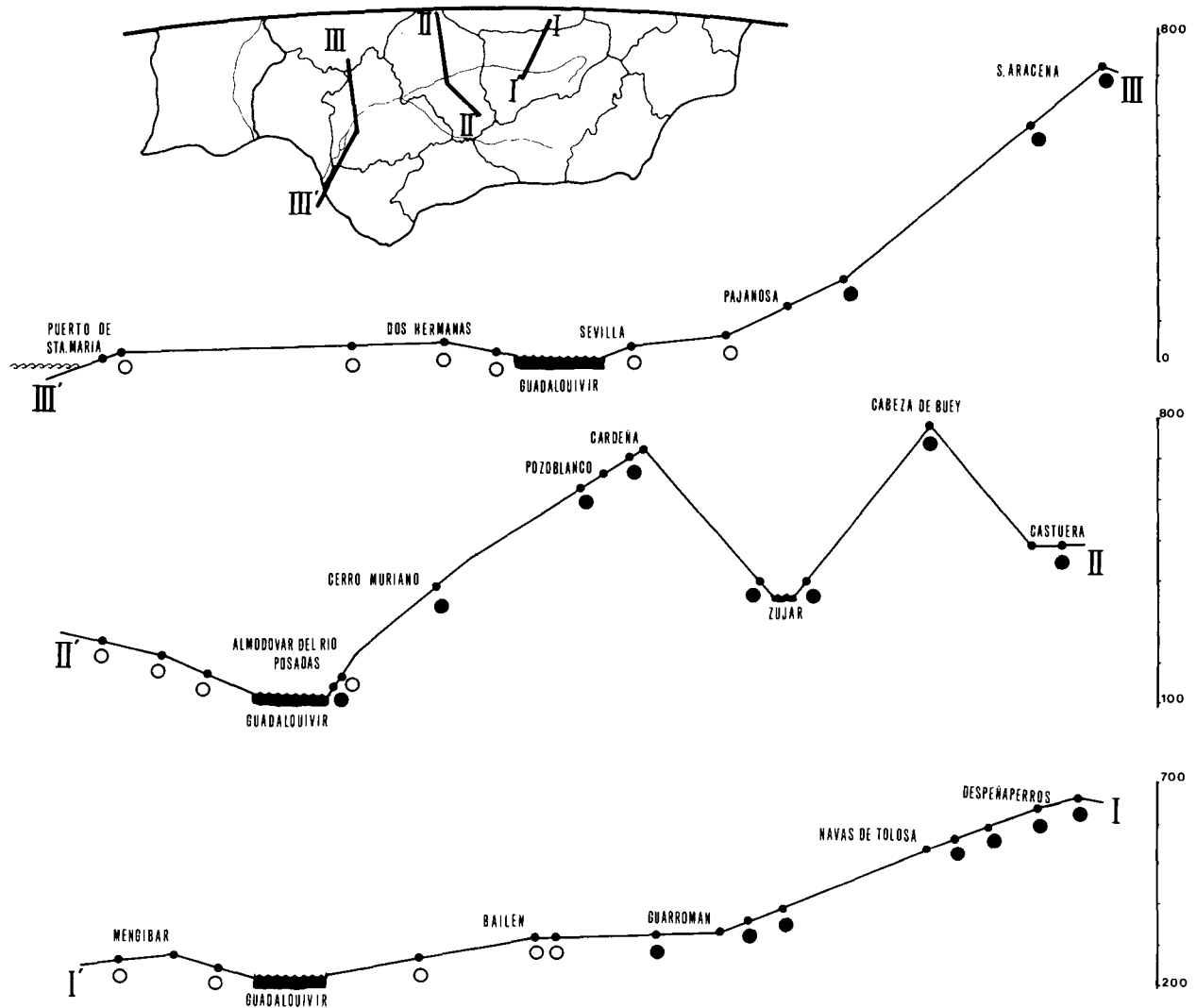


Fig. 7.—North-South transect showing the presence of *C. velox* (○) and *C. hispanica* (●).

(Sierra de Luna) (TINAUT, 1989), indicates that this species is found in an *intermediate zone* that could be delimited between the 300 mm and 1000 mm of total annual precipitation isohyet. This can justify in part the rise in altitude of the species as we displace towards the East. But obviously the rainfall is not the only abiotic factor that would condition its distribution and in this way if we compare its area of distribution with different maps of the Climatic Atlas of Spain (FONT, 1983), we can see that this could also be conditioned by the environmental humidity (< 50 % during the active period) and the rainy days (between 40 and 80). In the beginning, all of these factors would explain the distribution of this species but I think that they are not the only ones and the

competition and exclusion with other species of the subgenus must be also very important (fig. 7).

#### MATERIAL EXAMINED

The specimens examined come from the following localities and collections:

- Albacete: Sierra Alcaraz (CAT).
- Cádiz: Jerez (CUCM), Puerto de Las Palomas (Sierra Grazalema) (CXE) Puerto de Santa María (NMB).
- Ciudad Real: Pozuelo de Calatrava (NMB).
- Córdoba: Almodóvar del Río (CAT), Córdoba (CAT) (CUCM) (NMB), Espejo (CAT), Luque (CAT), Puente Genil (CAT).
- Granada: Armilla (CAT), Jerez del Marquesado (CAT), Mo-

reda (CAT), Granada (CAT) (CUCM) (MZL) (MHNG), Huelva (CAT), Pinos Genil (IZPAN), Sierra de Alfacar (CAT), Sierra de la Almijara (CAT), Sierra de Baza (CAT), Sierra Elvira (CAT), Sierra Nevada (CAT) (CUCM) (NMB), Sierra de La Sagra (CAT), Sierra de Loja (CAT).

Jaén: Andújar (CAT), Bailén (CAT), Jaén (CUCM), Linares (CAT), Mengibar (IZPAN), Pozo Alcon (CUCM), Sabiote (CXE) (CUCM), Sierra de Cazorla (CAT) (CUCM) (CXE).

Málaga: Antequera (CUCM), Puerto de las Pedrizas (CAT), Puerto de los Alazores (CAT), Sierra de las Nieves (CAT).

Sevilla: El Arahál (CAT), Carmona (CAT), Osuna (CAT), Las Pajanosas (CAT), Sevilla (CAT) (CUCM) (NMB).

Toledo: Consuegra (CAT).

## ACKNOWLEDGEMENTS

I want to express my gratitude to all the institutions named in this paper but also specially to: Dr. Petersen, curator of the Zoologisk Museum of Copenhagen for facilitating the access to the Fabricius collection; to Dr. Brancucci from the Naturhistorisches Museum of Basel for sending the types of Santschi; to Dr. Donat Agosti for his revision of the manuscript and his contribution of valuable advice; to Mariona Hurtado for the translation, and finally to the reviewers for their useful corrections.

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Recibido el 16 de agosto de 1989  
Aceptado el 8 de mayo de 1990