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THE TIGER-BEETLES OF *"HYBRIDA"*-SPECIES GROUP (COLEOPTERA, CARABIDAE, CICINDELINAE). III. A TAXONOMIC REVIEW OF THE IBERIAN *CICINDELA LAGUNENSIS* GAUTIER, 1872 COMPLEX

A. V. Matalin (*)

ABSTRACT

On the base of morphological as well as male's and female's genitalia peculiarities of four subspecies of the Iberian tiger beetle *Cicindela lagunensis* Gautier, 1872 (according to Gebert, 1995) their taxonomic status is discussed. There are three separate species which habitat in the Iberian Peninsula: *C. lagunensis*, *C. iberica* Mandl, 1935, *stat. nov.* and *C. lusitanica* Mandl, 1935, *bona spec., stat. nov*. *C. lusitanica* includes two subspecies: *C. l. lusitanica* Mandl, 1935 and *C. l. silvaticoides* W. Horn, 1937 *comb. nov.* The lectotypus and paralectotypus of *Cicindela (s. str.) hybrida silvaticoides* W. Horn, 1937 were designated. Morphological characters and genitalia of both sexes are described. The geographic distribution is given. The results of phylogenetic analysis are discussed. The Iberian species of *"lagunensis"*-complex make a monophyletic group with *C. hybrida* Linnaeus, 1758, and this group has a sister group which was made up by *C. sahlbergii* Fischer von Waldheim, 1824 and other related species. A key for identify the Iberian species of *"lagunensis"*-complex is given.

Key words: *Cicindela (s. str.)*, *"hybrida"*-species group, *"lagunensis"*-complex, Palaearctic, Iberian Peninsula, review, identification key, phylogenetic relationships.

RESUMEN (**)

Los cicindélidos del grupo de especies "*hybrida*" (Coleoptera, Carabidae, Cicindelinae). III. Revisión taxonómica de las especies ibéricas del complejo *Cicindela lagunensis* Gautier, 1872

Se discute el estatus taxonómico de cuatro subespecies de *Cicindela lagunensis* Gautier, 1872 (*sensu* Gebert, 1995) sobre la base tanto de la morfología externa como de las características de las genitalias masculina y femenina. En la Península Ibérica viven tres especies de *Cicindela*: *C. lagunensis*, *C. iberica* Mandl, 1935, *stat. nov.* y *C. lusitanica* Mandl, 1935, *bona spec., stat. nov*. *Cidindela lusitanica* incluye dos subespecies: *C. l. lusitanica* Mandl, 1935 y *C. l. silvaticoides* W. Horn, 1937 *comb. nov.* Se designan lectotipo y paralectotipos de *Cicindela (s. str.) hybrida silvaticoides* W. Horn, 1937; se describen los caracteres morfológicos y la genitalia de ambos sexos y se proporciona la distribución geográfica de la subespecie. El análisis filogenético muestra que las especies ibéricas del complejo *"lagunensis"* constituyen un grupo monofilético junto a *C. hybrida* Linnaeus, 1758, y este grupo es un grupo hermano del integrado por *C. sahlbergii* Fischer von Waldheim, 1824 y otras especies próximas. Por último, se proporciona una clave para identificar a las especies ibéricas del complejo *"lagunensis"*.

Key words: *Cicindela (s. str.)*, grupo de especies *"hybrida"*, complejo *"lagunensis"*, Paleártico, Península Ibérica, revisión, claves de identificación, relaciones filogenéticas.

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* 129278, Russia, Moscow, Kibalchicha 6, build. 5, Zoology and Ecology Department, Moscow State Pedagogical University.

** Tanto el resumen en castellano como los pies de figura en este mismo idioma han sido redactados por la revista.

Introduction

The *"hybrida"*-group is the most numerous within Palaearctic *Cicindela (sensu stricto)* Linnaeus, 1758 (Horn, 1915, 1926; Mandl, 1935, 1936; Gebert, 1995). Inter- and intraspecific taxonomy of the group always was very difficult, because many colour morphs and aberrations were described.

Chaudoir (1863) interpreted *C. hybrida* Linnaeus, 1758 as the polymorphic species, which included the 11-th varietates. Horn & Roeschke (1891) designated five species, which belong to the *"hybrida"*-group (II Gruppe, II Untergruppe), while *C. hybrida* included four races. Lately Horn (1905, 1915, 1926, 1930) changed the group composition and *C. hybrida* included the 18-th subspecies. According to Mandl (1935, 1936) the *"hybrida"*-species group included five species, while *C. hybrida* - 15-th subspecies. However, Rivalier (1950) and lately Freitag (1965) selected two similar species-groups: *"hybrida"*- and *"maritima"*- as well. This point of view was accepted by the all following authors (Cassola & van Nidek, 1984; Werner, 1991, 1992; Wiesner, 1992; Zaballos & Jeanne, 1994).

In the last revision of *"hybrida"*-group Gebert (1995) gave up the polymorphic conception of *C. hybrida*. So, *C. hybrida*, *C. sahlbergii* Fischer von Waldheim, 1824, *C. transversalis* Dejean, 1822, *C. lagunensis*, *C. maritima* Dejean, 1822 and *C. restricta* Fischer von Waldheim, 1825 were considered as separate species. However, some species were unfoundedly interpreted very widely (*C. sahlbergii* and *C. lagunensis*), while the other ones - very tightly (*C. transversalis*). Moreover, the essential deficiencies of the Gebert's revision are the poor analysis of male's and female's genitalia and incomplete review of the species, which belong to the *"hybrida"*-species group (according to Mandl).

The present paper contains some results which I have made within the framework of own revision of *"hybrida"*-group since 1994 (four papers in press). The intraspecific structure of *C. lagunensis* and taxonomy status of the subspecies (according to Gebert) are discussed specifically.

Material and methods

Adult specimens were examined and comparison with the types (holotypes, paratypes, lectotypes, paralectotypes or syntypes) and with the original descriptions.

Specimens for study were received from the following museums:

MNCN- Museo Nacional de Ciencias Naturales (Dra. Isabel Izquierdo, Madrid, España),
DEI- Deutschland Entomological Institute Eberswalde (Dr. Lothar Zerche, Eberswald, Deutschland),
MNHU- Muzeum für Naturkunde der Humbold-Universität zu Berlin (Dr. Fritz Hieke, and Dr. Manfred Uhlig, Berlin, Deutschland),
NHMW- Naturhistorisches Museum Wien (Dr. Heinrich Schönmann, Wien, Austria),
ZISP- Zoological Institute of Russian Academy of Science (Dr. Boris M. Kataev, St.-Petersburg, Russia),
ZMM- Zoological Museum of Moscow Lomonosov University (Dr. Nikolay B. Nikitsky, Moscow, Russia).

Private collectors loan me some material and assisted thereby in my research:

JP- collection of Jesus Plaza (Madrid, España),
GIZ- collection of Gario and Iuri Zappi (Casalecchio di Reno, Bologna, Italy).

The description of the elytral patterns follows the standard terminology that was given by Acciavatti & Pearson (1989). The measurements were performed with an ocular-micrometer. As the most important measurements the following ones were used: total body length (from posterior margin of labrum to apical elytral slope along of suture), labrum length (along the middle), labrum width (in the widest place), pronotum length (along the middle line), pronotum width (in the widest place), elytral length (along of suture), elytral width (in the widest place), mandibles length (from retinaculum base to apex), mandibles width (in the widest place), tibia and tarsus and aedeagus length (all in mm).

The morphological characters of male's and female's genitalia were studied. The nomenclature of male genitalia follows Freitag (1965), Spanton (1988) and Ishikawa (1978), with some additions. The nomenclature of female genitalia follows Freitag (1972). The peculiarities of the aedeagus internal sac were used too. The internal sac was gradually blown out and dried into a warm air flow. There are seven sclerites in the internal sac: *flag* (f) - relatively small, poorly sclerotised structure, *flagellum* (fl) - well developed, distinct curved sclerite, *upper limitator* (ul) - short, relatively thin sclerite always placed towards from flagellum, *spring* (sp) - long, relatively width, slightly curved sclerite, *shield* (sh)- large, width sclerite, *medial tooth* (mt) - very long or short sclerite always placed towards from shield, *lower limitator* (ll) - relatively large sclerite often connected with the base of

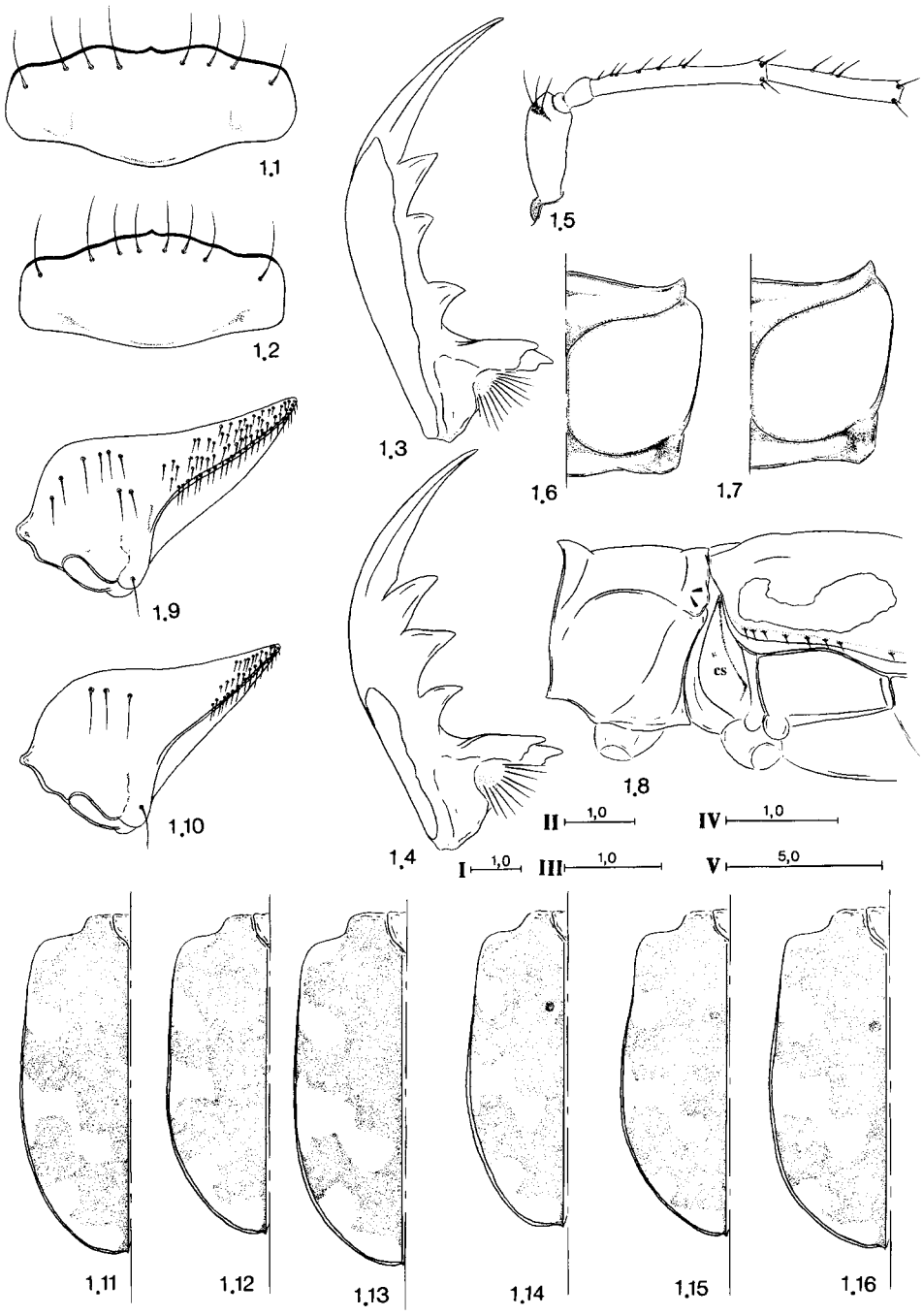


Fig. 1.— *Cicindela lagunensis*: 1.1-1.2) labrum, 1.3-1.4) left mandibles, 1.5) scape and next three antennomeres, 1.6-1.7) pronotum, right half, 1.8-1.9) right hind trochanter, 1.10) female's coupling sulcus (cs), lateral view, 1.11-1.16) left elytra. Male: 1.1, 1.3, 1.5, 1.6, 1.8, 1.11-1.13. Female: 1.2, 1.4, 1.7, 1.9-1.10, 1.14-1.16. Scale bars (in mm): I) 1.8, II) 1.6-1.7, III) 1.1-1.2 and 1.9-1.10, IV) 1.3-1.5, V) 1.11-1.16.

Fig. 1.— *Cicindela lagunensis*: 1.1-1.2) labro, 1.3-1.4) mandíbula izquierda, 1.5) escapo y los tres antenómeros adyacentes, 1.6-1.7) pronoto, mitad derecha, 1.8-1.9) trocánter de la pata posterior derecha, 1.10) surco de acoplamiento femenino (cs), vista lateral, 1.11-1.16) élitro izquierdo. Macho: 1.1, 1.3, 1.5, 1.6, 1.8, 1.11-1.13. Hembra: 1.2, 1.4, 1.7, 1.9-1.10, 1.14-1.16. Escalas (en mm): I) 1.8, II) 1.6-1.7, III) 1.1-1.2 y 1.9-1.10, IV) 1.3-1.5, V) 1.11-1.16.

medial tooth (fig. 4). Moreover, there are seven sclerotised bladders in the internal sac: *ventro-apical* (VA), *ventro-lateral left* (VLL), *ventro-lateral right* (VLR), *dorso-apical* (DA), *dorso-lateral left* (DLL), *basal* (B) and *basi-lateral right* (BLR) (fig. 5). This structures are possibly homologous parts of the internal sac of all species which belong to nominate subgenera.

For the data analysis the STATISTICA program, version 5.0 and NTSYS, version 1.70 were used. Clustering was performed using the UPGMA-linkage method. The 52 morphological (non genitalic) characters, 32 characters of male's genitalia and 15 characters of female's genitalia were analysed (Appendix 1). Other species of nominate subgenus, which do not belong to the *"hybrida"*-species group (*C. sylvatica* Linnaeus, 1758, *C. campestris* Linnaeus, 1758 and *C. soluta* Dejean, 1822) were included in the analysis too (Appendices 1 and 2). At last, by the one species from subgenera *Eumecus* Motschulsky, 1850 (*C. germanica* Linnaeus, 1758), *Myriochile* Motschulsky, 1862 (*C. melancholica* Fabricius, 1798), *Cephalota* Dokhtouroff, 1883 (*C. elegans* Fischer von Waldheim, 1824), *Cicindina* Adam & Merkl, 1986 (*C. sublacerata*, Solsky, 1874) and *Lophyridia* (*C. littoralis* Fabricius, 1787) were used in the analysis as the outer groups (Appendix 2). The results of clustering are given in figure 16.

Results

Contrary to the conclusion of Gebert (1995) I think that there are three separate species, which live in the Iberian Peninsula: *C. lagunensis*, *C. iberica* Mandl, 1935 and *C. lusitanica* Mandl, 1935. *C. lusitanica* includes two subspecies: *C. lusitanica lusitanica* and *C. lusitanica silvaticoides* W. Horn, 1937. The morphological and genitalic characters and of distribution area of *C. lagunensis* subspecies (according to Gebert) supported this opinion. The redescriptions of all this taxons are presented below.

Cicindela (s. str.) lagunensis Gautier, 1872
(Figs. 1; 3.1-2; 4; 10; 14; 15)

Petites Nouvelles Entomologiques, 1872, 56: 223
Type locality: Castilla

= *korbi* Beuthin, 1888 [*Ent. Nachr*., XIV: 181 (Type locality: Nueva Castilla)];
= *hybrida lagunensis* Gautier, 1872 *sensu* W. Horn, 1915 [*Genera Insectorum*, 82c: 334]

Horn & Roeschke, 1891: 40 (Taf. 1, fig. 8e); Fleutiaux, 1892: 103; Horn, 1905: 158, 1926: 217, 1930: 50, 1938: 45 (Taf. 63, fig. 8-9); Jakobson, 1905-1916: 190; Mandl, 1935: 302; Jagemann, 1945: 24; Jeanne, 1967: 5, 1976: 28; Schilder, 1952: 125, 1953: 564; Cassola & van Nidek, 1984: 10; Ptacnik, 1991: Tab. 1, fig. C; Zaballos & Jeanne, 1994: 24; Werner, 1991: 16 (Tab. 12, fig. 78), 1992: 83; Wiesner, 1992: 116; Gebert, 1995: 20.

TYPE MATERIAL EXAMINED: Not study.

OTHER MATERIAL EXAMINED: 2♂♂ 1♀ - "Ap. Guadarrama. J. Lauffer"; 3♂♂ 3♀♀ - "Villaviciosa. J. Ardois"; 3♂♂ 5♀♀ - "Móstoles. J. Ardois"; 1♂ 1♀ - "Madrid. G. Carrasco"; 1♀ - "Madrid. C. Hernández", "*C. hybrida* L. Madrid"; 1♂ 2♀♀ - "Madrid 689 m. J. Abajo"; 2♂♂ 1♀ - "Madrid (España). Ant. Varquer F."; 1♀ - "Madrid. Fuencarral. G. Schramm"; 2♂♂ 2♀♀ - "Barajas (Madrid). Junio 1945"; 1♀ - "Algete (Madrid). J. Abajo"; 1♂ - "Moncloa (Madrid)"; 1♀ - "Escorial"; 1♂ - "Lominchar"; 1♀ - "Montarco. VI-1908. Arias"; 1♀ - "Toledo. Junio 1906. Arias"; 1♀ - "Toledo. V.1909. M. san Miguel"; 1♀ - "Brunete. 6-94. G.H."; 1♂ - "Cienvallejos Brunete (Madrid) VI-1927 C. Bolívar"; 1♂ 1♀ - "Getafe Madrid (España). S.V. Peris", "coll. Peris", "*Cicindela hybrida* L. Peris det."; 2♀♀ - "El Pardo (Madrid). Arias"; 1♀ - "Villa, 4.1915"; 1♂ - "*C. hybrida* L. Sitio"; 1♀ - "Villaverde C. Bolívar"; 1♂ - "Albarracín" (all in MNCN); 1♂ - "Castilien. Cuenca. Korb 1896", "v. *Korbi* Beuth.", "*hybrida lagunensis* Gautier", "sbsp. *lagunensis* Gaut."; 1♀ - "Castilien. Cuenca. Korb 1896", "*Cicindela hybrida* L. v. *Korbi* Beuth."; 1♂ - "Castilien. Cuenca. Korb. 1896"; 1♂ - "Madrid. G. Schramm", "66", "v. *Korbi*", "89737", " var. *Korbi* Beuth."; 1♀ - "Madrid. G. Schramm", "*hybrida* v. *Korbi* B."; 1♂ 1♀ - Madrid. G. Schramm"; 1♂ - "Madrid"; 1♀ - "Madrid. Reitter", "v. *Korbi* Beuth." (all in MNHU); 1♂ - "Madrid (España). Ant. Varquer. F."; 1♂ - "Chiclana. Andalusien. 1890. Korb", "*Cicindela hybrida* Linne var. *Korbi* Beuthin. G. Suworow det.", "r. U. Cedohodf"; 2♂♂ - "Madrid. Reitter", "subsp. *lagunensis* Gautier (Korbi Beuth.) ♂ G. Suworow det.", "r. U. Cedohodf"; 1♀ - "Cuenca. 82", "*Cicindela* v. *lagunensis*"; 1♂ - "Hispania. Reitter", "Madrid. Reitter", "*hybrida* aberr. *Korbi* Beuth. Tschitscherin det." (all in ZISP); 1♀ - "Cuenca, Castilien Korb. 1893", "*C. hybrida* var. *Korbi* Beuth." (ZMM); 3♂♂ - "El Pardo. Madrid. 08-2-79"; 1♀ - "El Pardo. Madrid. 1-5-82 J. Plazo leg."; 1♀ - "Pardo. Madrid. I-37" (all in JP); 1♂ - "España, Comunidad de Madrid, Madrid, El Pardo. m 600 VII. 1992 leg. Jesus Plaza Lama" (GIZ).

DIMENSIONS: Total body length (without labrum) - 12,6-15,1 mm (69 specimens).

DESCRIPTION: Lower surface of head metallic green or blue-green with cupric or bronze reflections. Genae green with violet or purple lustre, sometimes bright cupric. Clypeus golden-green with purple-lilac or cupric reflections. Front, vertex and occiput green or blue-green with golden or cupric reflections, frontal strips bright blue or green. The ocular area bright cupric or golden-cupric with greenish tinge. In some specimens head black with light bronze lustre. Scape blue or blue-green, second antennomere blue-green, 3-4 ones greenish-blue with golden-cupric reflections apically. Labrum white, with narrow dark anterior margin. Third-fourth maxillar and fourth labial pal-

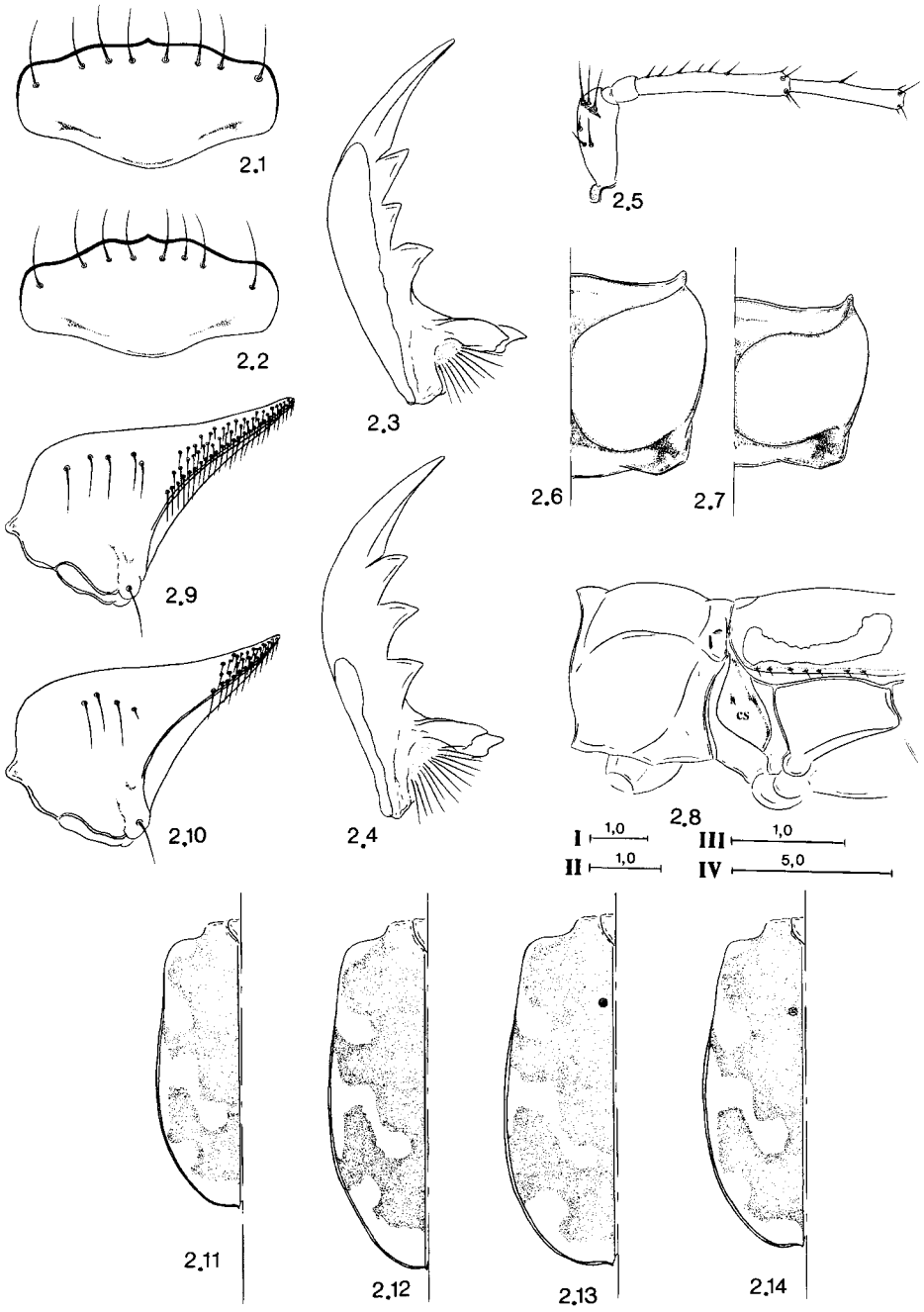


Fig. 2.— *Cicindela iberica*: 2.1-2.2) labrum, 2.3-2.4) left mandibles, 2.5) scape and next three antennomeres, 2.6-2.7) pronotum, right half, 2.8-2.9) right hind trochanter, 2.10) female's coupling sulcus (cs), lateral view, 2.11-2.14) left elytra. Male: 2.1, 2.3, 2.5, 2.6, 2.8, 2.11-2.12. Female: 2.2, 2.4, 2.7, 2.9-2.10, 2.13-2.14. Scale bars (in mm): I) 2.8, II) 2.6-2.7, III) 2.1-2.5 and 2.9-2.10, IV) 2.11-2.14.

Fig. 2.— *Cicindela iberica*: 2.1-2.2) labro, 2.3-2.4) mandíbula izquierda, 2.5) escapo y los tres antenómeros adyacentes, 2.6-2.7) pronoto, mitad derecha, 2.8-2.9) trocánter de la pata posterior derecha, 2.10) surco de acoplamiento femenino (cs), vista lateral, 2.11-2.14) élitro izquierdo. Macho: 2.1, 2.3, 2.5, 2.6, 2.8, 2.11-2.12. Hembra: 2.2, 2.4, 2.7, 2.9-2.10, 2.13-2.14. Escalas (en mm): I) 2.8, II) 2.6-2.7, III) 2.1-2.5 y 2.9-2.10, IV) 2.11-2.14.

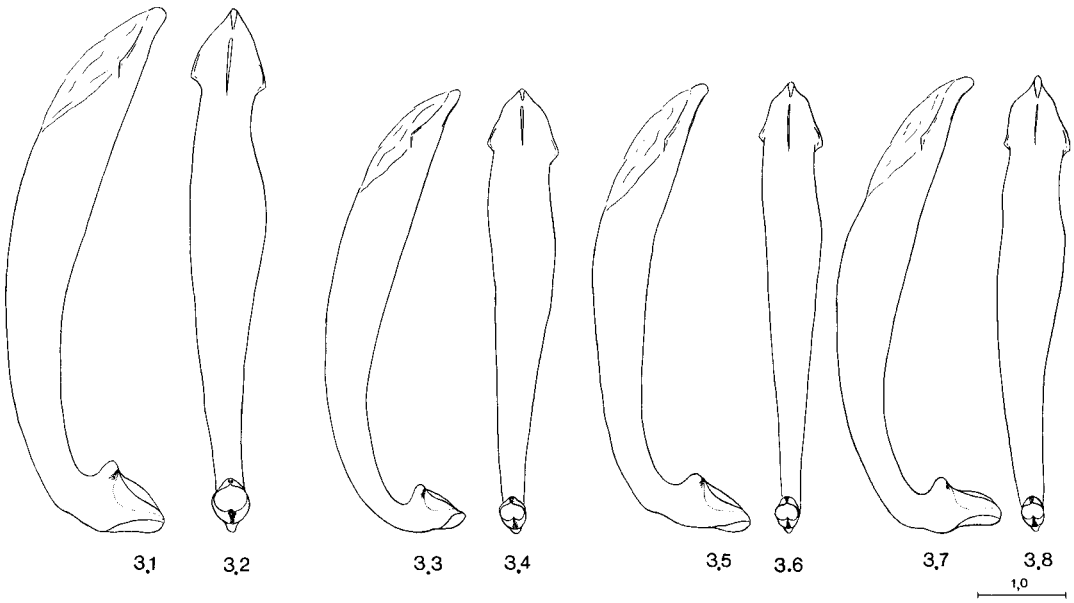
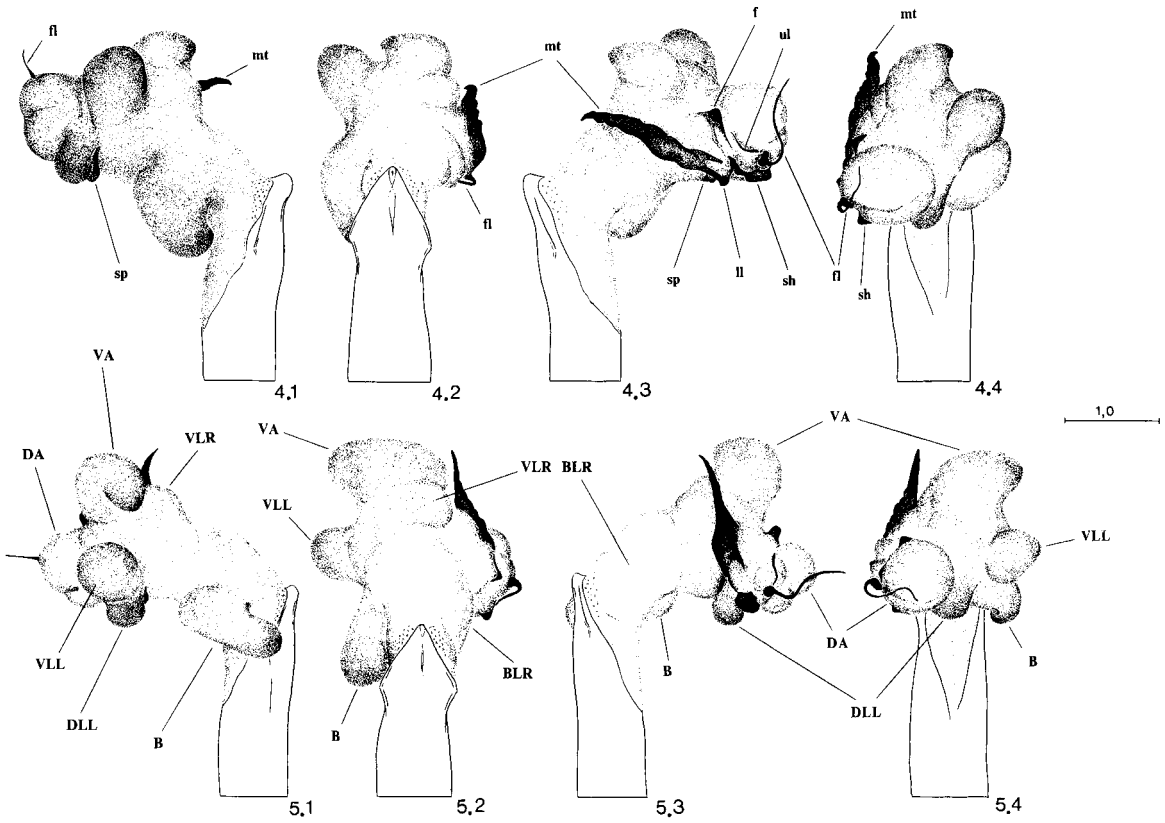


Fig. 3.— Aedeagus: 3.1-3.2) *C. lagunensis*, 3.3-3.4) *C. iberica*, 3.5-3.6) *C. lusitanica lusitanica*, 3.7-3.8) *C. lusitanica silvaticoides.* Left view: 3.1, 3.3, 3.5, 3.7. Dorsal view: 3.2, 3.4, 3.6, 3.8. Scale bar (in mm).

Fig. 3.— Edeago: 3.1-3.2) *C. lagunensis*, 3.3-3.4) *C. iberica*, 3.5-3.6) *C. lusitanica lusitanica*, 3.7-3.8) *C. lusitanica silvaticoides* Vista lateral (izquierda). 3.1, 3.3, 3.5, 3.7. Vista dorsal: 3.2, 3.4, 3.6, 3.8. Escala (en mm).

pomeres bright green or blue-green. Pronotum cupric with golden-green lustre, frontal and basal sutures blue with light green tinge. The middle line distinct, metallic blue-green. Proepisternum bright cupric or cupric-bronze with blue posterior margin, sometimes golden-green with cupric posterior margin. Prothorax blue-green, meso- and metathorax dark blue or violet with greenish-cupric lustre by sides. Mes- and metepisternum cupric-bronze, golden-green or greenish-blue with bright blue anterior margin, mesepimerum green with bright blue anterior margin. In some specimens pronotum, pro-, mes- and metathorax black-bronze. Abdominal sternites blue or violet with cupric-green or purple-lilac reflections by sides. Legs green, femora and tibiae with bright cupric or golden lustre. In some specimens legs fully black-blue with bronze lustre. Elytra cupric-green with light golden lustre and numerous, uniform diffused blue-green points, rarely black-bronze. Scutelum bright cupric or golden-cupric, rarely black-bronze. Elytral suture bright cupric with golden or golden-green lustre, in some specimens black. Elytral pattern always complete, lunulae separated, humeral lunula wide; middle band easily curved with more wide apical portion (figs. 1.13-14 and 1.16). In some specimens the middle band more narrow and sinuate (figs. 1.11 and 1.15), rarely apical portion of middle band fully absent (fig. 1.12).

Head wrinkled on vertex and occiput, with shallow longitudinal furrows on front, and rough, deep furrows behind the eyes. Genae glabrous, with rough, sparse longitudinal wrinkles. Front poorly pubescent with four-five thin, soft hairs, rarely vertex with one-two hairs, occiput always glabrous. There are only one frontal and one basal supraorbital seta. Scape glabrous, rarely with one strong white setae except for three apical ones, third antennomere 1,15-1,3 times longer than fourth, with 4-7, fourth one with 1-3 strong white seta outside (fig. 1.5). Labrum glabrous, transversal, 1,75-2,2 (2,05) times wider than long, unidentate, with 4-10 submarginal setae (figs. 1.1-2). Mandibles massive and stocky, 4,5-5,5 times longer than wide in males and 4,0-5,0 times - in females (figs. 1.3-4). Pronotum finely wrinkled, transversal, 1,15-1,35 (1,3) times wider than long, with not rounded, slightly converged to base lateral margin (figs. 1.6-



Figs. 4-5.— Fig. 4: *Cicindela lagunensis*, internal sac: 4.1) left view, 4.2) dorsal view, 4.3) right view, 4.4) ventral view. Abreviatures: f) flag, ul) upper limitator, fl) flagellum, sh) shield, ll) lower limitator, sp) spring, mt) medial tooth. Scale bar (in mm). Fig. 5: *Cicindela iberica*, internal sac: 5.1) left view, 5.2) dorsal view, 5.3) right view, 5.4) ventral view. Abreviatures: VA) ventro-apical, VLL) ventro-lateral left, VLR) ventro-lateral right, DA) dorso-apical, DLL) dorso-lateral left, B) basal, BLR) basi-lateral right bladders. Scale bar (in mm).

Figs. 4-5.— Fig. 4: *Cicindela lagunensis*, saco interno: 4.1) vista lateral (izquierda), 4.2) vista dorsal, 4.3) vista lateral (derecha), 4.4) vista ventral. Abreviaturas: f) estanderte, ul) limitador superior, fl) flagelo, sh) escudo, ll) limitador inferior, sp) esclerito arrollado, mt) diente medio. Escala (en mm). Fig. 5: *Cicindela iberica*, saco interno: 5.1) vista lateral (izquierda), 5.2) vista dorsal , 5.3) vista lateral (derecha), 5.4) vista ventral. Abreviaturas: VA) ventro-apical, VLL) ventro-lateral izquierda, VLR) ventro-lateral derecha, DA) dorso-apical, DLL) dorso-lateral izquierda, B) basal, BLR) hojas derechas baso laterales. Escala (en mm).

7). Pronotum disc slightly convex, glabrous except row of sparse white setae along lateral margin. Coupling sulcus on female mesepisternum present by a long, poorly sinuated, deep groove with shapely curved basal part (fig. 1.8). Elytra slightly extended in apical third, relatively short, 1,4-1,6 (1,5) times longer than wide. Hind tarsus shortest than tibia 0,89-0,97 times only. Hind trochanters of male with 7-17 long white setae along anterior margin, of female - with 2-7 setae (figs. 1.9-10).

Aedeagus relatively short, 0,53-0,60 (0,55) times shortest than elytra (fig. 15.4), with poorly curved spearforme apex without extended flanks (figs. 3.1-2). Flag very large, triangular; medial tooth twisted on the whole length, short and sharply curved apically (figs. 4.2-4). Ventro-apical bladder relatively small, poorly curved (fig. 4.2), ventro-lateral left bladder large, dorso-lateral left one medium size, basal bladder massive, without additional apical portion, slightly projected by left (fig. 4.1), ventro-lateral right bladder slight, basi-lateral right one practically absent (figs. 4.2-3).

V-shaped posterior margin of 8-th sternum of female with three or four setae on each side; apices

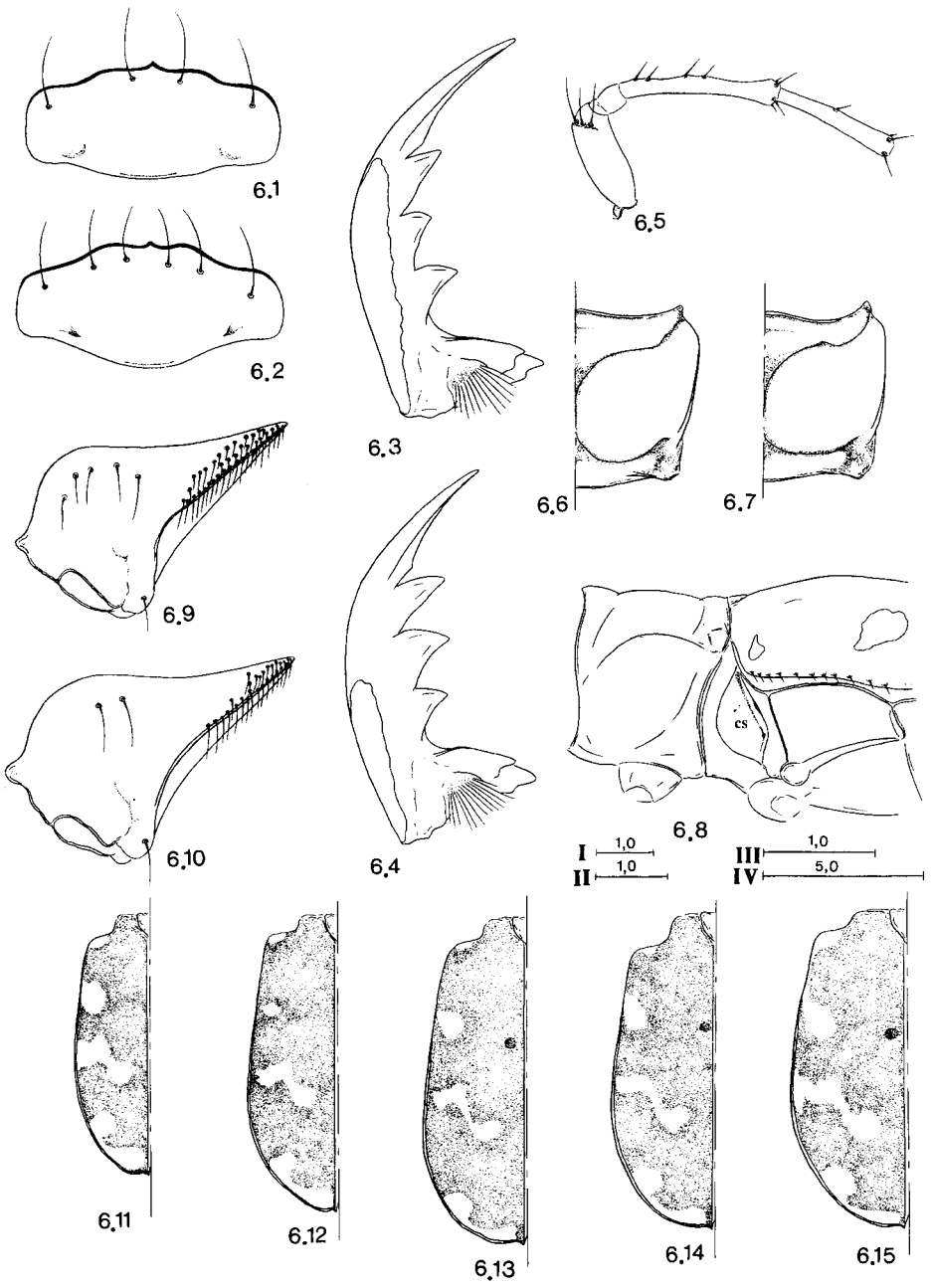


Fig. 6.— *Cicindela lusitanica lusitanica*: 6.1-6.2) labrum, 6.3-6.4) left mandibles, 6.5) scape and next three antennomeres, 6.6-6.7) pronotum, right half, 6.8-6.9) right hind trochanter, 6.10) female's coupling sulcus (cs), lateral view, 6.11-6.15) left elytra. Male: 6.1, 6.3, 6.5, 6.6, 6.8, 6.11-6.13. Female: 6.2, 6.4, 6.7, 6.9-6.10, 6.14-6.15. Scale bars (in mm): I) 6.8, II) 6.6-6.7, III) 6.1-6.5 and 6.9-6.10, IV) 6.11-6.15.

Fig. 6.— *Cicindela lusitanica lusitanica*: 6.1-6.2) labro, 6.3-6.4) mandíbula izquierda, 6.5) escapo y los tres antenómeros adyacentes, 6.6-6.7) pronoto, mitad derecha, 6.8-6.9) trocánter de la pata posterior derecha, 6.10) surco de acoplamiento femenino (cs), vista lateral , 6.11-6.15) élitro izquierdo. Macho: 6.1, 6.3, 6.5, 6.6, 6.8, 6.11-6.13. Hembra: 6.2, 6.4, 6.7, 6.9-6.10, 6.14-6.15. Escalas (en mm): I) 6.8, II) 6.6-6.7, III) 6.1-6.5 y 6.9-6.10, IV) 6.11-6.15.

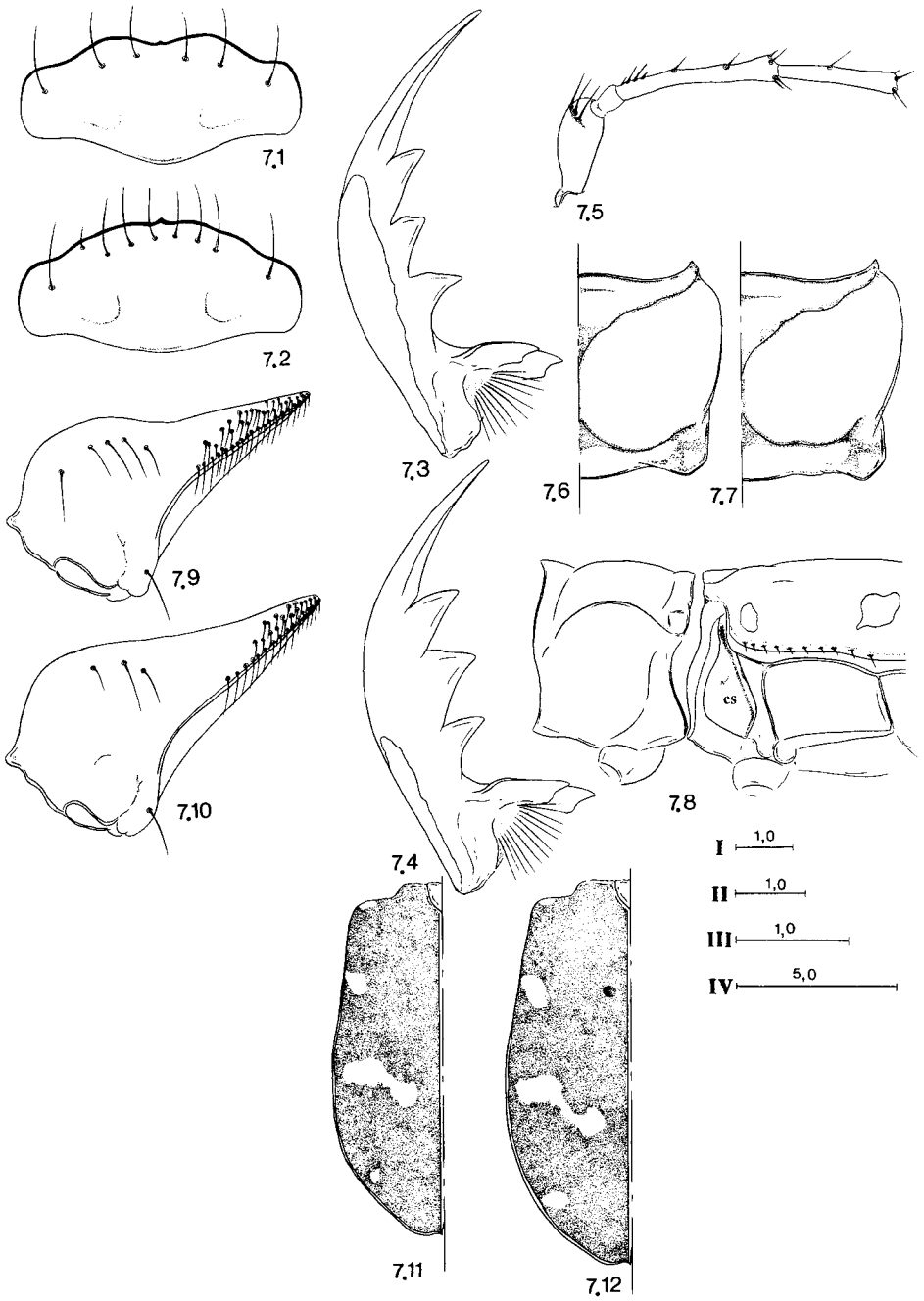
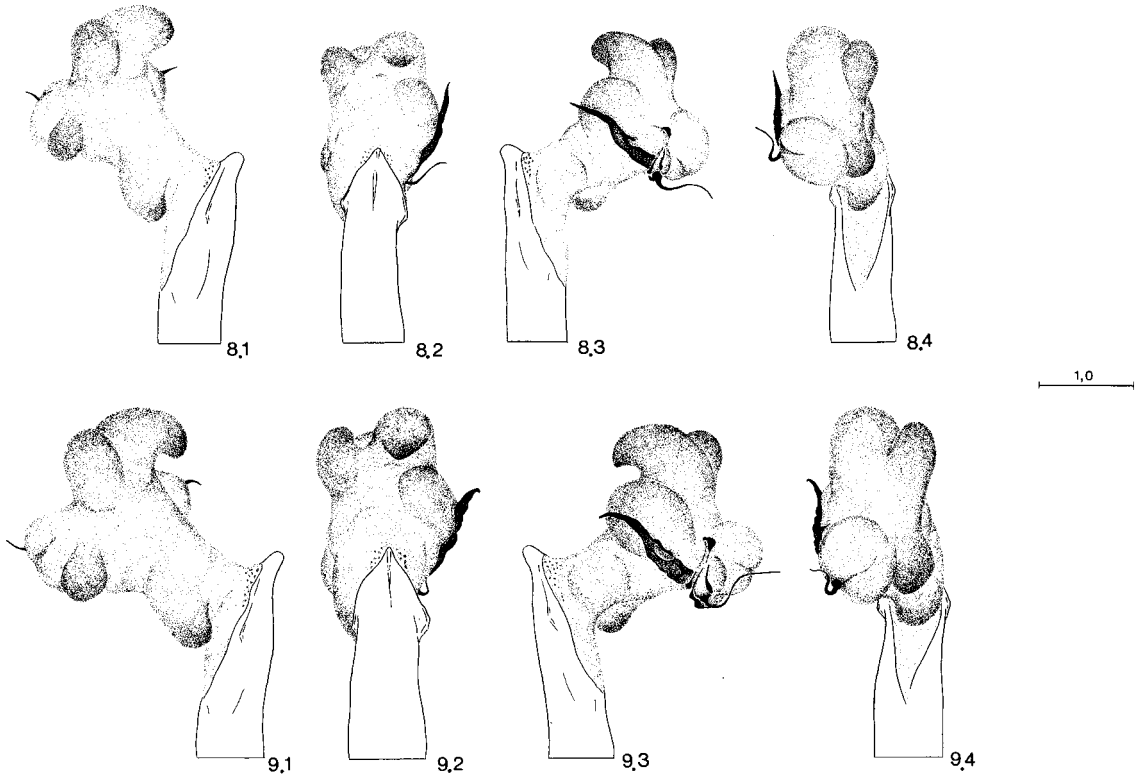


Fig. 7.— *Cicindela lusitanica silvaticoides*: 7.1-7.2) labrum, 7.3-7.4) left mandibles, 7.5) scape and next three antennomeres, 7.6-7.7) pronotum, right half, 7.8-7.9) right hind trochanter, 7.10) female's coupling sulcus (cs), lateral view, 7.11-7.12) left elytra. Male: 7.1, 7.3, 7.5, 7.6, 7.8, 7.11. Female: 7.2, 7.4, 7.7, 7.9-7.10, 7.12. Scale bars (in mm): I) 6.8, II) 6.6-6.7, III) 6.1-6.5 and 6.9-6.10, IV) 6.11-6.12.

Fig. 7.— *Cicindela lusitanica silvaticoides*: 7.1-7.2) labro, 7.3-7.4) mandíbula izquierda, 7.5) escapo y los tres antenómeros adyacentes, 7.6-7.7) pronoto, mitad derecha, 7.8-7.9) trocánter de la pata posterior derecha, 7.10) surco de acoplamiento femenino (cs), vista lateral, 7.11-7.12) élitro izquierdo. Macho: 7.1, 7.3, 7.5, 7.6, 7.8, 7.11. Hembra: 7.2, 7.4, 7.7, 7.9-7.10, 7.12. Escalas (in mm): I) 6.8, II) 6.6-6.7, III) 6.1-6.5 y 6.9-6.10, IV) 6.11-6.12.



Figs. 8-9.— Fig. 8: *Cicindela lusitanica lusitanica*, internal sac: 8.1) left view, 8.2) dorsal view, 8.3) right view, 8.4) ventral view Fig. 9: *Cicindela lusitanica silvaticoides*, internal sac: 9.1) left view, 9.2) dorsal view, 9.3) right view, 9.4) ventral view. Scale bar (in mm).

Figs. 8-9.— *Cicindela lusitanica lusitanica*, saco interno: 8.1) vista lateral (izquierda), 8.2) vista dorsal, 8.3) vista lateral (derecha), 8.4) vista ventral. Fig. 9: *Cicindela lusitanica silvaticoides*, saco interno: 9.1) vista lateral (izquierda), 9.2) vista dorsal, 9.3) vista lateral (derecha), 9.4) vista ventral. Escala (en mm).

slightly rounded, each with two short, stout setae; each outer side with six long, thin setae (fig. 10.2). Tergite 9 oval, 2,0-2,1 times longer than wide, with 34-36 long setae apically. Tergite 10 membranous in the apical half, setose in apical third only, with 18-20 long setae laterally (fig. 10.1). Lateral portion of second gonapophyses with one long seta (fig. 10.4). Ventral notch of second gonacoxa with three long and three short setae. There is a suboval additional sclerite between the second gonocoxa. Bursa copulatrix rounded, large, oviduct sclerite medium size (fig. 10.3).

Genitalia of 30 males and 12 females were studied.

DISTRIBUTION: Spain - Prov.: Madrid, Toledo, Cuenca, Teruel and Jaén (fig. 14).

Cicindela (s. str.) iberica Mandl, 1935, **bona spec., stat. nov.**

(Figs. 2; 3.3-4; 5; 11; 14; 15)

Arb. morph. taxon. Ent. Berlin-Dahlem, 1935, 2, 4: 302-303
Type locality: Soria, Valladolid, Olmedo (Nordspanien)

= *hybrida iberica* Mandl, 1935;
= *lagunensis iberica* Mandl, 1935 *sensu* Gebert, 1995 [*Mitt. Munch. Ent. Ges.*, 86: 20-21]

Horn, 1938: 45 (Taf. 63, fig. 16); Jeanne, 1967: 5; Schilder, 1952: 125, 1953: 564; Cassola & van Nidek, 1984: 10; Zaballos & Jeanne, 1994: 24; Werner, 1991: 17 (Tab. 12, fig. 85), 1992: 84; Wiesner, 1992: 116.

TYPE MATERIAL EXAMINED: 1♂ - white handle-write label "Valladolid", white type/handle-write label "*Cicindela hybr. iberica* m. det. Ing. Mandl", pink type-write label "type", red type-write label "Syntypus", white type-write label "coll. W. Horn DEI Eberswalde", white type-write label "*Cicindela (s. str.) l. iberica* Mandl, 1935. det. J. Gebert 1994"; 1♂ - white

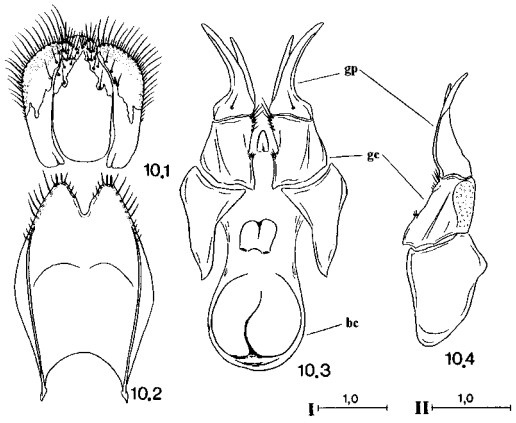


Fig. 10.— *Cicindela lagunensis*, female's genitalia: 10.1) 9&10 syntergume, dorsal view, 10.2) sternum 8, ventral view, 10.3) second gonapophyses (gp), gonacoxa (gc) and bursa copulatrix (bc), ventral view, 10.4) second gonapophyses and gonacoxa, left lateral view. Scale bars (in mm): I) 10.2, II) 10.1 and 10.3-10.4.

Fig. 10.— *Cicindela lagunensis*, genitalia femenina: 10.1) 9&10 sintergo, vista dorsal, 10.2) 8º esterno, vista ventral, 10.3) segunda gonapófisis (gp), gonocoxa (gc) y bursa copulatrix (bc), vista ventral, 10.4) segunda gonapófisis y gonocoxa, vista lateral (izquierda). Escalas (en mm): I) 10.2, II) 10.1 y 10.3-10.4.

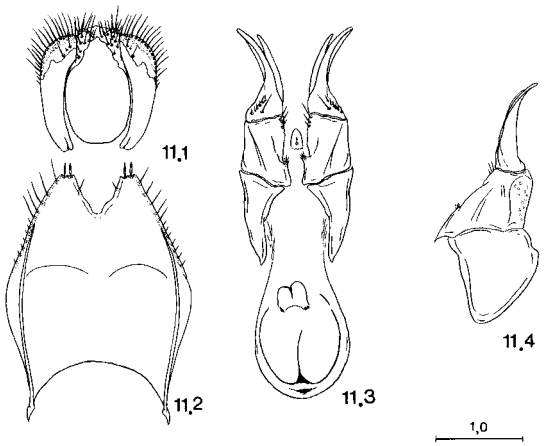


Fig. 11.— *Cicindela iberica*, female's genitalia: 11.1) 9&10 syntergume, dorsal view, 11.2) sternum 8, ventral view, 11.3) second gonapophyses (gp), gonacoxa (gc) and bursa copulatrix (bc), ventral view, 11.4) second gonapophyses and gonacoxa, left lateral view. Scale bar (in mm).

Fig. 11.— *Cicindela iberica*, genitalia femenina: 11.1) 9&10 sintergo, vista dorsal, 11.2) 8º esterno, vista ventral, 11.3) segunda gonapófisis (gp), gonocoxa (gc) y bursa copulatrix (bc), vista ventral, 11.4) segunda gonapófisis y gonocoxa, vista lateral (izquierda). Escala (en mm).

handle-write label "Espagne", white type-write label "Le Moult", red type-write label "Type", white type/handle-type label "*Cicindela hybr. iberica* m. det. Ing. Mandl", white type-write label "coll. W. Horn DEI Eberswalde", white type-write label "*Cicindela (s. str.) l. iberica* Mandl, 1935. det. J. Gebert 1994"; 1 ♀ - white handle-write label "Laguna de Valladolid", white handle-write label "*lagunensis* Gaut.", white type/handle-write label "*Cicindela hybr. iberica* m. det. Ing. Mandl", pink type-write label "type", red type-write label "Syntypus", white type-write label "coll. W. Horn DEI Eberswalde"; 1 ♀ - white handle-write label "", Lauffer. Hispania", white handle-write label "Olmedo", red type-write label "type", white type/handle-write label "*Cicindela hybr. iberica* m. det. Ing. Mandl", red type-write label "Syntypus", white handle-write label "ssp. *iberica* Mandl", white type-write label "coll. W. Horn DEI Eberswalde" (all in DEI).

OTHER MATERIAL EXAMINED: 1♂ - "Segovia 960 m A. Varea"; 1♂ - "Olmedo"; 1♂ - "Ávila J. Sanz"; 1 ♀ - "Vinuesa (Soria) VII. 1939 Parra"; 1 ♀ - "Muñopedro Prov. de Segovia IX-1956. Vaquero"; 1 ♀ - "Marandeja Calleja" (all in MNCN); 1♂ - "Hispania. Tl. Villafore. Ávila", "12.VII.1968 Vives leg.", "*Cicindela h. iberica* Mandl Dr. K. Mandl det. 1979 " (NHMW).

DIMENSIONS: Total body length (without labrum) - 11,7-14,0 mm (11 specimens).

DESCRIPTION: Lower surface of head metallic green with distinct cupric reflections. Genae bronze. Clypeus cupric-bronze, often with greenish or greenish-blue tinge. Front, vertex and occiput green or blue-green with light cupric or golden-cupric lustre, frontal strips bright green. The ocular area bright cupric. First four antennomeres blue or blue-green, 3-4 ones with distinct cupric or golden-cupric reflections apically. Labrum white, with narrow dark anterior margin. Third-fourth maxillar and fourth labial palpomeres metallic green with light cupric or blue tinge. Pronotum cupric with golden-green tinge, in some specimens green with cupric reflections; frontal suture bright green or blue, basal suture - violet. The middle line thin, metallic green. Proepisternum bright cupric, greenish basally. Prothorax blue-green with intensive cupric reflections by sides, meso- and metathorax blue-green with intensive cupric reflections by sides, episternum and epimerum bright cupric. Abdominal sternites blue, first with cupric reflections, second with green reflections laterally. Legs green or blue-green, femora and tibiae with intensive cupric reflections. Elytra green or cupric-green with light golden tinge and numerous, uniform diffused blue points. Scutelum and elytral suture cupric, sometimes with distinct golden tinge. Elytral pattern always complete, humeral and apical lunulae narrow, middle band sharply curved

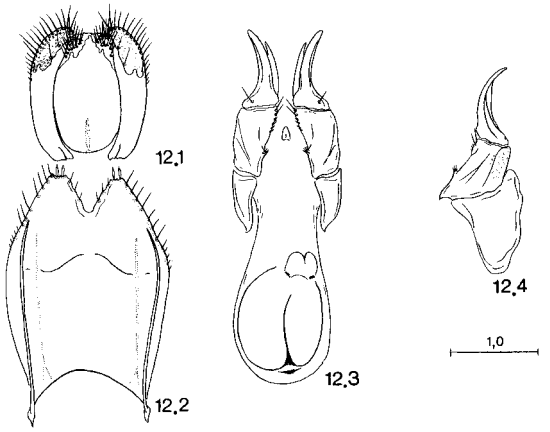


Fig. 12.— *Cicindela lusitanica lusitanica*, female's genitalia: 12.1) 9&10 syntergum, dorsal view, 12.2) sternum 8, ventral view, 12.3) second gonapophyses (gp), gonacoxa (gc) and bursa copulatrix (bc), ventral view, 12.4) second gonapophyses and gonacoxa, left lateral view. Scale bar (in mm).

Fig. 12.— *Cicindela lusitanica lusitanica*, genitalia femenina: 12.1) 9&10 sintergo, vista dorsal, 12.2) 8º esterno, vista ventral, 12.3) segunda gonapófisis (gp), gonocoxa (gc) y bursa copulatrix (bc), vista ventral, 12.4) segunda gonapófisis y gonocoxa, vista lateral (izquierda). Escala (en mm).

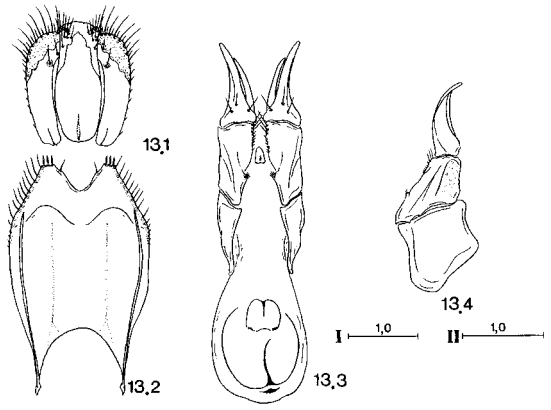


Fig. 13.— *Cicindela lusitanica silvaticoides*, female's genitalia: 13.1) 9&10 syntergum, dorsal view, 13.2) sternum 8, ventral view, 13.3) second gonapophyses (gp), gonacoxa (gc) and bursa copulatrix (bc), ventral view, 13.4) second gonapophyses and gonacoxa, left lateral view. Scale bars (in mm): I) 10.2, II) 10.1 and 10.3-10.4. Scale bars (in mm).

Fig. 13.— *Cicindela lusitanica silvaticoides*, genitalia femenina: 13.1) 9&10 sintergo, vista dorsal, 13.2) 8º esterno, vista ventral, 13.3) segunda gonapófisis (gp), gonocoxa (gc) y bursa copulatrix (bc), vista ventral, 13.4) segunda gonapófisis y gonocoxa, vista lateral (izquierda). Escalas (en mm): I) 10.2, II) 10.1 y 10.3-10.4. Escalas (en mm).

with distinct apical dot as well as long lateral band (figs. 2.12-13). The lunules and bands often coupling together: in some specimens lateral and middle bands margin with humeral lunula, in other - with apical one (fig. 2.11), sometimes all white pattern formed uninterrupted lateral band from humeral area to apex (figs. 2.14).

Head wrinkled on vertex and occiput, with shallow longitudinal furrows on front and rough, deep furrows behind the eyes. Genae glabrous, with rough, thick longitudinal wrinkles. Front poorly pubescent with 3-5 thin, soft hairs, vertex and occiput glabrous. There are only one frontal as well as one basal supraorbital seta. Scape very often sparse pubescence, with 3-5 strong white setae except for three apical ones, third antennomere 1,2-1,3 times longer than fourth, with 5-7, fourth one with 1-3 strong white seta outside (fig. 2.5). Labrum glabrous, transversal, 2,0-2,2 (2,05) times wider than long, unidentate, with 4-8 submarginal setae (figs. 2.1-2). Mandibles 5,5-6,25 times longer than wide in males and 4,6-6,0 times - in females (figs. 2.3-4). Pronotum wrinkled, transversal, 1,25-1,45 (1,35) times wider than long, with slightly rounded lateral margin (figs. 2.6-7). Pronotum disc poorly convex, glabrous except row of sparse white setae along lateral margin. Coupling sulcus on female mesepisternum present as a long, deeply impressed, distinct fractured at the middle groove (fig. 2.8). Elytra distinct extended in apical third, relatively long, 1,5-1,7 (1,6) times longer than wide. Hind tarsus hardly shortest, sometimes nearly longer than tibia - in 0,9-1,02 times. Hind trochanters of male with 6-12 long white setae along anterior margin and in the middle, of female - with 3-7 setae (figs. 2.9-10).

Aedeagus long and graceful, 0,56-0,66 (0,6) times shortest than elytra (fig. 15.4), with straight spearforme apex without extended flanks (figs. 3.3-4). Flag very slender, rounded; medial tooth slightly twisted, practically straight (fig. 5.2-4). Ventro-apical bladder very large, not curved (fig. 5.2); ventro-lateral left bladder - medium and dorso-lateral left one small size; basal bladder long and graceful, with small additional apical portion, distinct turned by left (fig. 5.1); ventro-lateral right bladder distinct but poorly projected; basi-lateral right one slight (figs. 5.2-3).

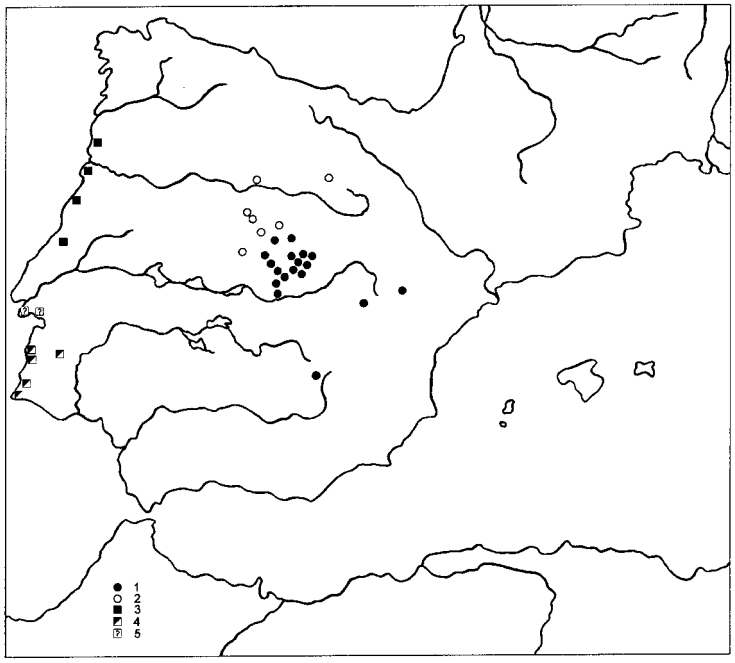


Fig. 14.— Distribution of the Iberian species of *"lagunensis"*-complex. 1) *C. lagunensis*, 2) *C. iberica*, 3) *C. lusitanica lusitanica*, 4) *C. lusitanica silvaticoides*, 5) Possible transition zone between *C. l. lusitanica* and *C. l. silvaticoides.*

Fig. 14.— Distribución de las especies ibéricas del complejo *"lagunensis"*: 1) *C. lagunensis*, 2) *C. iberica*, 3) *C. lusitanica lusitanica*, 4) *C. lusitanica silvaticoides*, 5) Zona de posible transición entre *C. l. lusitanica* y *C. l. silvaticoides.*

V-shaped posterior margin of 8-th sternum of female with one seta on each side only; apices not rounded, each with two short, stout setae; each outer side with five or six long, thin setae (fig. 11.2). Tergite 9 oval, 1,75-1,80 times longer than wide, with 24-26 long setae apically. Tergite 10 membranous in the apical third only, setose apically, with 15-17 long setae along each outer side and with two setae laterally (fig. 11.1). Lateral portion of second gonapophyses with one long and six short setae (fig. 11.4). Ventral notch of second gonacoxa with three long setae. There is suboval additional sclerite between the second gonocoxa. Bursa copulatrix suboval, oviduct sclerite medium size (fig. 11.3).

Genitals of five males and four females were studied.

DISTRIBUTION: Spain - Prov.: Ávila, Segovia, Soria, Valladolid (fig. 14).

Cicindela (s. str.) lusitanica Mandl, 1935, **bona spec., stat. nov.**
(Figs. 3.5-8; 6-9; 12-13; 14)

DIMENSIONS: Total body length (without labrum) - 11,2-14,6 mm (10 specimens).

DESCRIPTION: Lower surface of head metallic bronze or cupric-bronze, rarely cupric-green with distinct golden reflections. Genae bronze with greenish reflections. Clypeus and front, vertex and occiput cupric-bronze with golden or greenish tinge, frontal strips bright green or blue. The ocular area bronze, sometimes with cupric or green lustre. First four antennomeres dark blue, 3-4 ones with light greenish-bronze reflections apically. Labrum white, with narrow dark anterior margin. Third-fourth maxillar and fourth labial palpomeres metallic blue-green with light bronze reflections. Pronotum cupric-bronze, sometimes with light greenish tinge, frontal and basal sutures violet or blue-green. The middle line distinct, metallic blue or green. Proepisternum dark bronze. Prothorax dark blue with light green or cupric tinge, meso- and metathorax blue-green with distinct cupric reflections, episternum and epimerum cupric-bronze. Abdominal sternites blue with greenish reflections. Femora and tibia blue-green with cupric reflections, tarsus blue with light green tinge. Elytra light or dark bronze with numerous, uniform diffused dark blue points. Scutelum cupric-bronze with green base, elytral suture bright cupric. Elytral pattern always separate, complete or incomplete, humeral lunula complete (figs. 6.11 and 6.14-15), or sometimes slip up into two small dots (figs. 6.12-13 and 7.11-12), middle band weakly curved (figs. 6.11-14 and 7.11-12), rarely formed very short lateral shoot (fig. 6.15), apical lunula complete (figs. 6.11-15) or incomplete (7.11-12). There is small dark roundish deep spot in humeral, subsutural area on female's elytral disc (figs. 6.13-15 and 7.12).

Head wrinkled with shallow longitudinal furrows on front and rough, deep furrows behind the eyes. Genae glabrous, with thin, widely extended longitudinal wrinkles. Front poorly pubescent with 3-5 thin, soft hairs, vertex and occiput gla-

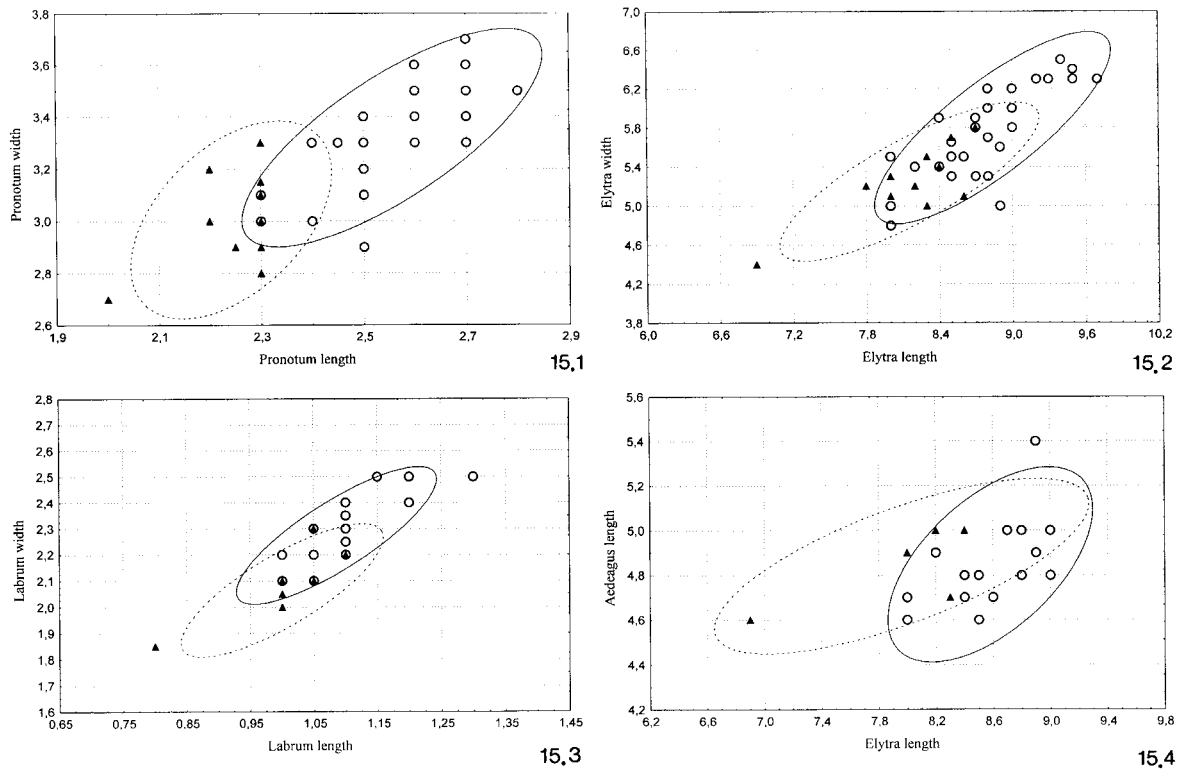


Fig. 15.— The some basic morphological measurements of *C. lagunensis* (white circles) and *C. iberica* (black triangles).

Fig. 15.— Algunas medidas morfológicas básicas de *C. lagunensis* (círculos blancos) y *C. iberica* (triángulos negros).

brous. There are one frontal as well as basal supraorbital setae. Scape glabrous, except for three apical setae, third antennomere 1,2-1,3 times longer than fourth, with 3-5, fourth one with 1-2 strong white seta outside (figs. 6.5 and 7.5). Labrum glabrous, transversal, 2,0-2,3 (2,1) times wider than long, unidentate, with 4-8 submarginal setae (figs. 6.1-2 and 7.1-2). Mandibles 5,6-6,25 times longer than wide in males and 5,4-6,0 times - in females (figs. 6.3-4 and 7.3-4). Pronotum wrinkled, transversal, 1,2-1,4 (1,3) times wider than long with non rounded, distinct converged lateral margin (figs. 6.6-7 and 7.6-7). Pronotum disc distinct convex, glabrous except narrow row of sparse white setae along lateral margin. Coupling sulcus on female mesepisternum present by a long, straight, deep groove with sharply curved basal part (figs. 6.88 and 7.8). Elytra distinct extended in apical third, 1,45-1,55 (1,5) times longer than wide. Hind tarsus hardly shortest than tibia - in 0,91-0,98 times only. Hind trochanters of male with five-seven long white setae along anterior margin and in the middle, of female - with two-four setae (figs. 6.9-10 and 7.9-10).

Aedeagus relatively long, 0,55-0,65 (0,58) times shortest than elytra, with distinct curved spearforme apex with slightly extended flanks (figs. 3.5-8). Flag small, rounded; medial tooth slightly twisted, curved apically (fig. 8.1) or practically straight (fig. 9.1). Ventro-apical bladder very large, distinct curved in apical part, longitudinal (figs. 8.2 and 9.2); ventro-lateral bladder - large and dorso-lateral left one medium size; basal bladder small and short, without additional apical portion (figs. 8.1 and 9.1); ventro-lateral right bladder very large, well projected towards; basi-lateral right one slight (figs. 8.2-3 and 9.2-3).

V-shaped posterior margin of 8-th sternum of female with one-three setae on each side; apices not rounded, each with two-three short, stout setae; each outer side with seven-ten long, thin setae (fig. 12.2 and 13.2). Tergite 9 oval or narrow-oval, 1,8-

2,5 times longer than wide, with 16-26 long setae apically. Tergite 10 membranous in the apical third only, setose on the whole membranous surface, with 8-12 long setae laterally (fig. 12.1 and 13.1). Lateral portion of second gonapophyses with one or three long setae (figs. 12.4 and 13.4). Ventral notch of second gonacoxa with two-three long and four-six short setae. There is a suboval additional sclerite between the second gonocoxa. Bursa copulatrix rounded, oviduct sclerite medium size (figs. 12.3 and 13.3).

DISTRIBUTION: Portugal Atlantic coasts from Miño river to cap San Vicente (fig. 14).

Cicindela (s. str.) lusitanica lusitanica Mandl, 1935
(Figs. 3.5-6; 6; 8; 12; 14)

Arb. morph. taxon. Ent. Berlin-Dahlem, 1935, 2, 4: 303
Type locality: Marinha Grande (Nord-Estremadure: Portugal)

= *hybrida lusitanica* Mandl, 1935;
= *hybrida maritima* Dejean, 1822 *sensu* Horn, 1930 [*Ent. Bl.*, 26 (2): 50];
= *hybrida hybrida* Linnaeus, 1758 *sensu* Seabra, 1941 [*Mem. Estud. Mus. Zool. Univ. Coimbra*, 126: 9-11];
= *lagunensis lusitanica* Mandl, 1935 *sensu* Gebert, 1995 [*Mitt. Munch. Ent. Ges*., 86: 21]

Horn, 1937: 95 (fig. 2-4), 1938: 45 (Taf. 63, fig. 11-13); Seabra, 1941: 9-11 (as *C. hybrida maritima*); Alves, 1943: 16-18 (as *C. hybrida hybrida* and *C. hybrida maritima*); Jeanne, 1967: 5, 1976: 28; Schilder, 1952: 125, 1953: 564; Cassola & van Nidek, 1984: 10; Zaballos & Jeanne, 1994: 24; Werner, 1991: 17 (Tab. 12, fig. 86-87), 1992: 84; Wiesner, 1992: 116.

TYPE MATERIAL EXAMINED: 1♂ 2♀♀ - white handle-write label "Marinha Grd. Portugal", white type-write label "Le Moult", red type-write label "Type", white handle/type-write label "*Cicindela hybr. lusitanica* nov. det. Ing. Mandl", red type-write label "Syntypus", white type-write label "coll. W. Horn DEI Eberswalde"; 1♀ - white handle-write label "Marinha Grd. Portugal", white type-write label "Le Moult", red type-write label "Type", white handle/type-write label "*Cicindela hybr. lusitanica* nov. det. Ing. Mandl", red type-write label "Syntypus", white type-write label "coll. W. Horn DEI Eberswalde", White handle-write label "ssp. *lusitanica* Mandl"; 1♂ - white handle-write label "Marinha Grd. Portugal", white type-write label "Le Moult", pink type-write label "Type", white handle/type-write label "*Cicindela hybr. lusitanica* nov. det. Ing. Mandl", white type-write label "coll. W. Horn DEI Eberswalde"; 1♂ - white handle-write label "Marinha Grd. Portugal", white handle-write label "Le Moult", white type-write label "coll. W. Horn DEI Eberswalde", white type-write label "*Cicindela (s. str.) lagunensis lusitanica* Mandl, 1935. det. J. Gebert 1994" (all in DEI).

OTHER MATERIAL EXAMINED: 1 Ex. (only single wing) - "Juli 1927. Azurara (Porto: Port.) C. de Barras", "v. *lusitanica* (*hybrida* m. olim.)", "coll. W. Horn DEI Eberswalde" (DEI); 1♀ - gold quadrat label, "Lusit." (MNHU).

DIMENSIONS: Total body length (without labrum) - 11,2-13,4 mm (eight specimens)

DESCRIPTION: Body less dark, light bronze with cupric reflections, sometimes with deep green lustre on the whole body surface. Humeral lunula complete (figs. 6.11 and 6.14-15), in some specimens slip up in two small separated dots (figs. 6.12-13). Apical lunula always complete. Middle band rarely formed very short lateral shoot toward to the apex (figs. 6.11-15).

Aedeagus more long, 0,55-0,65 (0,58) times shortest than elytra, with poorly retracted and curved apex (fig. 8.1 and 8.3); medial tooth practically straight (figs. 8.2-4).

V-shaped posterior margin of sternum 8-th of female with three thin setae on each side; apices with two short, stout setae; each outer side with seven long, thin setae (fig. 12.2). Tergite 9 oval, 1,8-1,85 times longer than wide, with 23-26 long setae apically. Tergite 10 with 10-12 long setae laterally (fig. 12.1). The base of lateral portion of second gonapophyses with one long seta only. Ventral notch of second gonacoxa with two long and four or five short setae. The additional sclerite between the second gonocoxa smaller (figs. 12.3).

Genital of three males and two females were studied.

DISTRIBUTION: Portugal Atlantic coast from Miño river to Tagus river (fig. 14).

Cicindela (s. str.) lusitanica silvaticoides W. Horn, 1937, **comb. nov.**
(Figs. 3.7-8; 7; 9; 13; 14)

Naturhistor. Maandbl., 1937, 26: 94, fig. 1
Type locality: Sagres.

= *hybrida silvaticoides* W. Horn, 1937;
= *hybrida lagunensis* Gautier, 1872 *sensu* Serrano, 1983 [*Nouv. Rev. Ent.*, 13(1): 35];
= *hybrida algarbica* Serrano, 1988a [*Bol. Soc. port. Entomol.*, 3(25): 6 (Type locality: Aljegur, Portugal)];
= *lagunensis silvaticoides* W. Horn, 1937 *sensu* Gebert, 1995 [*Mitt. Munch. Ent. Ges.*, 86: 21]

Horn, 1938: 45 (Taf. 63, fig. 14); Schilder, 1952: 125, 1953: 564; Serrano, 1988b: 1; Cassola & van Nidek, 1984: 10; Zaballos & Jeanne, 1994: 24; Werner, 1991: 17 (Tab. 13, fig. 90-92), 1992: 84; Wiesner, 1990: 90, 1992: 116.

TYPE MATERIAL EXAMINED: 1♂ - white type-write label "Sagres", white type-write label "Soc. Ent. Belg. Coll. Putzeys", white type-write label "Type. W. Horn", white handle-write label "*silvaticoides* m.", white type-write label "coll. W. Horn DEI Eberswalde", red type-write label "SYNTYPUS", white type-write label "*Cicindela (s. str.) lagun. silvaticoides* W. Horn, 1937. det. J. Gebert 1994", red type/handle-write label "Lectotypus. *Cicindela (s. str.) hybrida silvaticoides* W. Horn, 1937 design. A.V. Matalin, 1997"; 1♀ - white type-write label "Sagres", white type-write label "Van Vioxem", white type-write label "Type. W. Horn", red type-

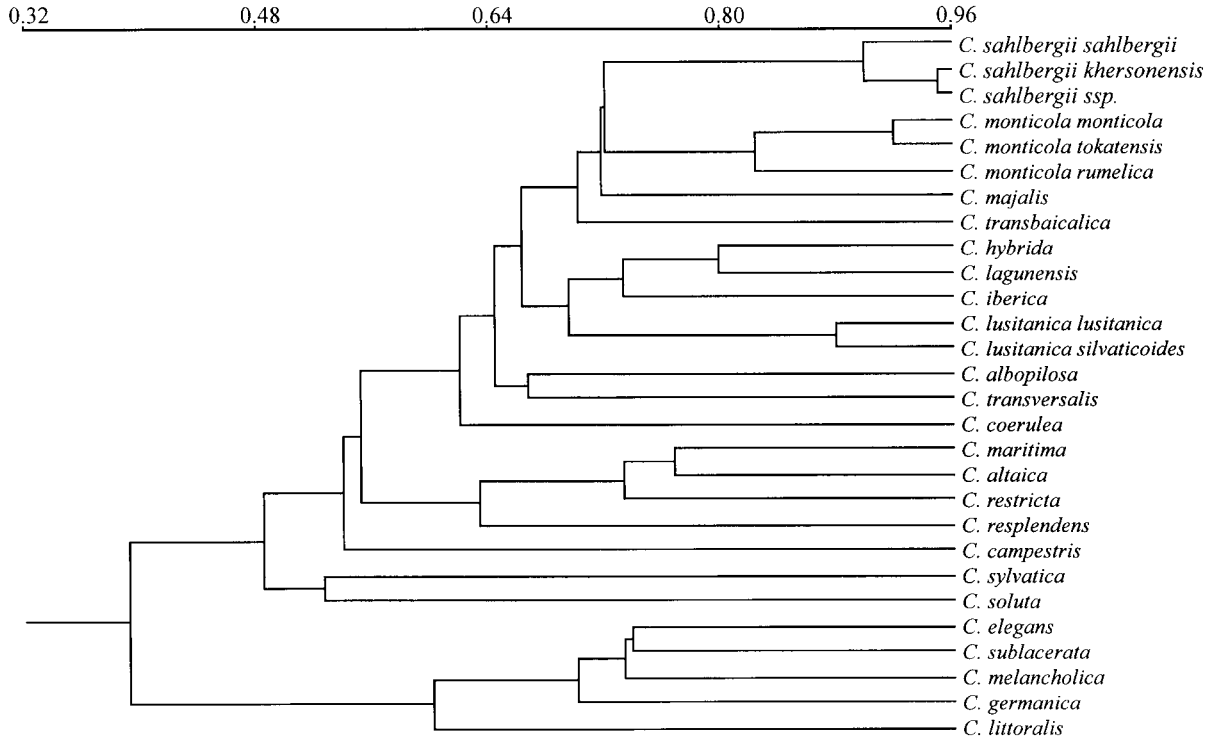


Fig. 16.— Hypothetical phylogeny of the some Palaearctic tiger beetles, which belong to the *"hybrida"*-species group (according to Mandl).

Fig. 16.— Filogenia hipotética de algunas especies paleárticas de *Cicindela* del grupo de especies *"hybrida"* (según Mandl).

write label "SYNTYPUS", red type/handle-write label "Paralectotypus. *Cicindela (s. str.) hybrida silvaticoides* W. Horn, 1937 design. A.V. Matalin, 1997" (all in DEI).

DIMENSIONS: Total body length (without labrum) - 13,4-14,6 mm (two specimens)

DESCRIPTION: Body more dark, deep bronze with distinct greenish reflections on the head, pronotum and humeral area and narrow elytral margin. Humeral lunula always present by two small separated dots. Apical lunula always incomplete, present as a very small submarginal dot. Middle band never formed lateral shoot (fig. 7.11-12).

Aedeagus more short, 0,55 times shortest than elytra only, with well retracted and curved apex (fig. 9.1 and 9.3); median tooth distinct curved by apex (figs. 9.2-4).

V-shaped posterior margin of sternum 8-th of female with one thin seta on each side; apices with three short, stout setae; each outer side with ten long, thin setae (fig. 13.2). Tergite 9 narrow oval, 2,3 times longer than width, with 16 long setae apically. Tergite 10 with eight long setae laterally (fig. 13.1). The base of lateral portion of second gonapophyses with three long thin setae. Ventral notch of second gonacoxa with three long and six short setae. The additional sclerite between the second gonocoxa largest (figs. 13.3).

Genital of one male and one female were studied.

DISTRIBUTION: Portugal Atlantic coast from Tagus river to cap San Vicente (fig. 14).

Discussion

According to Gebert's opinion (1995) *Cicindela lagunensis* includes four subspecies which live in the Iberian Peninsula only. This conclusion is based mainly on the study of the aedeagus. However, in the key for separating *C. lagunensis* and *C. sahlbergii*, only geographical characters were given by Gebert (1995). At the same time, the composition

of male internal sac and the genitalia of female were not studied.

Cicindela lusitanica is well differentiated from *C. lagunensis* and *C. iberica* by the dark dorsal coloration; narrow, often incomplete white elytral pattern; distinct elongate and curved aedeagus apex with slightly extended flanks; longitudinal orientation of the internal sac; composition of bladders and shape of female genitalia. All these peculiarities and the area of distribution of *C. lusitanica* along Atlantic ocean coast (Serrano, 1983, 1988a) support its nature of a separate species. *C. l. lusitanica* and *C. l. silvaticoides* are mostly similar within each other than with *C. lagunensis* or *C. iberica*. The differences between *C. l. lusitanica* and *C. l. silvaticoides* are such as the differences between *C. sahlbergii sahlbergii* Fischer von Waldheim, 1824 and *C. sahlbergii khersonensis* Motschulsky, 1845 or between *C. monticola monticola* Menetries, 1832 and *C. monticola tokatensis* Chaudoir, 1863 (fig. 16). This fact suggest that they are subspecies. As noted above *C. lusitanica* is distributed along Portugal Atlantic coast from Miño river to cap San Vicente. The transition zone between *C. l. lusitanica* and *C. l. silvaticoides* is probably the stuary of the Tagus river (fig. 14). However, additional material from these localities must be analysed for more founded conclusion.

Cicindela iberica is well differentiated from *C. lagunensis* by the narrow, partly or fully coupling white elytral pattern; scape setose; shape of coupling sulcus of female; relatively long and slender elytra and aedeagus; orientation of internal sac; composition of bladders and shape of female genitalia. On an average, *C. iberica* has more slender proportions than *C. lagunensis*, so the latter species is a larger. However, the basic morphological measurements are crossed partly (fig. 15). According to the results of clustering analysis *C. lagunensis* is more similar to *C. hybrida* than to *C. iberica* (fig. 16). This fact support opinion that *C. lagunensis* and *C. iberica* are separate species. The lack of a transition zone also support this conclusion. The Castillian mountains are natural borders which separate these taxa. *C. iberica* lives in the northern Mezeta while *C. lagunensis* lives in the southern Mezeta (fig. 14). A similar situation is known for the some carabid species, for example the Caucasian *Carabus* Linnaeus, 1758 species. *C. exaratus* Quensel, 1806 lives in northern slopes of Grand Caucasus Range and *C. septencarinatus* Motschulsky, 1840 lives in the southern slopes and in the Minor Caucasus (Kryzhanovskij et al., 1995). As a whole, the analysed species form a monophyletic group with *C. hybrida* and this group has a sister group which was made up by *C. sahlbergii* and other related species (fig. 16).

Key for identify the Iberian species of the "*lagunensis*"-complex:

1(2) Hind tarsus distinct shortest than femura. Mandibles of male slender, longer and narrower, no less than in 6,5 times longer than width. Aedeagus apex with distinct, width extended flanks. Internal sac without medial tooth. ..... species of "*maritima*"-group

2(1) Hind tarsus slightly shortest or some length than femura. Mandibles of male stocky, shortest and widths, no more than in 6,0-6,25 times longer than width. Aedeagus apex without or with very poor extended flanks. Internal sac with distinct medial tooth .... species of "*hybrida*"-group **(3)**

3(4) The beetles cupric-green or green with metallic cupric reflections. White markings wide, humeral and apical lunules always complete (figs. 1.11-16 and 2.11-14). Aedeagus apex straight or slightly curved, without extended flanks. Ventro-apical bladder small or medium size, poorly curved apically, a perpendicular; ventro-lateral right bladder slight (figs. 4 and 5). Tergite 10 with not less than 15 long setae laterally (figs. 10.1 and 11.1). ..... **(5)**

4(3) The beetles bronze. White markings narrow, humeral and apical lunules often incomplete (figs. 6.11-15 and 7.11-12). Aedeagus apex distinct retracted, curved, with slightly extended flanks. Ventro-apical bladder very large, distinct curved apically, longitudinal; ventro-lateral right bladder very large, well projected (figs. 8 and 9). Tergite 10 with no more than 8-10 long setae laterally (figs. 12.1 and 13.1). Portugal Atlantic coast. ....***C. lusitanica*** Mandl, 1935 **(a)**

a(b) Humeral lunula complete or rarely slip up in two separated dots, apical lunula always complete (figs. 6.11-15). V-shaped posterior margin of 8-th female's sternum with three thin setae, lateral margin with seven long setae (fig. 12.2). Tergite 9 with 23-26 long setae apically, tergite 10 with 10-12 long setae laterally (fig. 12.1). The base of second gonapophyses with one long seta. Portugal Atlantic coast from Miño river to Tagus river (fig. 14). 11,2-13,4 mm .... ***C. lusitanica lusitanica*** Mandl, 1935

b(a) Humeral lunula always present as the two small separated dots, apical lunula incomplete, present as a small submarginal dot (figs. 7.11-12). V-shaped posterior margin of 8-th female's sternum with one thin seta, lateral margin with ten long setae (fig. 13.2). Tergite 9 with 16 long setae apically, tergite 10 with eight long setae laterally (fig. 13.1). The base of second gonapophyses with three long setae. Portugal Atlantic coast from Tagus river to cap San Vicente (fig. 14). 13,4-14,6 mm ....***C. lusitanica silvaticoides*** W. Horn, 1937

5(6) Elytra relatively short, white markings wide, always separated, middle band poorly curved (figs. 1.11-16). Scape glabrous (fig. 1.5). Coupling sulcus poorly sinuate, with basal groove (fig. 1.8). Medial tooth sharply curved apically. Ventro-apical bladder smaller; basal bladder massive, without additional apical portion (fig. 4). V-shaped posterior margin of 8-th female's sternum with

three-four long setae (fig. 10.2). Tergite 9 with 34-36 long setae apically, tergite 10 with 18-20 long setae laterally (fig. 10.1). Spain - Prov.: Madrid, Toledo, Cuenca, Teruel and Jaén (fig. 14) ....***Cicindela lagunensis*** Gautier, 1872

6(5) Elytra relatively long, white markings narrow, often coupling, middle band sharply curved (figs. 2.11-14). Scape often sparse pubescence, with 3-5 strong white setae except for apical ones (fig. 2.5). Coupling sulcus well curved, with middle and basal grooves (fig. 2.8). Medial tooth practically straight. Ventro-apical bladder largest; basal bladder long and graceful, with small additional apical portion (figs. 5). V-shaped posterior margin of 8-th female's sternum with single long setae (fig. 11.2). Tergite 9 with 24-26 long setae apically, tergite 10 with 15-17 long setae laterally (fig. 11.1). Spain - Prov.: Ávila, Segovia, Soria, Valladolid (fig. 14) .... ***Cicindela iberica*** Mandl, 1935

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Appendix 1.— The description of character states which were used for reconstruct of the tree.

(1) *Body size*. 1 - small size (<9,0 mm), 2 - medium (9,0-10,0 mm), 3- large (>10 mm);
(2) *Head colour.* 1 - black, 2 - bronze, 3 - cupric with metallic reflections, 4 - dull green with metallic reflections, 5 - dull blue with metallic reflections, 6 - bright metallic green, 7 - bright metallic blue;
(3) *Genae rugosity*. 1 - shallow, 2 - deep;
(4) *Genae setae.* 1 - absent, 2 - sparse, 3 - dense;
(5) *Clypeus*. 1 - glabrous, 2 - with two shallow pits;
(6) *Clypeus setae*. 1 - absent, 2 - sparse, 3 - dense;
(7) *Front rugosity*. 1 - glabrous, 2 - shallow, 3 - deep;
(8) *Front setae*. 1 - absent, 2 - sparse soft hairs, 3 - numerous long thin setae, 4 - numerous short stout setae;
(9) *Vertex rugosity*. 1 - glabrous, 2 - shallow, 3 - deep;
(10) *Vertex setae*. 1 - absent, 2 - sparse soft hairs, 3 - numerous stout setae;
(11) *Supraorbital area rugosity*. 1 - glabrous, 2 - shallow, 3 - deep;
(12) *Anterior supraorbital setae*. 1 - single seta, 2 - more than one setae;
(13) *Posterior supraorbital setae*. 1 - single seta, 2 - more than one setae;
(14) *Occiput rugosity*. 1 - shallow, 2 - deep;
(15) *Occiput setae*. 1 - absent, 2 - scanty stout setae, 3 - numerous long thin setae, 4 - numerous short stout setae;
(16) *Labrum colour*. 1 - white, 2 - black;
(17) *Labrum shape, length/wide*. 1 - narrow, 2 - short, 3 - average, 4 - long;
(18) *Labrum margin*. 1 - unidentate, 2 - tridentate;

(19) *Labrum, shape of median longitudinal ridge*. 1 - absent, 2- broad and rounded, 3 - sharp carina;
(20) *Labrum setae position*. 1 - submarginal, 2 - discal;
(21) *Labrum setae*. 1 - scanty (<7), 2 - average (8-15), 3 - numerous (>15);
(22) *Mandibles shape, length/wide*. 1- stocky (4,0-6,5), 2 - slender (6,5-8,0);
(23) *Antennal scape apical setae*. 1- single, 2 - two-three, 3 - four-five;
(24) *Lateral labrum setae*. 1 - absent, 2 - present;
(25) *Antennal scape other setae*. 1- absent or several (0-2), 2 - average (3-9), 3 - numerous (10-15), 4 - dense (16-20);
(26) *Antennomeres colour*. 1- 5-11 pale, 2 - 5-11 dark brown;
(27) *Pronotum colour*. 1 - black, 2 - bronze, 3 - cupric with metallic reflections, 4 - dull green with metallic reflections, 5 - dull blue with metallic reflections, 6 - bright metallic green, 7 - bright metallic blue;
(28) *Pronotum rugosity*. 1 - glabrous, 2 - finely wrinkled, 3 - roughly wrinkled;
(29) *Pronotum shape: length/wide*. 1 - narrow, 2 - average, 3 - broad;
(30) *Pronotum setae*. 1 - glabrous, 2 - narrow lateral row of long thin setae, 3 - broad lateral row of long thin setae, 4 - broad lateral row of short stout setae, 5 - fully pubescent;
(31) *Proepisternum setae*. 1 - absent, 2 - sparse, 3 - moderate, 4 - dense;
(32) *Coupling sulcus, shape*. 1 - straight groove deep basally, 2 - straight groove deep centrally and basally, 3 - poorly sinuate groove deep basally, 4 - sharply curved groove deep basally, 5 - groove with central pit, 6 - central pit;
(33) *Mesepisternum setae*. 1 - absent, 2 - sparse, 3 - moderate, 4 - dense;
(34) *Abdominal sternites colour*. 1 - metallic, 2 - pale apical sternites;
(35) *Middle abdominal sternites setae*. 1 - one-two pairs of long setae, 2 - four pairs of long setae, 3 - four-six pairs of long and several small erect ones, 4 - numerous long and small erect setae, 5 - numerous small soft setae;
(36) *Setose of lateral portion of abdominal sternites*. 1 - absent, 2 - sparse, 3 - numerous, 4 - dense;
(37) *Legs colour*. 1 - tibia pale, 2 - fully metallic;
(38) *Hind legs, tarsus length/tibia length*. 1 - short (0,6-0,8), 2 - average (0,85-1,05), long (1,1-1,2), very long (1,25-1,35);
(39) *Hind male's trochanter setae*. 1 - single, 2 - little (3-7), 3 - average (7-15), 4 - numerous (15-25);
(40) *Hind female's trochanter setae*. 1 - single, 2 - little (2-5), 3 - average (5-10), 4 - numerous (10-15);
(41) *Elytral ground colour*. 1 - black, 2 - bronze, 3 - cupric with metallic reflections, 4 - dull green with metallic reflections, 5 - dull blue with metallic reflections, 6 - dull red with metallic reflections, 7 - bright metallic green or blue, 8 - bright metallic red;
(42) *Elytral white marking*. 1 - narrow, 2 - normal, 3 - broad;
(43) *Elytral texture*. 1 - glabrous, 2 - smooth, 3 - finely granulate, 4 - roughly granulate;
(44) *Elytral microsculpture.* 1 - absent, 2 - present;
(45) *Elytral apical margin*. 1 - glabrous, 2 - microzerrulated;
(46) *Elytral epipleurum*. 1 - fully pale, 2 - pale with metallic apical part, 3 - fully metallic;
(47) *Humeral lunule configuration*. 1 - only basal portion present, 2 - lunula reduced to two dots, 3 - complete lunula;
(48) *Apical lunule configuration*. 1 - only apical portion present, 2 - lunula reduced to two dots, 3 - complete lunula;
(49) *Middle band configuration*. 1 - sublateral portion, 2 - subsutural portion, 3 - sublateral and subsutural portions, 4 - complete band;
(50) *Middle band configuration.* 1 - straight, 2 - poorly curved, 3 - short curved, 4 - smoothly sinuate, 5 - sharply sinuate;
(51) *Lateral band configuration*. 1 - absent, 2 - short, 3 - long separate, 4 - coupling with humeral lunula, 5 - coupling with apical lunula, 6 - coupling with humeral and apical lunules;
(52) *Humeral setae.* 1 - absent, 2 - present;

GENITALIA OF MALE:

(53) *shape median lobe*. 1 - long, slender symmetrical tube, 2 - long tube, distinct projected by right, 3 - short, oval tube;
(54) *shape apex*. 1 - straight, 2 - longitudinal, symmetrical rounded speaform, 3 - longitudinal, symmetrical sharply speaform, 4 - longitudinal, asymmetrical sharply speaform, 5 - short, symmetrical sharply speaform, 6 - short, asymmetrical sharply speaform, 7 - laterally flattened projection, 8 - short suboval;
(55) *apex curved*. 1 - straight, 2 - slightly curved, 3 - distinct curved, 4 - sharply curved;
(56) *apical furrow*. 1 - absent, 2 - thin and shallow, 3 - deep;
(57) *apical carina*. 1 - absent, 2 - present;
(58) *apical hook*. 1 - absent, 2- large rounded and blunt, 3 - small sharp, 4 - long flat portion;
(59) *apical flanks*. 1 - absent, 2 - narrow, 3 - broad short, 4 - broad long;
(60) *internal sac position*. 1 - longitudinally, 2 - perpendicularly;
(61) *internal sac sclerites*. 1 - average (7), 2 - numerous (8-10);
(62) *flag*. 1 - small, 2 - large;
(63) *upper limitator*. 1 - small, 2 - average;
(64) *flagellum*. 1 - short, 2 - average, 3 - long;
(65) *spring*. 1 - single, 2 - double;
(66) *lower limitator.* 1 - small, 2 - average, 3 - large;
(67) *shield*. 1 - small, 2 - average, 3 - large;
(68) *medial tooth condition*. 1 - absent, 2 - present short, 3 - present average, 4 - present long;
(69) *apical part of medial tooth*. 1 - straight, 2 - smooth curved, 3 - sharp curved;
(70) *medial tooth shape*. 1 - flat, 2 - twisted;
(71) *ventro-apical bladder shape*. 1 - small, 2 - large;
(72) *ventro-apical bladder position*. 1 - longitudinally, 2 - perpendicularly;
(73) *ventro-lateral left bladder shape*. 1 - slight, 2 - small, 3 - average, 4 - large;
(74) *ventro-lateral right bladder shape*. 1 - slight , 2 - small, 3 - average, 4 - large;
(75) *dorso-apical bladder shape*. 1 - small, 2 - average, 3 - large;
(76) *dorso-lateral left bladder shape*. 1 - slight, 2 - small, 3 - average, 4 - large;
(77) *basal bladder shape*. 1 - elongated, 2 - rounded, 3 - flat, 4 - V-shaped, 5 - H-shaped;
(78) *basal bladder size*. 1 - small, 2 - average, 3 - large;
(79) *basal bladder condition*. 1 - without apical portion, 2 - with apical portion;
(80) *basal bladder position*. 1 - by left, 2 - longitudinally;
(81) *basi-lateral right bladder shape*. 1 - slight, 2 - small, 3 - large;
(82) *dorsal droplet bladder shape*. 1 - absent, 2 - slight, 3 - present completely;
(83) *media-apical bladder shape*. 1 - absent, 2 - small, 3 - large;
(84) *ligula shape*. 1 - absent, 2 - slight, 3 - small, 4 - large;

GENITALIA OF FEMALE:

(85) *abdominal sternum 8 apices*. 1 - rounded, 2 - truncate, 3 - angular, 4 - with outer notch bearing, 5 - with inner notch bearing;
(86) *longitudinal apical carina.* 1 - absent, 2 - present;
(87) *abdominal sternum 8, V-shaped apical emargination*. 1 - narrow, 2 - average, 3 - broad;
(88) *abdominal sternum 8, V-shaped inner long setae*. 1 - absent, 2 - single, 3 - average (2-5), 4 - numerous (5-10);
(89) *abdominal sternum 8 stout apical setae*. 1 - single, 2 - average (2-3), 3 - numerous (4-6);
(90) *abdominal sternum 8 lateral long seta*. 1 - sparse (4-9), 2 - dense (10-20);
(91) *9&10 syntergum shape*. 1 - oval, 3 - circular;
(92) *9&10 syntergum apical long setae*. 1 - sparse (5-10), 2 - average (10-15), 3 - dense (15-20);
(93) *9&10 syntergum lateral long setae*. 1 - sparse (4-8), 2 - average (8-10), 3 - dense (10-20);
(94) *9&10 syntergum discal setae*. 1 - one longitudinal row with two setae, 2 - one longitudinal row with three setae, 3 - one longitudinal row with four-five setae, 4 - one transversal row with two-three setae, 5 - two longitudinal setae rows;
(95) *9&10 syntergum.* 1 - glabrous, 2 - setose;
(96) *lateral portion of second gonapophyses shape*. 1 - smoothly curved lateral margins, 2 - notched lateral margins;
(97) *basal setose of lateral portion of second gonapophyses*. 1 - absent, 2 - single long seta, 3 - one-two long and numerous small setae, 3 - three-four long setae, 5 - numerous long setae, 6 - numerous small setae;
(98) *ventral notch setose of second gonacoxa*. 1 - sparse setose, 2 - dense setose;
(99) *additional sclerite shape*. 1 - absent, 2 - small, 3 - large.

Appendix 2. The character states matrix for analysed species of genus *Cicindela.*

No	sa	kh	sp	mn	tk	rm	al	hy	mj	lg	ib	ls	sv	tv	co	tb	mr	rs	at	rl	sy	cm	sl	el	li	sb	gm	ml
1	3	3	3	3	3	3	3	3	2	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	1	2	1
2	3	3	3	4	4	3	5	3	4	3	4	2	2	5	7	3	3	3	4	6	1	6	2	4	4	4	2	4
3	1	1	1	1	1	1	1	1	1	1	2	1	1	1	1	1	2	1	1	2	1	1	1	1	1	1	1	1
4	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	3	2	1	1
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No	sa	kh	sp	mn	tk	rm	al	hy	mj	lg	ib	ls	sv	tv	co	tb	mr	rs	at	rl	sy	cm	sl	el	li	sb	gm	ml
79	1	1	1	1	1	1	2	1	1	1	2	1	1	1	1	2	2	1	2	1	1	1	2	99	99	99	99	99
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88	3	3	3	2	2	4	2	3	2	3	2	3	2	3	1	1	1	2	1	3	1	1	1	1	1	2	4	1
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97	3	3	3	1	1	1	3	3	1	2	3	2	4	3	3	4	1	1	1	1	3	1	5	1	6	1	1	1
98	1	1	1	2	2	2	2	1	2	1	1	1	1	1	1	1	2	2	2	2	2	1	2	2	2	1	1	1
99	3	3	3	3	3	2	3	3	3	3	3	2	3	2	3	3	2	2	3	2	3	2	2	1	1	2	1	1

Legend: **sa)** *C. sahlbergii sahlbergii* F.-W, **kh)** *C. sahlbergii khersonensis*, **sp)** *C. sahlbergii* ssp., **mn)** *C. monticola monticola*, **tk)** *C. monticola tokatensis*, **rm)** *C. monticola rumelica*, **al)** *C. albopilosa*, **hy)** *C. hybrida*, **mj)** *C. majalis*, **la)** *C. lagunensis*, **ib)** *C. iberica*, **ls)** *C. lusitanica lusitanica*, **sv)** *C. lusitanica silvaticoides*, **tv)** *C. transversalis*, **co)** *C. coerulea*, **tb)** *C. transbaicalica*, **mr)** *C. maritima*, **rs)** *C. restricta*, **at)** *C. altaica*, **rl)** *C. resplendens*, **sy)** *C. sylvatica*, **cm)** *C. campestris*, **sl)** *C. soluta*, **el)** *C. elegans*, **li)** *C. littoralis*, **sb)** *C. sublacerata*, **gm)** *C. germanica*, **ml)** *C. melancholica*. Name of characters and states description as in a Appendix 1; the state 99 indicates lacking data.