

## Synopsis of the Iberian *Chelotrupes* species (Coleoptera: Geotrupidae)

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Received 6 December 2011; accepted 27 February 2012

Published 15 August 2012

**Abstract.** Synopsis of the Iberian *Chelotrupes* Jekel, 1866 species is presented. *Chelotrupes algarvicus* sp. nov., *C. brancoi* sp. nov. and *C. feryi* sp. nov. (all from Portugal), *C. hendrichi* sp. nov. and *C. kyliasi* sp. nov. (both from Spain) are described. *Chelotrupes laevipennis* (Mulsant et Godart, 1855), sp. restit. is removed from synonymy with *C. momus* (Olivier, 1789) and regarded as a separate species. Neotypes for *Ceratophyus laevipennis* Mulsant et Godart, 1855, *Ceratophyus momus* var. *momoides* Reitter, 1893 and *Geotrupes andalusiacus* Deyrolle, 1869 are designated. *Geotrupes andalusiacus* Deyrolle, 1869 is considered a junior synonym of *Ceratophyus laevipennis* (Mulsant et Godart, 1855). Lectotype for *Scarabaeus momus* Fabricius, 1792 is designated. Complete overview including identification key for males and females of all members of the genus is given. Relevant diagnostic characters (especially shape of head, eye, pronotum, male pronotal horns, male genitalia) are illustrated.

**Key words.** Taxonomy, revision, new species, synonymy, neotype designation, lectotype designation, key, distribution, Coleoptera, Scarabaeoidea, Geotrupidae, *Chelotrupes*, Portugal, Sardinia, Spain, Mediterranean, Palaearctic region.

### INTRODUCTION

Jekel (1866) established in his excellent publication “*Essai sur la classification naturelle des Geotrupes Latreille et descriptions d’espèces nouvelles*” the taxon *Chelotrupes* as a subgenus of the genus *Geotrupes* Latreille, 1796 with *Scarabaeus momus* Olivier, 1789 as the type species. In 1912, Boucomont considered *Chelotrupes* a subgenus of *Typhaeus* Leach, 1815 with two species *T. hiostius* (Gené, 1836) and *T. momus* (Olivier, 1789) and four species he placed to the nominotypical subgenus, *T. fossor* Waltl, 1838, *T. lateridens* (Guérin-Méneville, 1838), *T. typhoeus* (Linnaeus, 1758) and *T. typhaeoides* (Fairmaire, 1852), with *Typhaeus vulgaris* Leach, 1815 (= *Scarabaeus typhoeus* Linnaeus, 1758) as the type species. Dellacasa & Dellacasa (2008) elevated *Chelotrupes* to a good genus. These authors have characterized the genus by the following complex of synapomorphies: shape of antennomere II, presence of basal margin of pronotum, shape of scutellum, micropterous metathoracic wings and nearly vanished elytral striae. Additionally, they resurrected the former synonym of *C. hiostius* (Gené, 1836), *C. matutinalis* (Baudi di Selve, 1870) as a good species. Both genera *Chelotrupes* and *Typhaeus* can be separated within the tribe Chromogeotrupini by the morphological characters of the pronotum (especially male pronotum horns) and the aedeagus (symmetrical short parameres) in males or the bursa copulatrix (simple and symmetrical) in females (Zunino 1984, Dellacasa & Dellacasa 2008).

The Palaearctic genus *Chelotrupes* is confined to the European continent (Spain, Portugal and Italy) and all members of that genus are micropterous. The similar and probably closely related genus *Typhaeus* occurs all over Europe as well as in Morocco, Turkey and the Near East (cf. Báguena 1967, Baraud 1977, 1985, 1992, Löbl et al. 2006, Martín-Piera & López-Colón 2000).

In the present paper the Iberian representatives of the genus *Chelotrupes* are revised, based on the examination of material from many institutional and private collections.

## MATERIAL AND METHODS

The following acronyms (after Evenhuis 2009) identify the collections housing the material examined:

- ABCB – Axel Bellmann collection, Bremen, Germany;
- ARCL – Andreas Reichenbach collection, Leipzig, Germany;
- AWCH – Antonín Wrzeczionko collection, Havířov, Czech Republic;
- BMNH – The Natural History Museum, London, United Kingdom (Maxwell V. L. Barclay);
- DEIC – Senckenberg Deutsches Entomologisches Institut, Müncheberg, Germany (Lothar Zerche, Lutz Behne);
- DKCP – David Král collection, deposited in NMPC;
- ERCS – Eckehard Rößner collection, Schwerin, Germany;
- HFCB – Hans Fery collection, Berlin, Germany;
- HKCS – Harald Kalz collection, Schlabendorf, Germany;
- HNHM – Magyar Természettudományi Múzeum, Budapest, Hungary (Ottó Merkl);
- JECB – Jens Esser collection, Berlin, Germany;
- JKCP – Jiří Klícha collection, Praha, Czech Republic;
- JMCH – Jan Matějčiček collection, Hradec Králové nad Labem, Czech Republic;
- LMCO – Ladislav Mencl collection, Týnec nad Labem, Czech Republic;
- IRSB – Institut Royal des Sciences Naturelles de Belgique, Bruxelles, Belgium (Alain Drumont);
- JSCP – Jan Schneider collection, Praha, Czech Republic;
- JSCS – Joachim Schönfeld collection, Sinzig, Germany;
- JZCJ – Jaroslav Žák collection, Jezernice, Czech Republic;
- LHCB – Lars Hendrich collection, Berlin, Germany;
- LSCN – Ludger Schmidt collection, Neustadt, Germany;
- MMCO – Marion Mantič collection, Ostrava, Czech Republic;
- MNHN – Muséum national d’Histoire naturelle, Paris, France (Antoine Mantilleri, Olivier Montreuil);
- MHNL – Muséum d’histoire naturelle, Lyon, France (Harold Labrique);
- MSNT – Museo Regionale di Scienze Naturali, Torino, Italy;
- NHMW – Naturhistorisches Museum, Wien, Austria (Heinrich Schönmann);
- NMPC – Národní muzeum, Praha, Czech Republic (Jiří Hájek);
- OHCB – Oliver Hillert collection, Schöneiche bei Berlin, Germany;
- OXUM – Oxford University Museum of Natural History, Oxford, United Kingdom (Darren J. Mann);
- PJCB – Pavel Jáchymek collection, Buchlovice, Czech Republic;
- PKCS – Petr Kylvies collection, Slaný, Czech Republic;
- RCCP – Radek Červenka collection, Praha, Czech Republic;
- RMNH – Nationaal Natuurhistorische Museum (“Naturalis”), Leiden, Netherlands (Jan Krikken),
- SJCP – Stanley Jakl collection, Praha, Czech Republic;
- SMTD – Museum für Tierkunde, Senckenberg Naturhistorische Sammlungen, Dresden, Germany (Olaf Jäger);
- SZCM – Stefano Ziani collection, Meldola, Italy;
- VMCP – Vladislav Malý collection, Praha, Czech Republic;
- VT CZ – Václav Týr collection, Žihle, Czech Republic;
- ZMAS – Zoological Museum, Academy of Sciences, St. Petersburg, Russia (Andrey V. Frolov, Mark G. Volkovich);
- ZMHB – Museum für Naturkunde – Leibniz-Institut für Evolutions- und Biodiversitätsforschung an der Humboldt Universität zu Berlin, Germany (Johannes Frisch, Bernd Jäger, Joachim Willers);
- ZTCD – Zdeněk Trávníček collection, Dobroměřice, Czech Republic.

Altogether 2117 specimens (see material below) of the genus *Chelotrupes* were studied. Genitalia of at least six specimens of each species were dissected for examination. It is decided to designate not all material of newly described species as type series to minimize the possibility of including more taxa in the type material (possible presence of morphologically very similar, allopatrically distributed species of the genus).

The habitus photographs were taken using a Canon Macro EF-S 60mm/1:2.8 USM on bellows attached to a Canon EOS 550D camera. Partially focused images of specimen were combined using Helicon Focus 3.20.2Pro software.

Specimens of the newly described species are provided with one red printed label “Name of a taxon sp. nov., HOLOTYPUS, ALLOTYPUS or PARATYPUS, Oliver Hillert, David Král & Jan Schneider det. 2010 or 2011”. In the case of lectotype or neotype designation, each specimen bears a red printed label: “Name of a taxon with author and year of

original description, LECTOTYPUS or NEOTYPUS ♂, Oliver Hillert, David Král & Jan Schneider des. 2011". Remarks of the authors and comments are indicated by square brackets. Through the text the following abbreviations are used x / y = number of males / number of females. Exact label data are cited for the type material, individual labels are indicated by a double slash (//), individual lines of every label by a single slash (/), [p] – preceding data within quotation marks are printed, [hw] – the same but handwritten. Information in quotation marks (“ ”) indicates the original spelling.

Material was obtained mainly during the following expeditions: Portugal and Spain, February 2011: Oliver Hillert; Spain and Portugal, February–March 2010: Oliver Hillert & Harald Kalz; Spain and Portugal, February–March 2009: Oliver Hillert, Radek Dunda, David Král & Jan Schneider; Spain and Portugal, March 2008: Oliver Hillert; Italy (Sardinia), April 2007: Oliver Hillert & Harald Kalz; Spain, 1998: Oliver Hillert.

## TAXONOMY

### *Chelotrupes* Jekel, 1866

*Geotrupes* (*Chelotrupes*) Jekel, 1866: 549; revision, description; type species *Scarabaeus momus* Fabricius, 1792 (= *Scarabaeus momus* Olivier, 1789); Branco (2007: 9); comments.

*Thorectes* (*Chelotrypes*) [incorrect subsequent spelling]: Jakobson (1892: 256); diagnosis.

*Ceratophyus* (*Chelotrupes*): Reitter (1893: 8); diagnosis, key.

*Typhoeus* (*Chelotrupes*): Boucomont (1912: 22); catalogue.

*Chelotrupes*: Dellacasa & Dellacasa (2008: 631); revision, description, key.

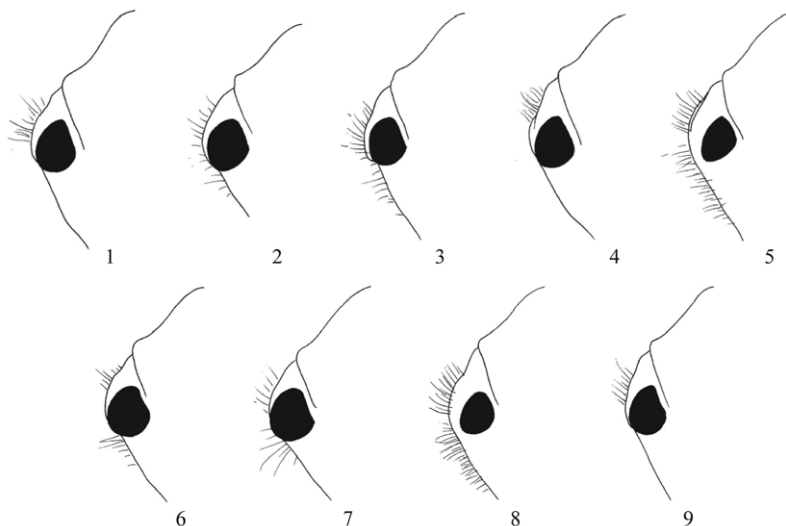
### *Chelotrupes algarvicus* sp. nov.

(Figs 1, 10, 19, 28–30, 55, 64, 73, 82, 91, 100, 110, 112)

TYPE LOCALITY. Portugal (Faro), SW Algarve, Vila do Bispo, 37°00'N, 8°57'W, ca. see level.

TYPE MATERIAL (278 specimens). **Portugal (Faro)**. Holotype (male), allotype (female), labelled: “Portugal, (Faro), / Vila do Bispo, / SW Algarve, see level, / 01.III.2010, leg. O. Hillert, [p]”, in OHCB. **Portugal (Beja)**. Paratypes labelled: “Portugal, (Beja), Valle de Ferro, NE of Odemira, 28.02.2011, O. Hillert lgt. [p]”, 6/6 in OHCB. **Portugal (Faro)**. Paratypes, labelled: “Portugal, (Faro), E of Loule, Vila do Bispo, SW Algarve, see level, 23.02.2011, O. Hillert lgt. [p]”, 3/2 in OHCB; “Portugal, Sierra de Monchique, Foia – 890m, 22.-23.2.2011, lgt. P.Kylios [p]”, 7/2 in PKCS; “Portugalsko jz[jihozápad = southwest]., 22.-23.II.2011, MONCHIQUE – Foia, KLÍCHA Jiří [p]”, 6/2 in JKCP; “Portugal – Faro, Sagres, 21.-25.2.2011, lgt. P. Kylios [p]”, 40/37 in PKCS, 2/2 in JSCP; “Portugalsko jz[jihozápad = southwest]., 19.-24.II.2011, LAGOS-SAGRES, KLÍCHA Jiří [p]”, 26/26 in JKCP, 1/1 in JSCP; “Portugal, (Faro), Vila do Bispo, SW Algarve, see level, 01.III.2010, O. Hillert lgt. [p]”, 10/6 in OHCB, 5/0 in HKCS, 1/1 in VMCP; “Portugal, (Faro), Carrapateira, SW of Monchique, W coast, see level, 01.03.2010, O. Hillert lgt. [p]”, 1/0 in OHCB; “Portugal, (Beja), Valle de Ferro, NE of Odemira, 28.02.2010, O. Hillert lgt. [p]”, 12/6 in OHCB, 5/9 in HKCS; “Portugal, SAGRES-LAGOS, 11.II.2010, KLÍCHA Jiří [p]”, 4/2 in JKCP; “Portugal, Sagres, 14.-15.2.2010, Kylios lgt. [p]”, 8/2 in PKCS; “Portugal, (Algarve), Carrapateira, W of Monchique, 37°12'13"N, 008°52'53"W, 24.02.2009, O. Hillert lgt. [p]”, 5/2 in OHCB; “Portugal, Faro distr., CARRAPATEIRA vill.env., 37°12.129 N 08°52.529 E, 24.ii.2009, Jan Schneider lgt. [p]”, 0/1 in JSCP; same but “28.ii.2009 [p]”, 2/3 in JSCP, 0/1 in SJCP; “Portugal, Faro distr., CARRAPATEIRA vill.env., 37°12.129 N 08°52.529 E, 28.ii.2009, David Král lgt. [p]”, 5/6 in DKCP; “Portugal mer. occ., Faro, Carrapateira – Amado, 09.03.2007, Mantič lgt., písečné duny [= sand dunes] aktiv (1), 37°10.10 N 08°54.00 W [p]”, 1/0 in mmCO; “Portugal mer., reg. Faro, Foia mt./5 - 4 km W of Monchique, 14.3.2007, Mantič lgt., step – v norách [= steppe – in holes], 37°18.53 N 08°35.53 W [p]”, 2/3 in MMCO; “Portugal, Vila do Bispo ad Lagos, 7.XII.2006, T. Gazurek lgt. [p]”, 3/0 in PKCS, 1/1 in VTCZ; “Portugal mer., reg. Faro, Foia, 4 km W Monchique, 1.11.2004, Mantič lgt., sheep-excr. Ovis, Bos, /5 [p]”, 1/1 in MMCO, 1/0 in JSCP; “Portugal, Faro, Sierra de Monchique, 6.1978, Lassalle lgt. [p]”, 2/0 in JMCH;

ADDITIONAL MATERIAL EXAMINED (52 specimens). **Portugal**. Portugal, (Faro), E of Loule, Faro env., 01.03.2010, O. Hillert lgt. [p]”, 1/0 in OHCB, 0/1 in HKCS; Portugal, (Faro), Santa Rita, between Tavira and Vila Real, 01.03.2010, O. Hillert lgt. [p]”, 1/0 in OHCB; Portugal, Algarve, Env. Faro, X [19]70, H. Coiffait lgt., 2/0 in MNHN; Portugal, Algarve, Sta Barbara de N[exe], XII [19]69, H. Coiffait lgt., 2/0 in MNHN; Portugal, Algarve, Sta Barbara de N[exe], IV [19]66, H. Coiffait lgt., 1/0 in MNHN; Algarve, Tavira, 14.2.1965, T. Branco lgt., 3/0 in MNHN; Portugal, Algarve, Sta Barbara de N[exe], XII [19]63, H. Coiffait lgt., 2/2 in MNHN; Monchique, A 1 4 [18]79, 2/0 in SMTD, 1/0 in DEIC, 0/1 in ZMHB; Monchique, A 3 4 [18]79, 1/0 in DEIC, 1/0 in NMPC; Monchique, A 2 4 [18]79, 2/0 in DEIC, 1/0 in SMTD; S. Portugal, Prov. Algarve, Monchique, 1/0 in ZMHB; Monchique, Dr. Martin, 3/0 in NMPC; Monchique, 1/0 in DEIC, 4/0 in MNHN, 2/0 in SMTD, 0/1 in NMPC; Grandola 1/0 in BMNH; Portugal, Olivier, 1/0 in ZMHB; Portugal, 1/1 in ZMHB, 0/1 in



Figs 1–9. Male head with left eye in dorsal aspect (schematically). 1 – *Chelotrupes algarvicus* sp. nov., 2 – *C. brancoi* sp. nov., 3 – *C. feryi* sp. nov., 4 – *C. hendrichi* sp. nov., 5 – *C. hiostius* (Gené), 6 – *C. kyliési* sp. nov., 7 – *C. laevipennis* (Mulsant et Godart), sp. restit., 8 – *C. matutinalis* (Baudi di Selve), 9 – *C. momus* (Olivier).

DEIC, 1/0 in MNHN; Lusit., 1/0 in ZMHB; Lusitan., 1/0 in MNHN. **Patria dubia.** Spanien, 1/0 in HNHM; Hispan. 1/0 in NMPC, 1/0 in SMTD; Hispania 1/0 in NMPC; His. 2/0 in NHMW; Marokko, 1/0 in SMTD.

**DESCRIPTION OF HOLOTYPE.** Maximum (hyperthelic) male with well developed pronotal horns. Body length 23.5 mm; strongly convex, dorsal surface black, not microsculptured, shiny (Figs 82, 91).

Head (Figs 82, 91). Clypeus broadly rounded, sides s-shaped, distinctly arcuate; posterior angles of clypeal margin elevated; tubercle shallowly and weakly keel-like elongated, disc simply, finely and sparsely punctate; oblique keels above eyes confluent with clypeal margin elevation and reaching approximately to half of eyes. Punctuation of frons and vertex similar as on clypeus; fronto-clypeal suture absent; occiput sparsely and finely punctate. Eyes weakly elliptic, moderately developed; eye canthus fine, straight in lateral aspect; intersection between eye canthus and genae not extending eyes (Fig. 1).

Pronotum (Figs 10, 19) moderately transverse, broadest just at level of anterior margin, entirely bordered. Lateral margin rounded, marginal carina weakly widened not crenulated, almost not elevated. Anterior angles not confluent with lateral pronotal hornlike apophyses. Lateral fovea shallowly impressed, finely punctate; longitudinal midline absent. Pronotal punctuation very fine, present only on lateral margin and lateral fovea. Lateral hornlike apophyses well developed, straight, weakly convergent; interior surface weakly broadened in middle and coarsely granulate from apex to basal third, interior longitudinal keel present, exhibited from anterior quarter to middle near the basal line; lateral surface impunctate; maximal length of apophyses more than mandibles; subapical tooth well developed above in anterior quarter. Surface regularly declivous from subapical tooth to base in lateral aspect. Medial pronotal apophysis well developed, acute apically, with based in middle of frons in lateral view.

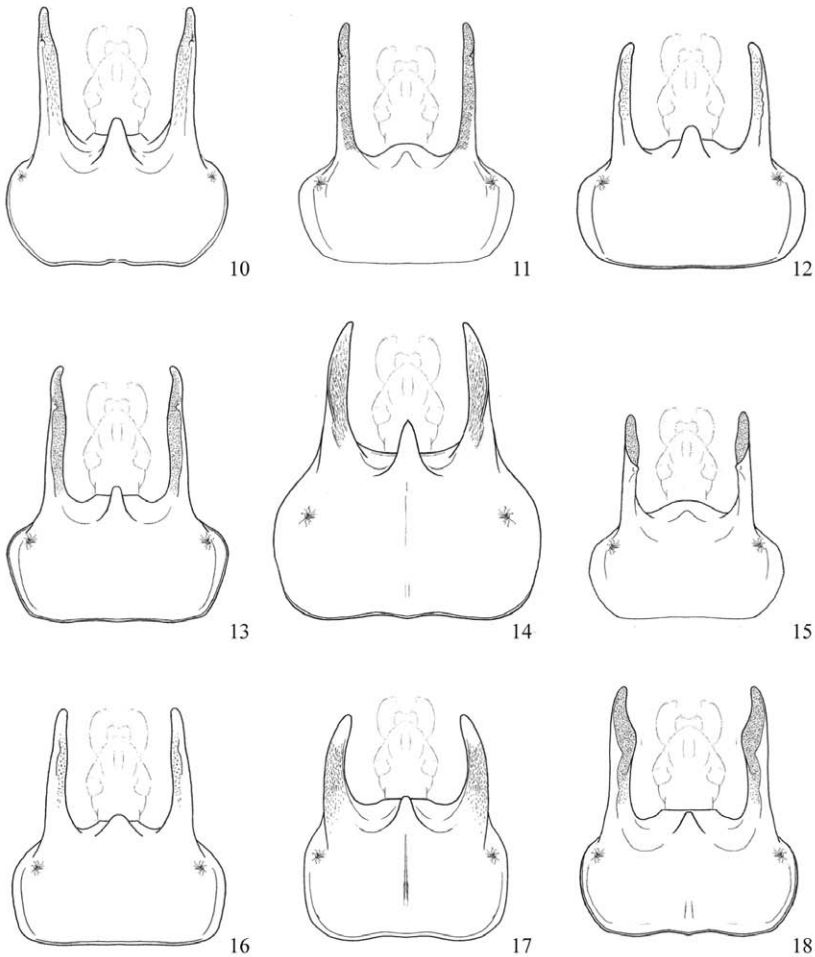
Scutellar plate broadly triangular, impunctate, shiny.

Elytra approximately as long as wide, between suture and humerus with 8 fine complete striae, striae distinctly deeply punctate; intervals flat, impunctate; humeral callus moderately prominent to almost flat (Figs 82, 91).

Micropterous, metathoracic wings narrow.

Aedeagus. Parameres as in Figs 28–30.

VARIABILITY IN MALES. Body length 14.0–23.0 mm. Pronotal hornlike apophyses in medium developed and underdeveloped (hypothelic) specimens short, more or less straight with only



Figs 10–18. Male pronotum in dorsal aspect (schematically). 10 – *Chelotrupes algarvicus* sp. nov., 11 – *C. brancoi* sp. nov., 12 – *C. feryi* sp. nov., 13 – *C. hendrichi* sp. nov., 14 – *C. hiostius* (Gené), 15 – *C. kyliesi* sp. nov., 16 – *C. laevipennis* (Mulsant et Godart), sp. restit., 17 – *C. matutinalis* (Baudi di Selve), 18 – *C. momus* (Olivier).

indicated longitudinal keels and subapical teeth or without them at all, simply rounded to almost acute apically.

**FEMALE** (Fig. 100). Body length 15.0–22.0 mm, allotype 20.0 mm. Clypeus rounded, sides s-shaped, densely, distinctly rugo-punctate; punctuation of frons, vertex and occiput slightly rugose; tubercle prominent, distinctly pointed; oblique keels above eyes distinct, reaching approximately to half of eye (Fig. 55); eyes well developed, weakly elliptic, not separated from eye canthus; genae distinctly prominent (Fig. 64). Pronotum transverse, without medial furrow, anterior margin weakly emarginate, lateral margin only little widened, broadest approximately in anterior third, anterior angles robust, projecting anterolaterad, weakly rounded, bent laterad, surface shiny, distinctly deeply punctate, except of discal area, lateral apophyses prominent, distinctly pointed (Fig. 73). Surface of elytra shiny, humeral callus weakly developed but visible (Fig. 100).

**DIFFERENTIAL DIAGNOSIS.** Refer to species key below.

**DISTRIBUTION.** Portugal (Beja, Faro) (Fig. 110).

**COLLECTING CIRCUMSTANCES.** So far collected from calcareous soils only (Fig. 112).

**NAME DERIVATION.** Derived from area of origin of the new species, the region Algarve in Portugal.

### *Chelotrupes brancoi* sp. nov.

(Figs 2, 11, 20, 31–33, 56, 65, 74, 83, 92, 101, 109, 113)

**TYPE LOCALITY.** Portugal (Ribatejo / Santarém), 40 km E of Lisbon, Rio Frio env., 38°37'39"N, 8°43'73"W.

**TYPE MATERIAL** (171 specimens). **Portugal (Setúbal).** Holotype (male), allotype (female), labelled: "Portugal, (Ribatejo, Santarem), / 38°37'39"N, 008°43'73"W / 40 km E of Lisbon / Rio Frio env., / 21.02.2009, leg. O. Hillert [p]", in OHCB. Paratypes, labelled: "Portugal, (Ribatejo, Santarem), Rio Frio env., 40 km E of Lisbon, 38°37'39"N, 008°43'73"W, 05.03.2010, O. Hillert lgt. [p]", 23/3 in OHCB, same data but "H. Kalz lgt. [p]", 9/0 in HKCS; "Portugal, (Ribatejo, Santarem), Rio Frio env., 40 km E of Lisbon, 38°37'39"N, 008°43'73"W, 21.02.2009, O. Hillert lgt. [p]", 7/3 in OHCB. "Portugal – Santarem, Poceirao, 25.-27.2.2011, lgt. P. Kyllies [p]", 14/12 in PKCS 1/1 in JSCP "Portugalsko střední = central], 25.II.2011, EVRORA-POCEIRAO, KLÍCHA Jiří [p]", 6/2 in JKCP; "Portugal, (Estremadura, Setubal), N of Alfirim, Sesimbra env., S of Lisbon, 06.03.2010, O. Hillert lgt. [p]", 32/1 in OHCB, 2/1 in ARCL, 2/0 in VMCP, same data but "H. Kalz lgt. [p]", 5/4 in HKCS; "Portugal, (Estremadura, Setubal), Brejos do Fetal, 10 km NW of Grandola, 06.03.2010, O. Hillert lgt.", 6/1 in OHCB, same data but "H. Kalz lgt. [p]", 2/0 in HKCS; "Portugal, Setúbal distr., POCEIRAO vill.env., 38°37.392 N 08°43.739 W, 21.ii.2009, Jan Schneider lgt. [p]", 6/2 in JSCP, 2/1 in SJCP; same data but "David Král lgt. [p]" 3/3 in DKCP; "Portugal, Setúbal distr., POCEIRAO vill.env., 38°37.392 N 08°43.739 W, 1.iii.2009, Jan Schneider lgt. [p]", 3/4 in JSCP; same data but "David Král lgt. [p]" 1/0 in DKCP. **Portugal (Santarém).** "Portugal, Muge / Santarem, 26.12.[19]91, Fery lgt. [p]", 0/1 in HFCB; "Portugal, Muge / Santarem, 5.11.[19]89, Fery lgt. [p]", 1/1 in HFCB; "Portugal, Ribatejo, 16 km S. Coruche, 3.IV.[19]84, J. Baraud lgt. [p]", 1/0 in MNHN; "Portugal, Ribatejo, Coruche, Monte da Barca, 2.IV.[19]84, J. Baraud lgt. [p]", 1/0 in MNHN, "Portugal, Ribatejo, Muge, 6.IV.[19]81, J. Baraud lgt. [p]", 1/1 in MNHN.

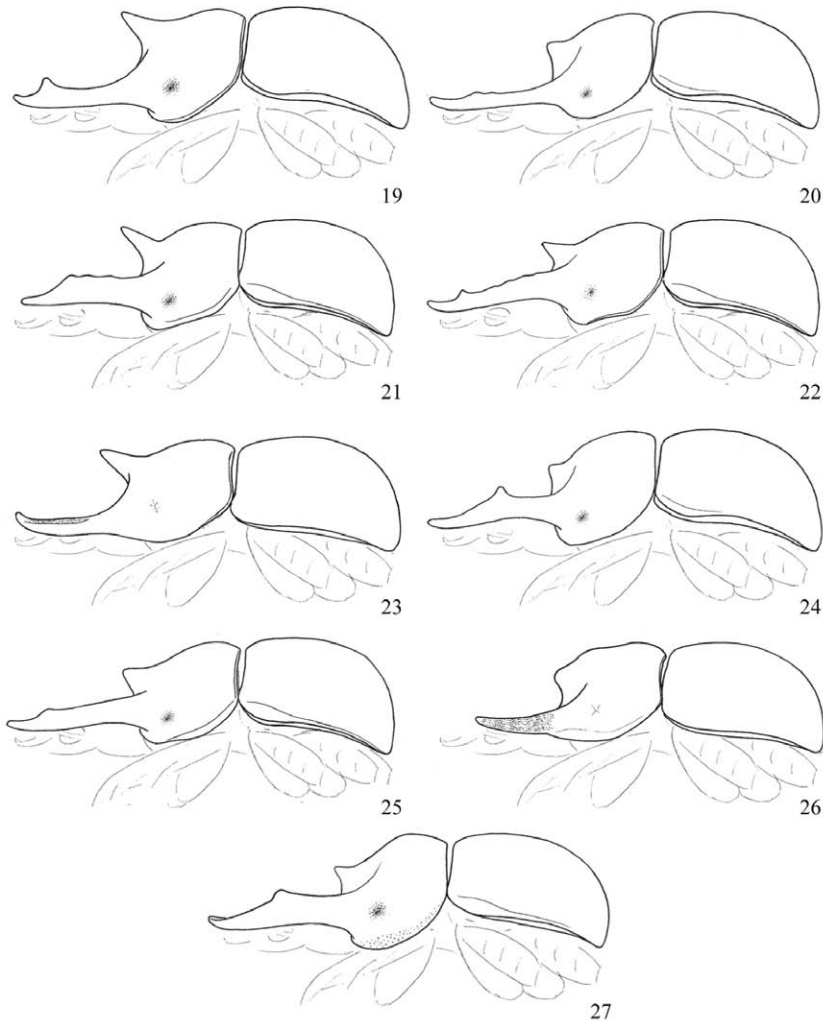
**ADDITIONAL MATERIAL EXAMINED** (4 specimens). **Portugal (Faro).** Algarve, Rost, 1/0 in NHMW. **Portugal.** Portugal, 0/1 in DEIC. **Patria dubia.** Lusitan., Andalus., Ramb, 1/0 in ZMHB. **Sine patria.** Rost, 0/1 in NHMW.

**DESCRIPTION OF HOLOTYPE.** Maximum (hyperthelic) male with well developed pronotum horns. Body length 18.5 mm; moderately convex, dorsal surface black, distinctly microsculptured, alutaceous, pronotum with silky lustre (Figs 83, 92).

**Head** (Figs 83, 92). Clypeus broadly rounded, sides s-shaped, arcuate; posterior angles of clypeal margin elevated; tubercle remarkably prolonged, surface with coarse, irregularly spaced, somewhat confluent punctuation, punctures separated approximately by their diameter; oblique keels above eyes not confluent with clypeal marginal elevation, reaching to posterior third of eyes; clypeal margin elevated and notched shortly before oblique keels; punctuation of frons and vertex approximately similar as on clypeus, punctuation becoming more sparse discally, frontoclypeal

suture absent; occiput rugose. Eyes well developed, almost rounded, canthus straight in lateral aspect; intersection between eye canthus and genae not extending eyes (Fig. 2).

Pronotum (Figs 11, 20) distinctly transverse; broadest just in anterior third, entirely bordered. lateral margin rounded, marginal carina distinctly widened, not crenulated, weakly elevated. Anterior angles not confluent with lateral pronotal hornlike apophyses. Lateral fovea diffusely impressed, distinctly simply punctate; longitudinal midline absent. Pronotal punctation simple and distinct on lateral margin and lateral fovea. Lateral hornlike apophyses well developed, straight



Figs 19–27. Male pronotum in left lateral aspect (schematically). 19 – *Chelotrupes algarvicus* sp. nov., 20 – *C. brancoi* sp. nov., 21 – *C. feryi* sp. nov., 22 – *C. hendrichi* sp. nov., 23 – *C. hiostius* (Gené), 24 – *C. kylliesi* sp. nov., 25 – *C. laevipennis* (Mulsant et Godart), sp. restit., 26 – *C. matutinalis* (Baudi di Selve), 27 – *C. momus* (Olivier).

and filiform-shaped; interior surface coarsely granulate from apex to basal quarter, interior longitudinal keel weak, exhibited only from apex to subapical tooth; lateral surface weakly, shallowly punctate; maximum length of apophyses more than mandibles; subapical tooth distinctly pointed in anterior quarter, area behind subapical tooth with one or two shallow elevations. Surface regularly declivous from posterior subapical tooth to base in lateral aspect. Medial pronotal apophysis weakly developed, weakly pointed, with base in middle of frons in lateral aspect.

Scutellar plate broadly triangular, impunctate, shiny.

Elytra approximately as long as wide, surface alutaceous, between suture and humerus with 8 fine but distinctly impressed complete striae, striae distinctly, deeply punctate; intervals flat, impunctate; humeral callus distinctly prominent (Figs 83, 92).

Micropterous, metathoracic wings narrow.

Aedeagus. Parameres as in Figs 31–33.

VARIABILITY IN MALES. Body length 13.0–19.5 mm. Pronotal hornlike apophyses in medium developed and underdeveloped (hypothelic) specimens short, more or less straight with only indicated longitudinal keels and subapical teeth or without them at all, simply rounded to almost acute apically.

FEMALE (Fig. 101). Body length 16.0–19.0 mm, allotype 18.0 mm. Clypeus rounded, sides distinctly s-shaped; densely, distinctly rugo-punctate; punctation of frons, vertex and occiput coarsely rugose; tubercle hardly visible, almost absent; oblique keels above eyes distinct, reaching approximately to basal third of eyes (Fig. 56); eyes well developed, weakly elliptic, not separated from eye canthus; genae moderately prominent (Fig. 65). Pronotum considerably transverse, without medial furrow, anterior margin almost straight, lateral margin distinctly widened and weakly elevated, broadest just in anterior half, anterior angles very weakly projecting anterolaterad, weakly rounded, surface alutaceous, distinctly deeply punctate, punctation becoming sparse discally, lateral apophyses prominent, weakly pointed (Fig. 74). Surface of elytra alutaceous, humeral callus distinctly prominent, visible (Fig. 101).

DIFFERENTIAL DIAGNOSIS. Refer to species key below.

DISTRIBUTION. Portugal (Santarém, Setúbal) (Fig. 109).

COLLECTING CIRCUMSTANCES. Prefers sandy soils (Fig. 113).

NAME DERIVATION. Patronymic; named in honour of our colleague Tristão Branco (Porto, Portugal), an excellent specialist on Scarabaeoidea.

### *Chelotrupes feryi* sp. nov.

(Figs 3, 12, 21, 34–36, 57, 66, 75, 84, 93, 102, 110, 114)

TYPE LOCALITY. Portugal (Faro), W of Albufeira, Armação de Pêra, 37°06'N, 8°22'W, ca. 25 m a. s. l.

TYPE MATERIAL (39 specimens). **Portugal (Faro)**. Holotype (male), allotype (female), labelled: “Portugal, (Faro), / Armacao de Pera, W of Albufeira / 23.II.2011, leg. O. Hillert [p]”, in OHCB. Paratypes, labelled: same data, 15/9 in OHCB, 1/1 in DKCP, 1/1 in JSCP; “Portugal, Algarve, Armacao de Pera, 23.03.[19]86, Fery lgt. [p]”, 2/1 in HFCB; same data but “7.11.[19]89, Fery lgt. [p]”, 4/2 in HFCB.

ADDITIONAL MATERIAL EXAMINED (2 specimens). **Portugal**. Portugal, Kirsch, 1/1 in SMTD.

DESCRIPTION OF HOLOTYPE. Maximum (hypertelic) male with well developed pronotum horns. Body length 18.0 mm; moderately convex, dorsal surface black, pronotum moderately alutaceous, elytron distinctly alutaceous (Figs 84, 93).

Head (Figs 84, 93). Clypeus broadly rounded, sides s-shaped, weakly arcuate; posterior angles of clypeal margin weakly elevated; tubercle present, distinctly pointed; disc rugo-punctate; oblique



keels above eyes confluent with clypeal marginal elevation, reaching to half of eyes. Punctuation of frons similar as in clypeus, vertex simply and sparsely punctated; fronto-clypeal suture absent; occipital punctuation similar as on vertex. Eyes well developed, rounded, eye canthus fine, straight in lateral aspect; intersection between eye canthus and genae not extending eyes (Fig. 3).

Pronotum (Figs 12, 21) distinctly transverse, broadest just in anterior third, entirely bordered; lateral margin rounded, marginal carina distinctly widened and elevated, not crenulated. Anterior angles not confluent with lateral pronotal hornlike apophyses. Lateral fovea distinctly impressed, shallowly simply punctate; longitudinal midline missing. Pronotal punctuation fine, shallow, present only on lateral margin and lateral fovea. Lateral hornlike apophyses well developed, straight, cross-section distinctly oval-shaped; interior surface coarsely granulate from apex to base, interior longitudinal keel absent; lateral surface weak shallowly punctate; apophyses reaching to apex of mandibles. Surface keel-like sculptured from subapical tooth to base of apophyses; subapical tooth present in anterior third. Medial pronotal apophysis distinctly developed, pointed apically.

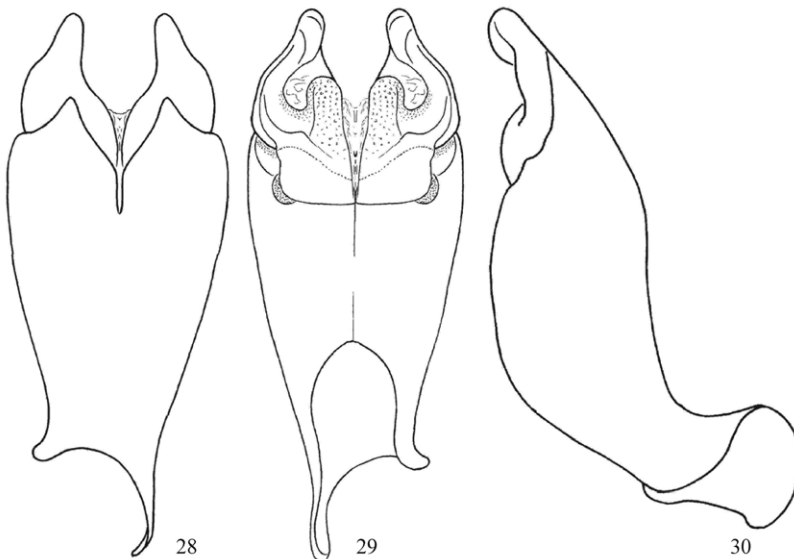
Scutellum plate broadly triangular, impunctate, moderately shiny.

Elytra approximately as long as wide, surface alutaceous, between suture and humerus with 7 fine complete striae, striae weakly impressed, punctate; intervals flat, impunctate; humeral callus distinctly prominent (Figs 84, 93).

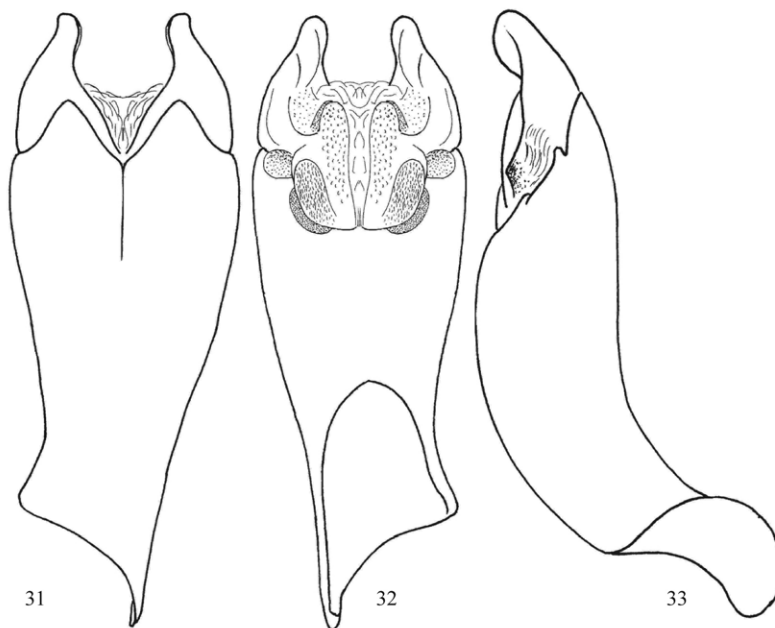
Micropterous, metathoracic wings narrow.

Aedeagus. Parameres as in Figs 34–36.

VARIABILITY IN MALES. Body length 14.5–19.0 mm. Pronotal hornlike apophyses in medium developed and underdeveloped (hypothelic) specimens short, more or less straight with only indicated longitudinal keels and subapical teeth or without them at all, simply rounded to almost acute apically.



Figs 28–30. Aedeagus of *Chelotrupes algarvicus* sp. nov. (schematically). 28 – ventral aspect, 29 – dorsal aspect, 30 – left lateral aspect.



Figs 31–33. Aedeagus of *Chelotrupes brancoi* sp. nov. (schematically). 31 – ventral aspect, 32 – dorsal aspect, 33 – left lateral aspect.

FEMALE (Fig. 102). Body length 15.0–17.5 mm, allotype 17.5 mm. Clypeus rounded, sides s-shaped, densely, distinctly rugo-punctate; frons distinctly coarsely, vertex and occiput shallowly rugo-punctate; tubercle absent; oblique keels above eyes distinct, reaching approximately to apex of eyes (Fig. 57); eyes well developed, weakly elliptic, not separated from eye canthus, genae weakly prominent (Fig. 66). Pronotum transverse, without medial furrow, anterior margin weakly emarginate, lateral margin only little widened and weakly elevated, broadest just before middle, anterior angles strongly projecting, bent laterad, surface alutaceous, distinctly deeply punctate except of discal area, lateral apophyses prominent, weakly rounded (Fig. 75). Surface of elytra alutaceous, humeral callus well developed (Fig. 102).

DIFFERENTIAL DIAGNOSIS. Refer to species key below.

DISTRIBUTION. Portugal (Faro) (Fig. 110).

COLLECTING CIRCUMSTANCES. Prefers sandy soils (Fig. 114).

NAME DERIVATION. Patronymic; named in honour of our longtime friend Hans Fery (Berlin, Germany), an excellent specialist on Dytiscidae and one of the collector of the new species.

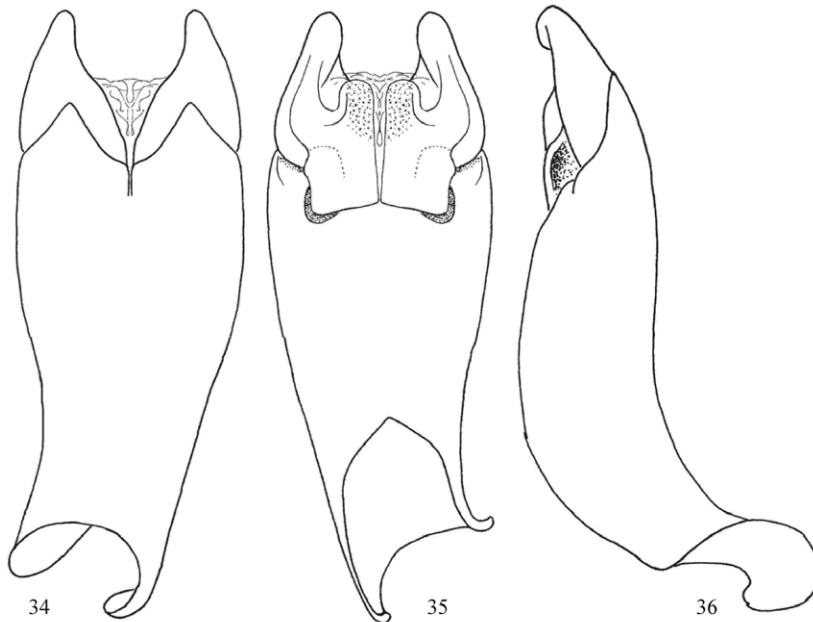
***Chelotrupes hendrichi* sp. nov.**

(Figs 4, 13, 22, 37–39, 58, 67, 76, 85, 94, 103, 111, 115)

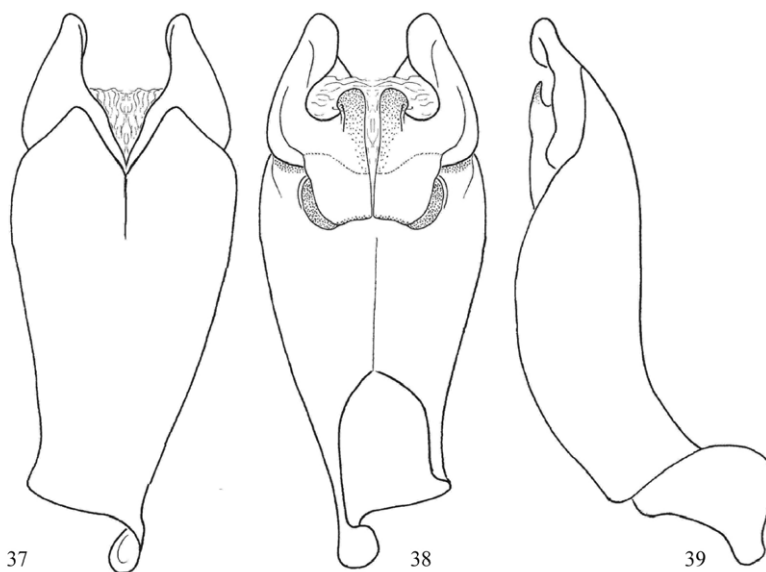
TYPE LOCALITY. Spain (Andalucía), Algeciras env., 10 km N of San Roque, Castillo de Castillar, 36°13'N, 5°23'W, ca. 110 m a. s. l.

TYPE MATERIAL (238 specimens). **Spain (Andalucía: Cádiz)**. Holotypus (male), allotypus (female), labelled: “Spain, (Andalusia), / Castillo de Castillar, Algeciras / env., 10 km N of San Roque, / 26.02.2009, leg. O. Hillert [p]”, in OHCB. Paratypes, labelled: “Spain, (Andalusia), Castillo de Castillar, Algeciras env., 10 km N of San Roque, 27.II.2011, O. Hillert lgt. [p]”, 8/7 in OHCB; “Spain, (Andalusia), Castillo de Castillar, Algeciras env., 10 km N of San Roque, 26.II.2009, O. Hillert lgt. [p]”, 13/3 in OHCB; “Spain, Cádiz distr., CASTILLO DE CASTILLAR vill.env., 36°18.186 N 05°25.401 E, 27.ii.2009, Jan Schneider lgt. [p]”, 4/2 in JSCP, 1/1 in SJCP; the same but “David Král lgt. [p]”, 4/4 spec. in DKCP; “Spain, TARAGUTTILLA – SAN RAGUE, 12. I.2009, KLÍCHA Jiří [p]”, 8/3 in JKCP; “Spain, Cadiz, San Roque – Castellar env., 13. I.2009, P. Kylies lgt. [p]”, 29/9 in PKCS; “Spain, TARAGUTTILLA – SAN RAGUE, 16. I.2009, KLÍCHA Jiří [p]”, 9/10 in JKCP; “Spain, (Andalusia), Castillo de Castillar, Algeciras env., 10 km N of San Roque, 02.III.2008, O. Hillert lgt. [p]”, 17/26 in OHCB, 1/1 in SZCM; 1/1 in JSCP, 1/1 in DKCP, 1/1 in TBCP, 1/1 in HKCS, 1/1 in ARCL, 1/1 in VMCP; “Spain, TARAGUTTILLA – SAN RAGUE, 10.II.2008, KLÍCHA Jirka [p]”, 1/1 in JSCP; “Spain, TARAGUTTILLA – SAN RAGUE, 13.II.2008, KLÍCHA Jiří [p]”, 2/1 in JSCP; “Spain, TARAGUTTILLA – SAN RAGUE, 14.II.2008, KLÍCHA Jiří [p]”, 0/1 in VTCZ, 4/3 in JKCP; “Spain, TARAGUTTILLA – SAN RAGUE, 15.II.2008, KLÍCHA Jirka [p]”, 2/2 in JSCP; “Spain, TARAGUTTILLA – SAN RAGUE, 16.II.2008, KLÍCHA Jiří [p]”, 1/0 in VTCZ; “Spain, San Roque, Almorama, 14.-16. 2008, P. Kylies lgt. [p]”, 1/1 in JSCP, 14/10 in PKCS, 1/1 in VTCZ; “Cádiz, San Roque, 12.XII.1993, leg. Luis Torres [p]”, 1/0 in VMCP; “Spain, Cádiz distr., San Roque, 1.II.1988, leg. Torres Mendez [p]”, 1/1 in RCCP; “E / Andalusia / Cadiz, Pinar d. San Roque, bei San Roque, 2.3.1986, lgt. L. Hendrich / T. Mendez [p]”, 1/0 in LHCB; 1/0 in JSCS; “Spain, CÁDIZ, San Roque, 19.11.1986 [p]”, 1/1 in PKCS; “Spain, Cádiz distr., San Roque, 19.XI.1984, Torres lgt. [p]”, 3/1 in JSCP; “Espana, San Roque (Cadiz), 18.II.1984, lgt. J.L.T.Mendez [p]”, 1/1 in HNHM; “Hisp. m., 12.11.[19]82, San Roque (Cadiz), lgt. T. Mendez [p]”, 1/1 in DKCP; “Spain, San Raque (Cádiz), 14.1.1984, J. Ramirez lgt. [p]”, 2/1 in PKCS.

DESCRIPTION OF HOLOTYPE. Maximum (hyperthelic) male with well developed pronotum horns. Body length 22.0 mm; strongly convex, dorsal surface black, pronotum slightly microsculptured, moderately alutaceous, elytron shiny (Figs 85, 94).



Figs 34–36. Aedeagus of *Chelotrupes feryi* sp. nov. (schematically). 34 – ventral aspect, 35 – dorsal aspect, 36 – left lateral aspect.



Figs 37–39. Aedeagus of *Chelotrupes hendrichi* sp. nov. (schematically). 37 – ventral aspect, 38 – dorsal aspect, 39 – left lateral aspect.

Head (Figs 85, 94). Clypeus broadly rounded, sides s-shaped, distinctly arcuate; posterior angles of clypeal margin elevated; tubercle present, weakly keel-like prolonged; disc simply punctate; oblique keels above eyes confluent with elevation of clypeal margin, reaching to half of eyes. Front distinctly, finely punctate, vertex sparsely finely punctate to impunctate; fronto-clypeal suture absent; occiput impunctate. Eyes moderately developed, weakly elliptic, canthus straight in lateral; intersection between eye canthus and genae not extending eyes (Fig. 4).

Pronotum (Figs 13, 22) transverse; broadest just in anterior quarter, entirely bordered. Lateral margin rounded, marginal carina not crenulated, weakly widened and weakly elevated; Anterior angles not confluent with lateral pronotal hornlike apophyses. Lateral fovea deeply impressed, very sparsely punctate, longitudinal midline missing. Pronotal punctation very fine and sparse, present only anteriorly and on lateral fovea. Lateral hornlike apophyses well developed, straight, weakly bent inwardly apically in dorsal aspect; interior surface coarsely granulate from apex to basal third, interior longitudinal keel present, well elevated from bottom line in front quarter to middle of apophyses in basal third; lateral surface impunctate; maximal length of apophyses more than mandibles; subapical tooth well present pointed above in front quarter. Surface keel-like developed and regularly bent from outside of subapical tooth to middle of basal part of apophysis. Medial pronotal apophyses well developed, pointed, based in front in lateral view.

Scutellum plate broadly triangular, impunctate, shiny.

Elytra combined approximately as long as wide, surface shiny, between suture and humerus with 8 fine complete striae, striae distinctly, deeply punctate; intervals flat, impunctate; humeral callus prominent (Figs 85, 94).

Micropterous, metathoracic wings narrow.

Aedeagus. Parameres as in Figs 37–39.

VARIABILITY IN MALES. Body length 16.0–22.0 mm. Pronotal hornlike apophyses in medium developed and underdeveloped (hypothelic) specimens short, more or less straight, with only indicated longitudinal keels and subapical teeth or without them at all, simply rounded to almost acute apically.

FEMALE (Fig. 103). Body length 16.5–22.0 mm, allotype 20.0 mm. Clypeus rounded, sides weakly s-shaped; disc densely rugo-punctate, frons, vertex and occiput coarsely rugo-punctate; tubercle present, distinctly prominent; oblique keels above eyes distinct, reaching approximately to half of eyes (Fig. 58); eyes well developed, not separated from eye canthus (Fig. 67). Pronotum transverse, without medial furrow, anterior margin weakly emarginate, lateral margin only weakly widened, broadest just in middle, anterior angles weakly protruding anterolaterad, rounded apically, surface shiny, distinctly deeply punctate, except for broad discal area, lateral apophyses prominent, weakly pointed (Fig. 76). Surface of elytra shiny, humeral callus distinct (Fig. 103).

DIFFERENTIAL DIAGNOSIS. Refer to species key below.

DISTRIBUTION. Spain (Andalucía: Cádiz: San Roque vill. env.) (Fig. 111).

COLLECTING CIRCUMSTANCES. Prefers sandy soils (Fig. 115).

NAME DERIVATION. Patronymic; named in honour of our longtime friend Lars Hendrich (Berlin, Germany), an excellent specialist on Dytiscidae and one of the collectors of the new species.

### *Chelotrupes hiostius* (Gené, 1836)

(Figs 5, 14, 23, 40–42, 59, 68, 77, 86, 95, 104)

*Geotrupes hiostius* Gené, 1836: 27; description.

*Ceratophyus hiostius*: Sturm (1843: 113); list.

*Minotaurus hiostius*: Mulsant & Godart (1855: 4); list.

*Geotrupes* (*Minotaurus*) *hiostius*: Marseul (1863: 122); list.

*Geotrupes* (*Chelotrupes*) *Hiostius*: Jekel (1866: 550); revision, key.

*Geotrupes* (*Minotaurus*) *Hiostium*: Baudi di Selve (1870: 70); list.

*Geotrupes* (*Typhoeus*) *hiostius*: Reitter (1891: 184); list.

*Thorectes* (*Chelotrupes*) *hiostius*: Jakobson (1892: 256); list.

*Ceratophyus* (*Minotaurus*) *Hiostius*: Reitter (1893: 9); diagnosis, key.

*Ceratophyus* (*Typhoeus*) *Hiostius*: Reitter (1906: 725); list.

*Typhoeus* (*Chelotrupes*) *hiostius*: Boucomont (1912: 22); list.

*Typhoeus* (*Chelotrupes*) *Hiostius*: Winkler (1929: 1036); list.

*Ceratophyus* (*Chelotrupes*) *Hiostius*: Porta (1932: 401); key.

*Typhoeus hiostius*: Baraud (1992: 49); diagnostic characters, key.

*Typhaeus* (*Chelotrupes*) *hiostius*: López-Cólon (2003: 140); list.

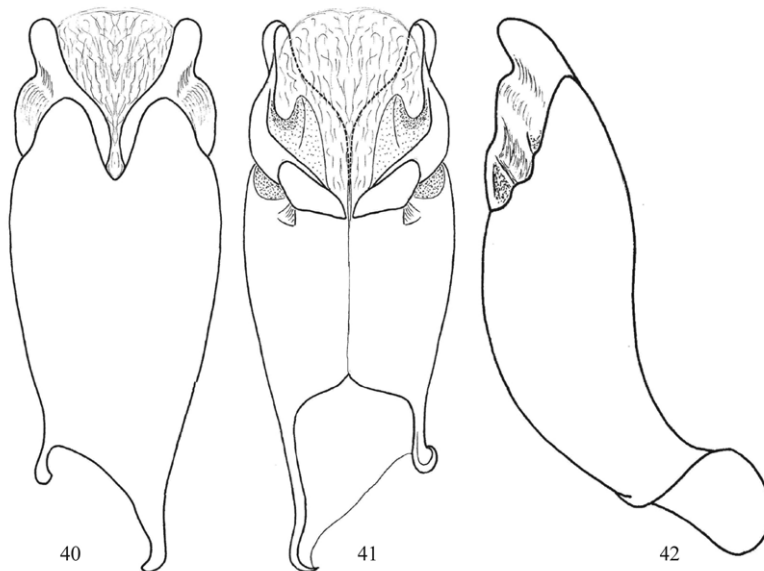
*Chelotrupes hiostius*: Dellacasa & Dellacasa (2008: 632); revision, key.

TYPE LOCALITY. Sardinia (Italy) (Dellacasa & Dellacasa 2008).

TYPE MATERIAL (not examined). **Italy (Sardinia)**: neotype (male), labelled: “1 / 37 [p, yellow label] // Sard[inia]. [p, white label] // *Geotrupes / hiostius / Gené, 1836 / NEOTYPUS / Des. Dellacasa, 2005* [p, red label]”, in MSNT (Dellacasa & Dellacasa 2008).

ADDITIONAL MATERIAL EXAMINED (195 specimens). **Italy (Sardinia)**. SW Sardinia (Italy), W of Guspini Costa Verde, Marina de Arbus, 15.IV.2007, lgt. O. Hillert, 59/37 in OHCB, 4/3 in DKCP, 1/1 in NMPC; S Sardinia (Italy), S of Iglesias, Bacu Abies, 15.IV.2007 O. Hillert lgt., 3/1 [fragments of pronotum and/or elytra] + 10/0 in OHCB; 16.IV.2007, H. Kalz lgt., Sardinien, Italien, Marina de Arbus, Costa Verde, 34/21 in HKCS; Costa Verde, Sardinien, 1.-15.IV.[20]06, Dr. K. Handke lgt., 1/0 in LSCN; Italy, Sardinia CA, Marina di Arbus, 13.11.2002, Piero Leo lgt., 1/1 in OHCB; Carloforte, Sard., 20-V., A. Doderò, 1892, 0/1 in HNHM; Sardinia, Sicora, 1887, 1/5 in NHMW; Sardinia, Carloforte, A. Doderò, 1/0 in ZMHB; Sardinia, Carloforte, 1/0 in ZMHB; Carloforte (Sardinia), A. Doderò, 1/0 in ZMHB; I., Sard., S. Antioco, 1/0 in DKCP; Italia, Sardin., 2/1 in NHMW; Sard., 1/0 in DEIC; Sardin., 1/0 in DEIC; Sardinia, Dahl, 1/1 in DEIC.

DESCRIPTION. Body length 15.0–25.0 mm, black, dorsal surface moderately convex, dark cupreous to cupreous-greenish, almost alutaceous, with slight metallic lustre (Figs 86, 95).



Figs 40–42. Aedeagus of *Chelotrupes hiostius* (Gené) (schematically). 40 – ventral aspect, 41 – dorsal aspect, 42 – left lateral aspect.

Maximum (hyperthelic) male with well developed pronotal horns. Head (Figs 86, 95). Clypeus regularly rounded, almost semicircular, sides weakly arcuate; posterior angles of clypeal margin slightly elevated; tubercle, weakly prominent, keel-like prolonged to anterior clypeal margin, punctation of clypeal disc weakly rugose, somewhat indistinct, subconfluent; oblique keels above eyes almost confluent with clypeal margin on clypeal margin elevation, reaching approximately to half of eyes. Frons simply, sparsely punctate, vertex in posterior half impunctate; frontoclypeal suture laterally impressed; occiput impunctate. Eyes weakly developed, lenticular, distinctly separated from eye canthus; eye canthus considerably robust in lateral aspect; intersection between eye canthus and genae extending eyes (Fig. 5).

Pronotum (Figs 14, 23) weakly transverse, with longitudinal midline; broadest just in middle, entirely bordered. Lateral margin rounded, marginal carina crenulated in lateral aspect, not widened, not elevated; anterior angles confluent with lateral pronotal hornlike apophyses. Lateral fovea impressed, impunctate. Pronotum impunctate, only diffusely rugose on lateral margin. Lateral hornlike apophyses well developed, weakly bent inwardly apicad; interior surface finely sculptured from apex to basal third, interior longitudinal keel present, weakly visible from apex to base on upper line of apophysis; surface impunctate laterally; maximum length of apophyses reaching to apex of mandibles; subapical tooth absent. Surface weakly regularly declivous from apex to base in lateral aspect. Medial pronotal apophysis well developed, distinctly pointed apically, based in middle in lateral aspect.

Scutellum plate broadly triangular to semicircular, impunctate, shiny.

Elytra combined approximately as long as wide, surface silky alutaceous; between suture and humerus 10 complete striae, striae distinctly impressed, near apex of elytra more deeply; intervals flat, impunctate; humeral umbone distinct, humeral callus missing (Figs 86, 95).

Micropterous, metathoracic wings squamiform.

Aedeagus. Parameres as in Figs 40–42.

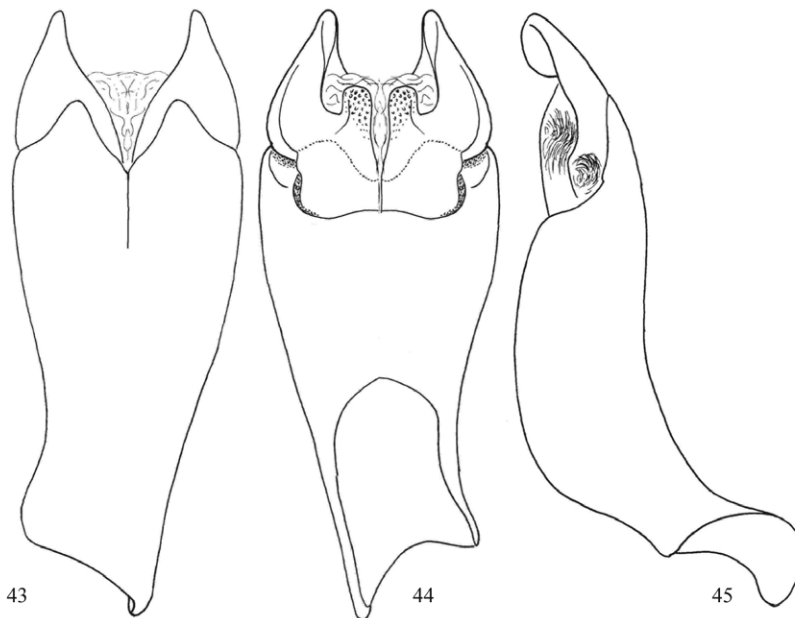
VARIABILITY IN MALES. Pronotal hornlike apophyses in medium developed and underdeveloped (hypothelic) specimens short, more or less straight with only indicated longitudinal keels and subapical teeth or without them at all, simply rounded to almost acute apically.

FEMALE (Fig. 104). Body length 17.0–24.0 mm. Clypeus broadly rounded, sides weakly s-shaped, densely, coarsely punctate, frons of similar punctation, punctation of vertex much sparser, occiput impunctate; tubercle weakly prominent, simply rounded; oblique keels above eyes distinct, reaching to half of eyes (Fig. 59); eyes weakly developed, lenticular, distinctly separated from eye canthus, genae distinctly protruding, elevated (Fig. 68). Pronotum weakly transverse, medial furrow present, anterior margin almost straight, lateral margin not widened, broadest just at middle, anterior angles broadly rounded, projecting anterad, surface satin glossy, except of anterolateral area impunctate, lateral apophyses distinctly prominent (Fig. 77). Surface of elytra satin glossy, humeral callus weakly visible, prolonged (Fig. 104).

DIFFERENTIAL DIAGNOSIS. Refer to species key below.

DISTRIBUTION. Italy, endemic to Sardinia.

COLLECTING CIRCUMSTANCES. Prefers sandy soils.



Figs 43–45. Aedeagus of *Chelotrupes kyliasi* sp. nov. (schematically). 43 – ventral aspect, 44 – dorsal aspect, 45 – left lateral aspect.

*Chelotrupes kyliesi* sp. nov.

(Figs 6, 15, 24, 43–45, 60, 69, 78, 87, 96, 105, 110, 116)

TYPE LOCALITY. Spain (Andalucía), 10 km W of Huelva, Aljaraque, 37°16'N, 7°01'W, ca. 20 m a. s. l.

TYPE MATERIAL (279 specimens). **Spain (Andalucía: Huelva)**. Holotype (male), allotype (female), labelled: “Spain, (Andalucía), Aljaraque, / 10 km W of Huelva, / 25.02.2009 O. Hillert leg. [p]”, in OHCB. Paratypes, labelled: “Spain, (Andalucía), Aljaraque, 10 km W of Huelva, 23.02.2011, O. Hillert lgt. [p]”, 42/25 in OHCB; “Spain, (Andalucía), Aljaraque 37°15.425 N 07°04.078 E, 10 km W of Huelva, 02.03.2010, O. Hillert lgt. [p]”, 12/11 in OHCB, 1/0 in VMCP; “Spanien, N of Aljaraque, 10 km WNN Huelva, 02.03.2010, H. Kalz lgt. [p]”, 7/3 in HKCS; “Spain, (Andalucía), Aljaraque 37°15.425 N 07°04.078 E, 10 km W of Huelva, 25.02.2009, O. Hillert lgt. [p]”, 18/13 in OHCB, 1/1 in ARCL, 0/1 in VMCP; “Spain, Huelva distr., ALJARAQUE vill.env., 37°15.425 N 07°04.078 E, 25.ii.2009, Jan Schneider lgt. [p]”, 26/12 in JSCP, 3/3 in SJCP; same data but “David Král lgt. [p]”, 16/6 in DKCP; “Spain, Prov. Huelva, 6 km N of Cartaya, 13.1.2009, lgt. P. Kyliès [p]”, 9/5 in PKCS; “Spain, 6 km N of Cartaya, 13.2.2008, lgt. P. Kyliès [p]”, 1/3 in PKCS; “Spain, 6 km N of Cartaya, 3.-14.2.2007, lgt. P. Kyliès [p]”, 4/1 in PKCS, 1/1 in ZTCD; “Spain, Prov. Huelva / 6km N of Cartaya / 12.I.2009, KLÍCHA Jiří [p]”, 11/3 in JKCP; “Spain, Prov. Huelva / 6km N of Cartaya / 11.II.2007, KLÍCHA Jiří [p]”, 10/1 in JKCP; “Spain, Prov. Huelva / 6km N of Cartaya / 8.II.2007, KLÍCHA Jiří [p]”, 12/2 in JKCP; “Spain, 13km j. TARGUEJO, 13.II.2007, KLÍCHA Jiří [p]”, 9/3 in JKCP.

ADDITIONAL MATERIAL EXAMINED (99 specimens). **Spain (Andalucía: Huelva)**. Spain, Huelva – El Rocio, 14.II.2010, Klícha Jiří, 1/1 in JKCP; Spain mer., Andalucía, Tariquejo 5 km SW, 24.03.2009, Mantič lgt., Pinetum – excr. Bos, 37°18.31 N 07°10.00 W, 14/5 in MMCO, 1/1 in JSCP; Spain, Huelva distr., Hinojos vill.env., 37°17.342 N 06°25.334 E, 26.ii.2009, Jan Schneider lgt., 3/2 in JSCP, 1/1 in SJCP; same data but David Král lgt., 1/0 in DKCP; Spain, Huelva distr., La Rabida vill.env., 37°11.129 N 06°56.346 E, 26.ii.2009, Jan Schneider lgt., 0/1 in JSCP; same data but David Král lgt., 1/0 in DKCP; Spain, 6 km W of Almonte, 3.-14.2.2007, lgt. P. Kyliès, 4/2 in PKCS; Spain, El Rocio, 3.-14.2.2007, lgt. P. Kyliès, 1/0 in PKCS; Spain, Almonte env. SW 10 km, 14.2.2006, Kyliès lgt., 0/1 in ZTCD; Spain, Andalucía, Almonte env. SW 10 km, 14.2.2006, Jaroslav Žák lgt., 3/2 in JZCJ; Spain, Andalucía, Almonte env. SW 10 km, 14.2.2006, lgt. J. Vališ, 1/2 in VMCP; Spain, Andalucía, Almonte env. SW 10 km, 14.2.2006, lgt. P. Kyliès, 0/4 in PKCS; Spain mer., Andalucía, Almonte env. SW 10 km, 14.II.2006, lgt. Pavel Jáchymek, 4/2 in PJCB; Coto Donana, Andalusien, April 2000, Dr. K. Handke lgt., 1/0 in ABCB; El Rocio, (E-Huelva), 25.3.1985, Sv. Esswein lgt., 1/0 in JECB; Prv. Huelva, 2 km w. Torre de la Higuera, 28./29.4.1981, M. Baehr lgt., 1/0 in JSCS; Esp. 7.iv.1980, Matalascañas (Huelva), J. M. Ávila lgt., 3/1 in DKCP; España, 4.1983, Huelva, Piñero lgt., 1/2 in DKCP. **Spain (Andalucía: Sevilla)**. Spain, Aznalcázar env., 14.2.2010, lgt. P. Kyliès, 2/1 in PKCS; Spain, Colinas - Sevilla, 16.I.2009, Klícha Jiří, 2/1 in JKCP; Spain, Prov. Sevilla, Colinas – 16.1.2009, lgt. P. Kyliès, 11/8 in PKCS; Sevilla (España), Pinares de Aznalcázar, Aznalcázar, 29.2.2008, 1/0 in AWCH; Sevilla (España), Pinares de Aznalcázar, Aznalcázar, 9.2.2008, 2/3 in AWCH; Spain, Sevilla – Colinas, 11.2.2008, lgt. P. Kyliès, 2/0 in PKCS; Spain, Los Cabezudos - Sevilla, 11.II.2008, Klícha Jiří, 1/0 in JKCP; Spain, Sevilla – Colinas, 10.II.2007, Klícha Jiří, 1/0 in JKCP; Sevilla, Villamanrique, 13.IV.1981, 0/1 in VMCP; Espagne, Prov. de Seville, Villamanrique, 4.X.[19]60, J. Baraud lgt., 1/0 in NHMW; Espagne, Prov. de Seville, Villamanrique, 4.X.[19]60, J. Baraud lgt., 3/0 in MNHN; Espagne, Prov. de Seville, Villamanrique, 3.X.[19]60, J. Baraud lgt., 1/0 in MNHN; Espagne, Prov. de Seville, Villamanrique, 5.X.[19]60, J. Baraud lgt., 1/0 in MNHN; Seville, Pant.dPintado, 5.78., 1/1 in RCCP. **Spain (Andalucía)**. Hispania, Adalusia, 0/2 in NHMW. **Patria dubia**. Lusitan., Andalus., Ramb., 0/1 in ZMHB.

DESCRIPTION OF HOLOTYPE. Maximum (hyperthelic) male with well developed pronotum horns. Body length 18.5 mm; surface black, alutaceous, elytron more distinctly than pronotum (Figs 87, 96).

Head (Fig. 87, 96). Clypeus broadly rounded, sides arcuate and distinctly s-shaped; posterior angles of clypeal margin weakly elevated; tubercle, prominent, simple, pointed, punctuation of clypeal disc coarse, somewhat confluent; oblique keels above eyes confluent with clypeal margin elevation, reaching to half of eyes. Punctuation of frons and vertex coarse and more sparse as punctuation on clypeus; frontoclypeal suture absent; occiput with single distinct punctures. Eyes well developed, rounded; canthus fine, straight in lateral aspect; intersection between eye canthus and genae not extending eyes (Fig. 6).

Pronotum (Figs 15, 24) transverse; broadest just apically, entirely bordered. Lateral margin rounded, marginal carina not crenulated, distinctly widened and weakly elevated; anterior angles not confluent with lateral pronotal hornlike apophyses. Lateral fovea distinctly impressed and distinctly punctate; longitudinal midline missing. Pronotal punctuation distinct on lateral margin,



lateral fovea and basal area of hornlike apophyses. Lateral hornlike apophyses well developed; interior surface sparsely granulate from apex to base, granules simple, becoming more sparse basad, interior longitudinal keel distinct present, short, exhibited from apex to approximately subapical tooth, distinctly elevated in dorsal aspect; lateral surface impunctate; maximum length of apophyses reaching to apex of mandibles; subapical tooth present, pointed approximately in middle of apophyses dorsally. Surface regularly declivous from subapical tooth to base in lateral aspect. Medial pronotal apophysis weakly developed, weakly pointed, based anteriorly in lateral view.

Scutellum plate broadly triangular, impunctate, shiny.

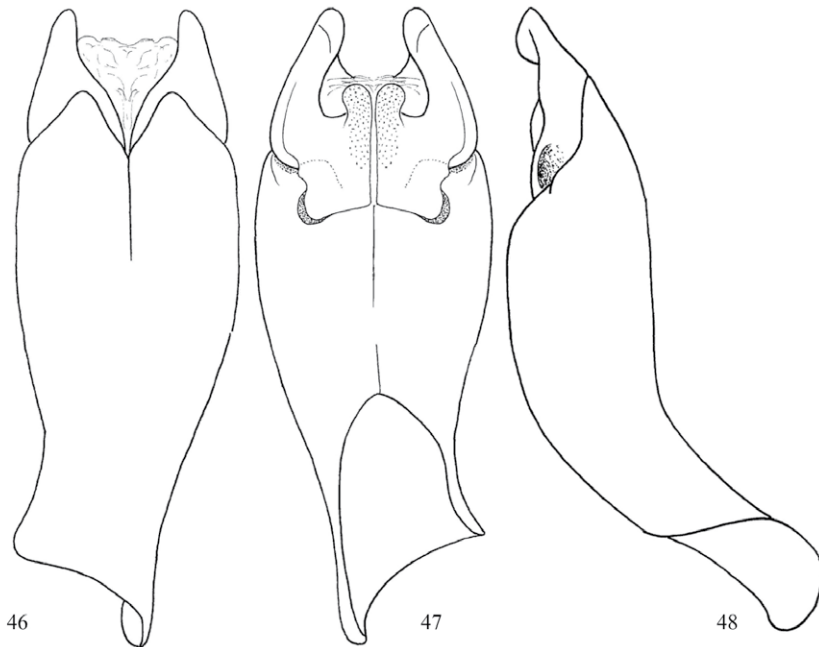
Elytra combined approximately as long as wide, surface alutaceous; between suture and humerus 7 fine complete striae, all striae with single small punctures; intervals flat, impunctate; humeral umbone distinct, humeral callus distinct prominent (Figs 87, 96).

Micropterous, metathoracic wings narrow.

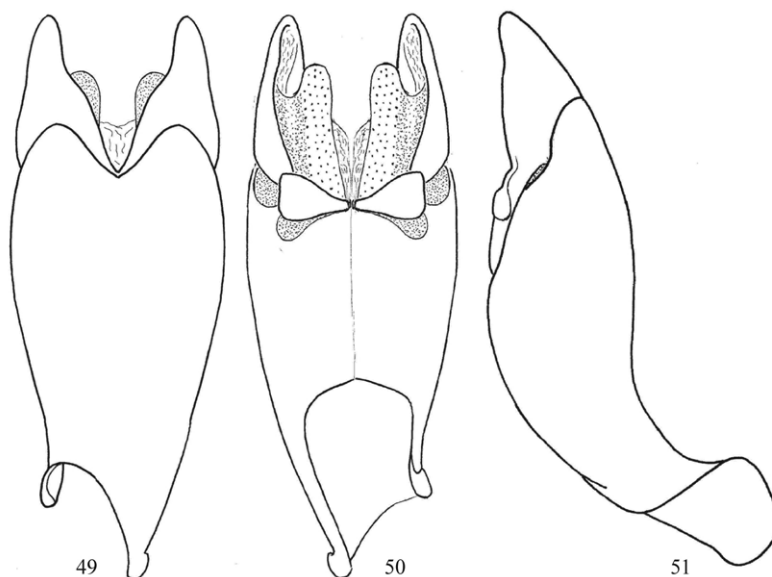
Aedoeagus. Parameres as in Figs 43–45.

VARIABILITY IN MALES. Body length 14.5–18.5 mm. Pronotal hornlike apophyses in medium developed and underdeveloped (hypothelic) specimens short, more or less straight with only indicated longitudinal keels and subapical teeth or without them at all, simply rounded to almost acute apically.

FEMALE (Fig. 105). Body length 16.0–20.0 mm, allotype 20.0 mm. Clypeus rounded, sides s-shaped, distinctly rugo-punctate; frons, vertex and occiput densely, distinctly rugo-punctate; tubercle present, prominent; oblique keels above eyes distinct, reaching approximately to half of



Figs 46–48. Aedeagus of *Chelotrupes laevipennis* (Mulsant et Godart), sp. restit. (schematically). 46 – ventral aspect, 47 – dorsal aspect, 48 – left lateral aspect.



Figs 49–51. Aedeagus of *Chelotrupes matutinalis* (Baudi di Selve) (schematically). 49 – ventral aspect, 50 – dorsal aspect, 51 – left lateral aspect.

eyes (Fig. 60); eyes well developed, genae protruding, elevated (Fig. 69). Pronotum transverse, without medial furrow, anterior margin weakly emarginate, lateral margin distinctly widened, broadest just at anterior third, anterior angles distinctly projecting anterolaterad, bent laterad, arcuate, surface alutaceous, distinctly deeply punctate, punctation of discal area more sparse, lateral apophyses prominent, distinctly pointed prominent (Fig. 78). Surface of elytra weakly alutaceous, humeral callus present, visible (Fig. 105).

DIFFERENTIAL DIAGNOSIS. Refer to species key below.

DISTRIBUTION. Spain (Andalucía: Huelva, Sevilla) (Fig. 110).

COLLECTING CIRCUMSTANCES. Prefers sandy soils (Fig. 116).

NAME DERIVATION. Patronymic; named in honour of our friend Petr Kyliés (Slaný, Czech Republic) an excellent student in scarab beetles and one of the collector of the new species.

***Chelotrupes laevipennis* (Mulsant et Godart, 1855), sp. restit.**

(Figs 7, 16, 25, 46–48, 61, 70, 79, 88, 97, 106, 111, 117)

*Ceratophyus laevipennis* Mulsant et Godart [sic !], 1855: 1; description.

*Minotaurus laevipennis*: Mulsant & Godart [sic !] (1855: 4); list.

*Geotrupes* (*Minotaurus*) *laevipennis*: Marseul (1863: 122); list.

*Geotrupes* (*Chelotrupes*) *Laevipennis*: Jekel (1866: 550), key.

*Geotrupes laevipennis*: Marseul (1867: 54); list.

*Geotrupes* (*Typhoeus*) *laevipennis*: Reitter (1891: 184); list.

*Thorectes* (*Chelotrupes*) *laevipennis*: Jakobson (1892: 256); list.

*Ceratophyus* (*Minotaurus*) *Momus* var. *laevipennis*: Reitter (1893: 9); diagnosis, key.

*Ceratophyus* (*Typhoeus*) *Momus* v. *laevipennis*: Reitter (1906: 725); list.

*Geotrupes andalusiacus* Deyrolle, 1869: 10; description; **syn. nov.**

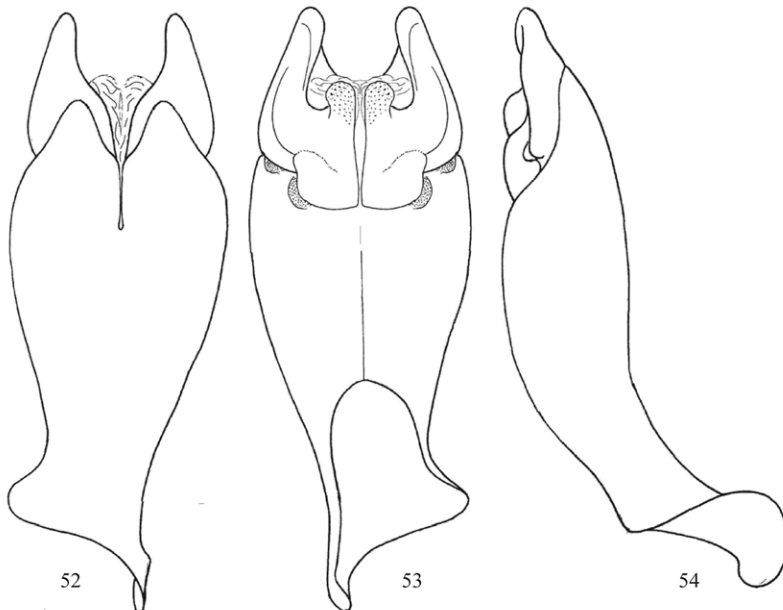
TYPE LOCALITY. Spain (Andalucía), NW of Jerez, N of Sanlúcar de Barrameda, 36°47'N, 5°21'W, ca. 20 m a. s. l.

TYPE MATERIAL EXAMINED (2 specimens). *Ceratophyus laevipennis*. **Spain (Andalucía: Cádiz)**. Neotype (male), here designated, labelled: “Spain, (Andalusia), / N of Sanlúcar de Barrameda, / NW of Jerez, / 26.02.2011, leg. O. Hillert [p]”, in MHNL. *Geotrupes andalusiacus*. **Spain (Andalucía: Cádiz)**. Neotype (male), here designated, labelled: “Spain, (Andalusia), / N of Sanlúcar de Barrameda, / NW of Jerez, / 26.02.2011, leg. O. Hillert [p]”, in MNHN.

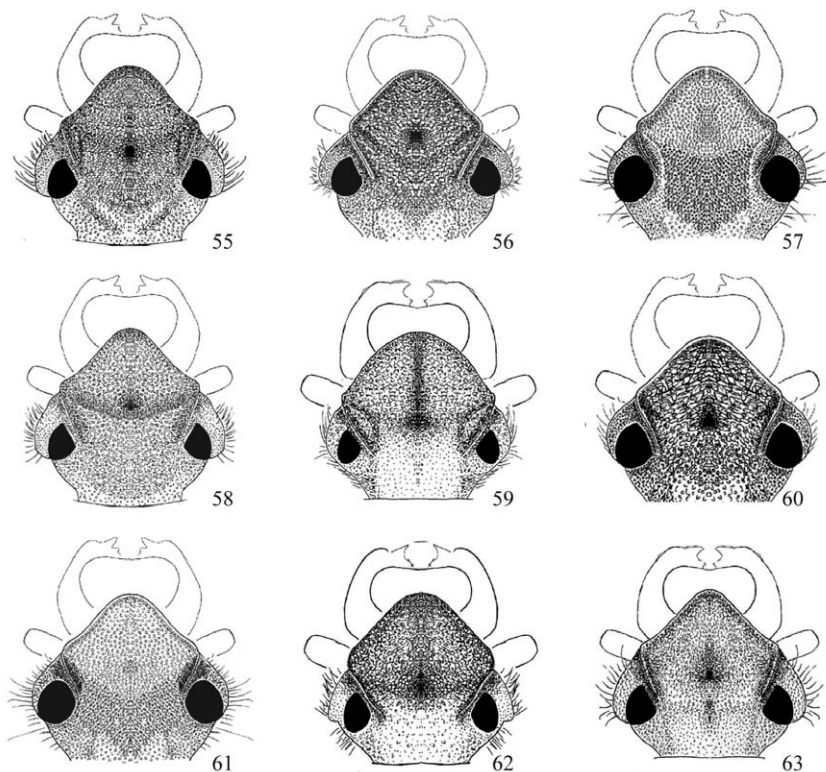
ADDITIONAL MATERIAL EXAMINED (47 specimens). **Spain (Andalucía: Cádiz)**. Spain, (Andalusia), N of Sanlúcar de Barrameda, NW of Jerez, 26.II.2011, O. Hillert lgt., 10/5 in OHCB, 1/1 in DKCP, 1/1 in JSCP; Spanien (Andalusien), Sanlúcar de Barrameda, 09.03.1998, O. Hillert lgt., 1/0 in OHCB; Espagne, Prov. Cadiz, (Andalusien), Rota, 20.03.[19]86, Fery lgt., 3/3 in HFCE; Jerez, XI 1908, E. Pons leg, 1/1 in NMPC; Cadiz, 1.-3.[19]06 Schramm, 2/1 in NMPC; Cadiz, San Diego, 1/0 in DEIC. Spain (Andalucía). Andalus., 1/0 in DEIC; Andalusia, 2/0 in SMTD; Andalusien, Rolph, 1/0 in SMTD. **Spain**. Espagne, 1/0 in NMPCB; Hispan., 1/0 in SMTD; Hispania, 1/1 in NMPC; Spanien, 2/1 in SMTD. **Patria dubia**. Lusitan., 1/0 in DEIC; Sardinia, 1/2 in NMPC.

DESCRIPTION OF NEOTYPE. Maximum (hyperthelic) male with well developed pronotal horns. Body length 19.0 mm; moderately convex, dorsal surface black, alutaceous, elytron more distinctly than pronotum (Figs 88, 97).

Head (Figs 88, 97). Clypeus broadly rounded, sides s-shaped, arcuate; posterior angles of clypeal margin weakly elevated; tubercle present, weakly keel-like prolonged; punctation of clypeal disc rugose; oblique keels above eyes confluent with clypeal margin elevation, reaching to half of eyes. Punctation of frons similar as on clypeus, punctation of vertex and occiput more sparsely distributed; frontoclypeal suture absent. Eyes well developed, rounded, canthus straight in lateral aspect; intersection between eye canthus and genae not extending eyes (Fig. 7).



Figs 52–54. Aedeagus of *Chelotrupes momus* (Olivier) (schematically). 52 – ventral aspect, 53 – dorsal aspect, 54 – left lateral aspect.



Figs 55–63. Female head in dorsal aspect (schematically). 55 – *Chelotrupes algarvicus* sp. nov., 56 – *C. brancoi* sp. nov., 57 – *C. feryi* sp. nov., 58 – *C. hendrichi* sp. nov., 59 – *C. hiostius* (Gené), 60 – *C. kyliasi* sp. nov., 61 – *C. laevipennis* (Mulsant et Godart), sp. restit., 62 – *C. matutinalis* (Baudi di Selve), 63 – *C. momus* (Olivier).

Pronotum (Figs 16, 25) distinctly transverse; broadest just in middle, entirely bordered. Lateral margin rounded, marginal carina not crenulated, distinctly widened and elevated; anterior angles not confluent with lateral pronotal hornlike apophyses. Lateral fovea distinctly impressed, simply punctate; longitudinal midline missing. Pronotal punctation distinct on lateral margin and lateral fovea and base of lateral apophysis. Lateral hornlike apophyses well developed, straight, almost oval in lateral section; interior surface distinctly coarsely granulate from apex to base, interior longitudinal keel absent; lateral surface finely shallowly punctate; maximum length of apophyses reaching to apex of mandibles; subapical tooth indistinct, present in anterior third. Medial pronotal apophysis weakly developed, pointed, based anteriorly in lateral view.

Scutellum plate broadly triangular, impunctate, moderately shiny.

Elytron as long as wide approximately, surface dull; between suture and humerus 7 fine striae entire elytral length, all striae with single small points; intervals plane, impunctate; humeral umbone distinct, humeral callus distinct prominent (Figs 88, 97).

Micropterous, metathoracic wings narrow.

Aedoeagus. Parameres as in Figs 46–48.

VARIABILITY IN MALES. Body length 14.5–19.0 mm. Pronotal hornlike apophyses in medium developed and underdeveloped (hypothelic) specimens short, more or less straight with only indicated longitudinal keels and subapical teeth or without them at all, simply rounded to almost acute apically.

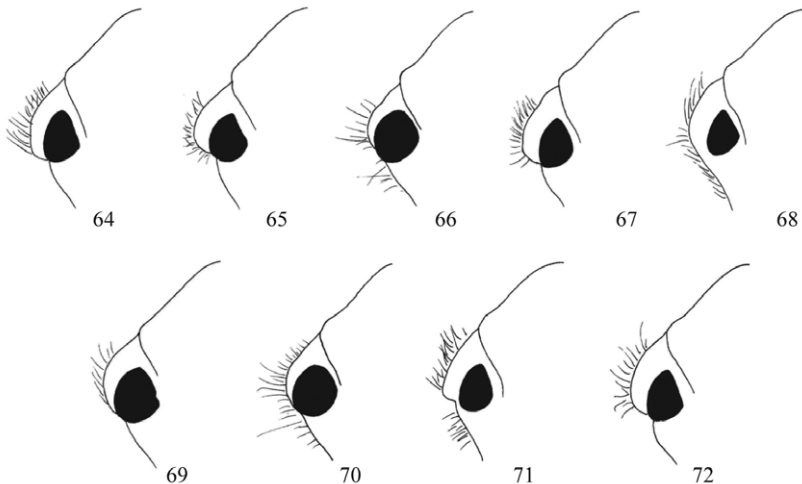
FEMALE (Fig. 106). Body length 16.0–19.0 mm. Clypeus rounded, sides s-shaped, densely, distinctly rugo-punctate; frons densely distinctly rugo-punctate; vertex and occiput shallowly rugo-punctate; tubercle almost absent, median area only weakly elevated; oblique keels above eyes distinct, reaching to half of eyes (Fig. 61); eyes well developed, genae prominent, elongated (Fig. 70). Pronotum transverse, without medial furrow, anterior margin weakly emarginate, lateral margin strongly widened, weakly elevated, broadest just at middle, anterior angles strongly projecting anterolaterad, bent laterally, arcuate, surface alutaceous, distinctly deeply punctate, punctuation of discal area more sparse, lateral apophyses weakly prominent, rounded (Fig. 79). Surface of elytra alutaceous, humeral callus present, distinctly developed (Fig. 106).

DIFFERENTIAL DIAGNOSIS. Refer to the species key below.

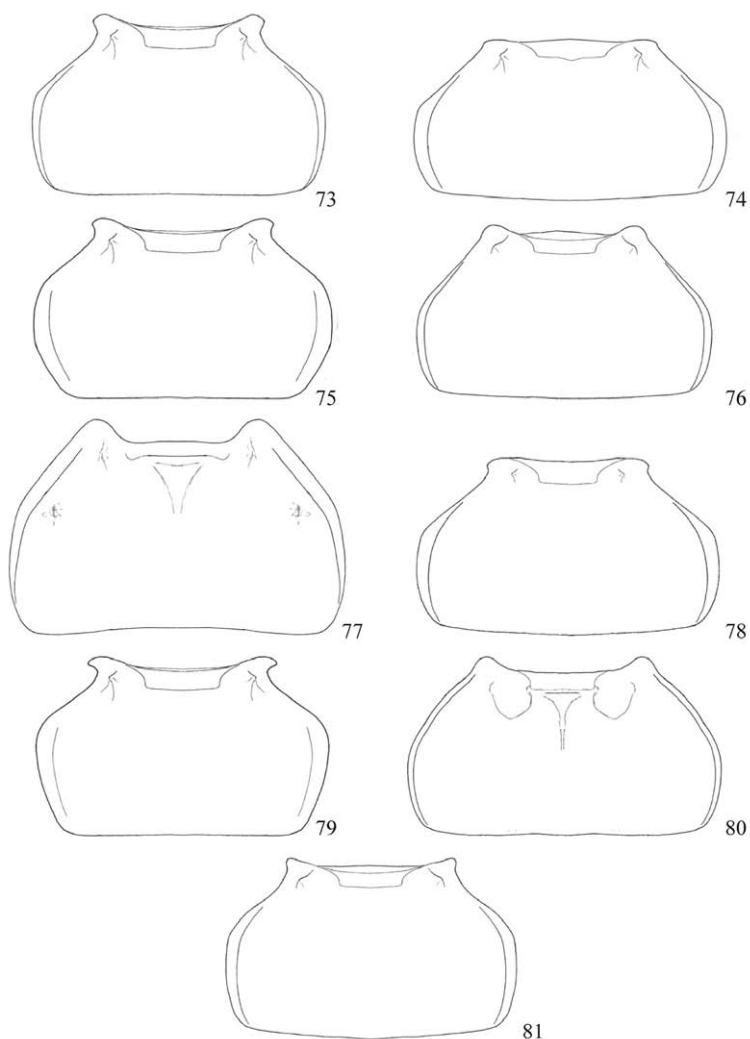
DISTRIBUTION. Spain (Andalucía: Cádiz) (Fig. 111).

COLLECTING CIRCUMSTANCES. Prefers sandy soils (Fig. 117).

TAXONOMIC REMARKS. Mulsant & Godart (1855: 1) have described *Ceratophyus laevipennis* from “l’Espagne”. However, these authors placed the same species in the genus *Minotaurus* Mulsant et Godart, 1855 in the same study on page five. Reitter (1893) considered the taxon only a “Var.” [= variety] of *Cerytophyus (Minotaurus) momus* (Olivier, 1789) and Boucomont (1912) actually identical with this species. According to the original description, this taxon belongs undoubtedly to the genus *Chelotrupes* Jekel, 1866 according to the concept of Dellacasa & Dellacasa (2008). The original description of this taxon and also diagnostic characters used in Reitter (1893) correspond more or less with above redescribed taxon. However, it was necessary to study the type material in order to eliminate confusion with another closely related taxon. Mulsant’s collection deposited in MHNL has been totally destroyed by moisture and *Anthrenus* carpet beetles (Paulian 1944, H.



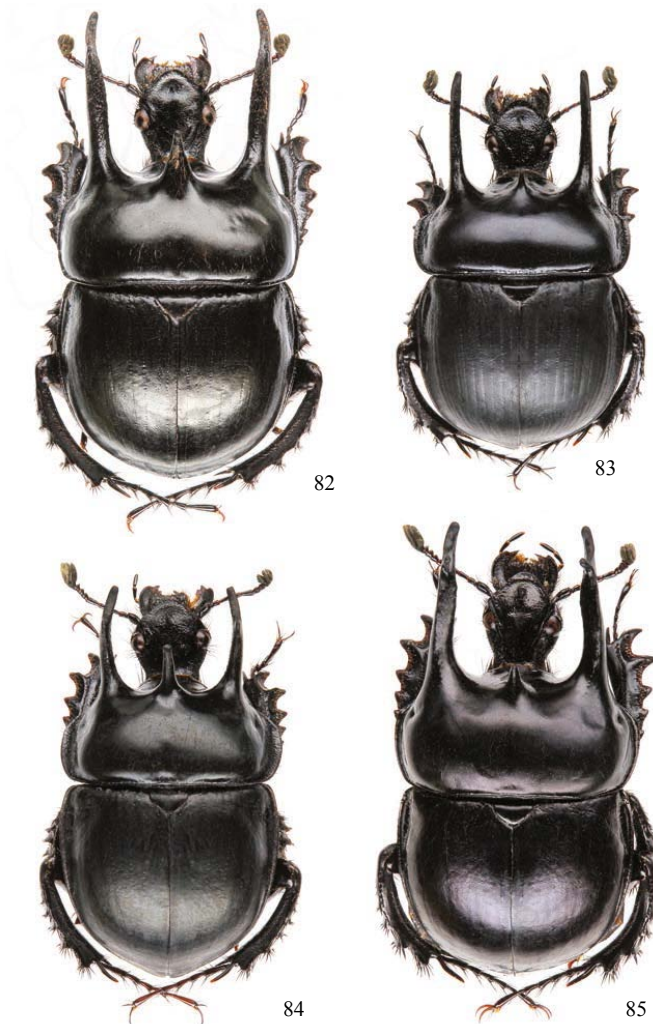
Figs 64–72. Female head with left eye in dorsal aspect (schematically). 64 – *Chelotrupes algarvicus* sp. nov., 65 – *C. brancoi* sp. nov., 66 – *C. feryi* sp. nov., 67 – *C. hendrichi* sp. nov., 68 – *C. hiostius* (Gené), 69 – *C. kyliesi* sp. nov., 70 – *C. laevipennis* (Mulsant et Godart), sp. restit., 71 – *C. matutinalis* (Baudi di Selve), 72 – *C. momus* (Olivier).



Figs 73–81. Female pronotum in dorsal aspect (schematically). 73 – *Chelotrupes algarvicus* sp. nov., 74 – *C. brancoi* sp. nov., 75 – *C. feryi* sp. nov., 76 – *C. hendrichi* sp. nov., 77 – *C. hiostius* (Gené), 78 – *C. kyliesi* sp. nov., 79 – *C. laevipennis* (Mulsant et Godart), sp. restit., 80 – *C. matutinalis* (Baudi di Selve), 81 – *C. momus* (Olivier).

Labrique 2009, pers. comm.). Only several few types have been saved by R. Paulian and deposited in MNHN, but unfortunately no geotrupid material was among them (Paulian 1944). Additionally, we have not found any syntypes of the taxon in Godart’s collection (MNHN). As no original material of *Ceratophyus laevipennis* exists we here designate a neotype from specimens collected in Spain (Cádiz distr., N of Sanlucar de Barrameda, NW of Jerez), that is within the area of its natural distribution, to clarify the taxonomic status of the species and for nomenclatural stability according to the Article 75.3 of the Code (ICZN 1999). We consider this taxon a good species.

Deyrolle (1869: 10) published a brief diagnosis of the species *Geotrupes andalusiacus*: “une espèce voisine du *Ceratophyus laevipennis* de M. Mulsant il en diffère particulièrement par ses stries plus nombreuses, bien marquées, par son épistome sans carène ni tubercule et par les éperons des pattes antérieures arqués dès la base”. These diagnostic characters are in terms of today’s concept of little predictive value. Boucomont (1912) and the following authors (e.g., Winkler 1929, Báguena 1967, Baraud 1992, Martín-Piera & López-Colón 2000, Löbl et al. 2006, Dellacasa & Dellacasa 2008) consider the name a synonym to *Chelotrupes momus* (Olivier, 1789). According to Horn & Kahle (1935–1937) Fairmaire’s collection is deposited in MNHN and several syntypes are also



Figs 82–85. Male habitus in dorsal aspect. 82 – *Chelotrupes algarvicus* sp. nov. (holotype); 83 – *C. brancoi* sp. nov. (holotype); 84 – *C. feryi* sp. nov. (holotype); 85 – *C. hendrichi* sp. nov. (holotype).



Figs 86–89. Male habitus in dorsal aspect. 86 – *Chelotrupes hioštius* (Gené), Italy: Sardinia: Marina di Arbus (body length: 23 mm); 87 – *C. kyliei* sp. nov. (holotype); 88 – *C. laevipennis* (Mulsant et Godart), sp. restit. (neotype); 89 – *C. matutinalis* (Baudi di Selve), Italy: Sardinia: Costa Verde, Marina di Arbus (body length 20 mm).

stored in IRSB and in RMNH. However, in MNHN we have not found any specimen of original material of this taxon, A. Drumont (2009, pers. comm.) has confirmed us that type material is not preserved in IRSB and J. Krikken (2011, pers. comm) told us that in RMNH is no type specimen of this taxon, too. As no original material of *Geotrupes andalusiacus* exists we here designate a neotype from specimens collected in Spain (Cádiz distr., N of Sanlucar de Barrameda, NW of Jerez), that is within the area of its natural distribution, to clarify the taxonomic status of the species and for nomenclatural stability according to the Article 75.3 of the Code (ICZN 1999).



Based on the above facts we consider *Geotrupes andalusiacus* Deyrolle, 1869 a junior synonym of *Ceratophyus laevipennis* Mulsant et Godart, 1855.

***Chelotrupes matutinalis* (Baudi di Selve, 1870)**

(Figs 8, 17, 26, 49–51, 62, 71, 80, 89, 98, 107)

*Geotrupes (Minotaurus) matutinalis* Baudi di Selve, 1870: 70; description.

*Geotrupes matutinalis*: Bargagli (1872: 283); list.

*Geotrupes (Typhoeus) matutinalis*: Reitter (1891: 184); list.

*Thorectes (Chelotrupes) matutinalis*: Jakobson (1892: 256); list.

*Ceratophyus (Typhoeus) Hiostius* v. *matutinalis*: Reitter (1906: 725); list.

*Typhoeus (Chelotrupes) Hiostius* v. *matutinalis*: Luigioni (1929: 390); list.

*Ceratophyus (Chelotrupes) Hiostius* a. *matutinalis*: Porta (1932: 401); key.

*Typhoeus hiostius* ab. *matutinalis*: Baraud (1992: 49); diagnosis, key.

*Chelotrupes matutinalis*: Dellacasa & Dellacasa (2008: 634); revision, key.

TYPE LOCALITY. “Cantoniera di Monte Santo, Bonnanaro [Sassari, Sardinia]” (Dellacasa & Dellacasa 2008).

TYPE MATERIAL (not studied). **Italy (Sardinia)**: Lectotype (male) and paralectotype (female), labelled: “1 / 35 [p, yellow label] // Sard[inia] / (Monte Santo, / Bonnanaro vic. / colline interne) [p, white label] // *Geotrupes / matutinalis* / Baudi, 1870 / LECTOTYPUS / Des. Dellacasa, 2005 [p, red label]”, in MSNT (Dellacasa & Dellacasa 2008).

ADDITIONAL MATERIAL EXAMINED (244 specimens). **Italy (Sardinia)**: SW Sardinia (Italy), W of Guspini Costa Verde, Marina de Arbus, 15.IV.2007, O. Hillert lgt., 15/21 in OHCB; 6.IV.2007 H. Kalz lgt., Marina de Arbus, Costa Verde Marina de Arbus, Sardinien Italien, 10/16 in HKCS; S Sardinia (Italy), S of Guspini 25 km SW, of Cantoniera Bidderdi, 15.IV.2007 O. Hillert leg., 20/14 [fragmental] 4/1 in OHCB, 2/2 in DKCP; 15.IV.2007 H. Kalz lgt., Umg. Cantoinera 25 km SW Guspini, Sardinien Italien, 21/11 in HKCS; S Sardinia Italy, S of Iglesias, Bacu Abis, 15.IV.2007. O. Hillert lgt, 0/8 in OHCB; 15.IV.2007 H. Kalz lgt., Bacu Abis, SSW Iglesias, Sardinien Italien, 1/5 in HKCS; Costa Verde, Sardinien, 1.-15.4.[20]06, Dr. K. Handke lgt., 0/1 in LSCN; Sardinia, Prov. OR, Monte Ferru, 8 km S Cuglieri, Totfund, 500 NN,



Fig. 90. Male habitus in dorsal aspect of *Chelotrupes momus* (Olivier), Spain: Andalucía: Algeciras env., NW of Tarifa (body length 22 mm).



91



92



93

Figs 91–93. Male habitus in dorsolateral aspect. 91 – *Chelotrupes algarvicus* sp. nov. (holotype); 92 – *C. brancoi* sp. nov. (holotype); 93 – *C. feryi* sp. nov. (holotype).

21.05.1992, Schaffrath lgt., 1/1 in OHCB; Sardegna, A. Dodero [19]18, 0/1 in HNHM; Sardinia, Limbara, 20.V.[18]91, 1/1 in ZMHB; Uras, Aprite 1891, 1/0 in NHMW; Sardegna, Linibara, 27. V. [18]90, 1/1 in ZMHB; Sardinia, Sicora, 1887, 0/3 in NHMW; Sardinia, Sengte, 1/0 in ZMHB; Sardinien, 2/1 in ZMHB; Sardinia, U. Lostia, 2/0 in ZMHB; Capo Caccia, Sardi., 0/1, in ZMHB; Sardegna, Alghero, X/, 9/5, in ZMHB; Sardinia, 4/1, in DEIC; St[?]in, Castelnuovo, 1/0 in DEIC; Sard., 3/0 in DEIC, 0/2 in NHMW; matutinalis, Sard. Kra. Berlin, coll Kraatz, 1/0 in DEIC; matutinalis, Sard. Baudi 70, 1/0 in DEIC; Sardinia, Ke[?]thal, 0/1 in DEIC; matutinalis, Sardin., Dieck, 1/0 in DEIC; Sardinia, Spinola, 0/1 in DEIC; Sardinia, coll. E. Friv., 1/1 in HNHM; Sardinien, 1/0 in HNHM; Tempio, Sard., A. Dodero, 2/0 in HNHM; Sardinien, Merkel, 1/0 in HNHM, 0/1 in NHMW; Ferra, Sardin., 1/0 [fragment]i n HNHM; Sardinia, 3/0 in HNHM, 0/1 in NMPC, 2/1 in NMPC, 2/0 in NHMW; Sardin., 4/4 in ZMHB, 0/1 in NMPC; U. Lostia, Sardinia, 2/0 in ZMHB; Capo Caccia, Sard., A. Dodero, 0/1 in ZMHB; Sardegna, Senegte, 1/0 in ZMHB; Sardin, Reymond, 1/3 in ZMHB; Sardinien,

Kiesw., 1/0 in ZMHB; Sard., 0/1 in ZMHB, 2/0 in NHMW; Sardinie, 0/1 in NMPC; Sardinia, Gonnesa, 1/0 in NHMW. **Patria dubia.** Laticollis, Alp. Mar. [= Alpes Maritimes] Bol., 1/0 in DEIC; Cypem, 0/1 in DEIC; Sicilia, 0/1 in NMPC; Cadiz, 1/0 in NHMW.

DESCRIPTION. Body length 13.0–21.0 mm; moderately convex, dorsal surface black, alutaceous, with weak dark cupreous tinge (Figs 89, 98).

Maximum (hyperthelic) male with well developed pronotal horns. Head (Figs 89, 98). Clypeus broadly rounded, nearly semicircular, sides weakly arcuate and shallowly s-shaped; posterior angles of clypeal margin vaguely elevated; tubercle weakly elevate, prolonged, punctation of clypeal disc simple, distinct, punctures separated by approximately their diameter; oblique keels above



Figs 94–96. Male habitus in dorsolateral aspect. 94 – *Chelotrupes hendrichi* sp. nov. (holotype); 95 – *C. hiostius* (Gené), Italy: Sardinia: Marina di Arbus (body length 23 mm); 96 – *C. kyliesi* sp. nov. (holotype).



Figs 97–99. Male habitus in dorsolateral aspect. 97 – *Chelotrupes laevipennis* (Mulsant et Godart), sp. restit. (neotype); 98 – *C. matutinalis* (Baudi di Selve), Italy: Sardinia: Costa verde, Marina di Arbus (body length 20 mm); 99 – *C. momus* (Olivier), Spain: Andalucía: Algeciras env., NW of Tarifa (body length 22 mm).

eyes confluent with clypeal margin almost on clypeal margin elevation, reaching approximately to half of eyes. Punctuation of front sparse, on vertex almost impunctate to impunctate; frontoclypeal suture absent; occiput impunctate.

Eyes weakly developed, lenticular, distinctly separated from eye canthus; canthus remarkably robust in lateral aspect; intersection between eye canthus and genae extending eyes (Fig. 8).

Pronotum (Figs 17, 26) weakly transverse, broadest just in anterior third, entirely bordered. Lateral margin not crenulated; marginal carina not elevated and not widened; anterior angles confluent with lateral pronotal hornlike apophyses. Lateral fovea distinctly impressed, sparsely, finely punctate; longitudinal midline present. Pronotal punctuation very fine on lateral margin, lat-

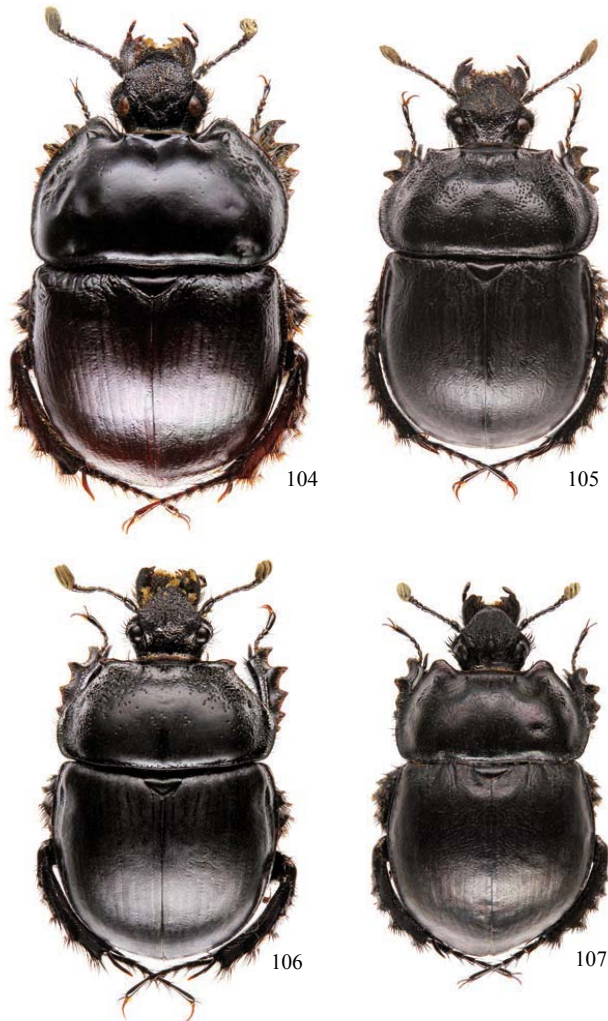
eral fovea and base of hornlike apophyses. Lateral hornlike apophyses well developed, distinctly bent inwardly; interior surface coarsely granulate from apex to basal third, interior longitudinal keel weak, exhibited from apex to base on upper line of apophysis; surface laterally impunctate and keel-like sculptured from apex to middle; maximum length of apophyses reaching to apex of mandibles; subapical tooth absent. Surface weakly, regularly bent from apex to base in lateral aspect. Medial pronotal apophysis weakly developed, subacute, based anteriorly in lateral view.

Scutellum plate semicircular, impunctate, shiny.



Figs 100–103. Female habitus in dorsal aspect. 100 – *Chelotrupes algarvicus* sp. nov. (holotype); 101 – *C. brancoi* sp. nov. (holotype); 102 – *C. feryi* sp. nov. (holotype); 103 – *C. hendrichi* sp. nov. (holotype).





Figs 104–107. Female habitus in dorsal aspect. 104 – *Chelotrupes hiostius* (Gené), Italy: Sardinia: Marina di Arbus (body length 21 mm); 105 – *C. kyliesi* sp. nov. (holotype); 106 – *C. laevipennis* (Mulsant et Godart), sp. valida (neotype); 107 – *C. matutinalis* (Baudi di Selve), Italy: Sardinia: Costa Verde, Marina di Arbus (body length 17 mm).

Elytra combined approximately as long as wide, surface alutaceous; between suture and humerus 9 complete striae, all striae vaguely impressed; intervals flat, impunctate; humeral umbone distinct, humeral callus implied (Figs 89, 98).

Micropterous, metathoracic wings narrow.

Aedeagus. Parameres as in Figs 49–51.

VARIABILITY IN MALES. Pronotal hornlike apophyses in medium developed and underdeveloped (hypothelic) specimens short, more or less straight with only indicated longitudinal keels and subapical teeth or without them at all, simply rounded to almost acute apically.

FEMALE (Fig. 107). Body length 15.0–21.0 mm. Clypeus broadly rounded, sides weakly s-shaped, densely, coarsely punctate, fronts densely, distinctly rugo-punctate, vertex simply sparsely punctate, occiput impunctate; tubercle prominent, simply rounded; oblique keels above eyes distinct, reaching to half of eyes (Fig. 62); eyes weakly developed, lenticular, distinctly separated from eye canthus, genae distinctly protruding (Fig. 71). Pronotum weakly transverse, medial furrow present, anterior margin almost straight, lateral margin not widened, broadest just in anterior half, anterior angles projecting anterad, broadly rounded, surface satin glossy, distinctly punctate, except of discal area, lateral apophyses weakly prominent (Fig. 80). Surface of elytra considerably alutaceous, humeral callus absent (Fig. 107).

DIFFERENTIAL DIAGNOSIS. Refer to the species key below.

DISTRIBUTION. Italy, endemic to Sardinia.

COLLECTING CIRCUMSTANCES. Prefers sandy soils in stony areas.

### *Chelotrupes momus* (Olivier, 1789)

(Figs 9, 18, 27, 52–54, 63, 72, 81, 90, 99, 108, 111, 118)

*Scarabaeus momus* Olivier, 1789: 60; description.

*Scarabaeus Momus* Fabricius, 1792: 13; description.

*Geotrupes momus*: Gené (1836: 27); diagnosis.

*Ceratophyus momus*: Sturm (1843: 113); list.

*Minotaurus momus*: Mulsant & Godart (1855: 4); diagnosis.

*Geotrupes (Minotaurus) momus*: Marseul (1863: 122); list.

*Geotrupes (Chelotrupes) Momus*: Jekel (1866: 550); monograph, key.

*Geotrupes (Typhoeus) momus*: Reitter (1891: 184); list.

*Thorectes (Chelotrupes) momus*: Jakobson (1892: 256); list.

*Ceratophyus (Minotaurus) Momus*: Reitter (1893: 8); diagnosis, key.

*Ceratophyus (Minotaurus) Momus* var. *momoides* Reitter, 1893: 8; description; type locality: “Südspanien”.

*Ceratophyus (Typhoeus) Momus*: Reitter (1906: 725); list.

*Ceratophyus (Typhoeus) Momus* v. *momoides*: Reitter (1906: 725); list.

*Typhoeus (Chelotrupes) momus*: Boucomont (1912: 22); list.

*Typhoeus (Chelotrupes) Momus*: Winkler (1929: 1036); list.

*Typhoeus momus*: Baraud (1992: 49); diagnosis, key.

*Typhaeus (Chelotrupes) momus*: López-Colón (2003:140); list.

*Chelotrupes momus*: Dellacasa & Dellacasa (2008: 637); diagnosis, key.

TYPE LOCALITY. “Afr. Aequin. [= Africa aequinoctialis]”, for details and comments see Dellacasa & Dellacasa (2008).

TYPE MATERIAL (not studied). *Scarabaeus momus* Olivier, 1789. Lectotype (male) and paralectotype (female), labelled: “*Geotrupes momus* / C. Olivier / Afr. Aequin. [hw, blue label] // *Geotrupes momus* / Olivier, 1789 / LECTOTYPUS / Des. Dellacasa 2005 [p, red label]”, in MNHN (Dellacasa & Dellacasa 2008).

TYPE MATERIAL EXAMINED (2 specimen). *Scarabaeus momus* Fabricius, 1792. Lectotype (male), here designated, labelled: “Hab. in India. [p] / capucinus [hw, black ink] / Momus [probably Fabricius’s hand, black ink] // Putative SYNTYPE / *Scarabaeus momus* / Fabricius, 1792 / Ent. Syst. 1: 13 / Teste D. J. Mann, viii.2006 [p]”, in OXUM; number of syntypes unknown. *Ceratophyus momus* var. *momoides*. Spain (Andalucía: Cádiz). Neotype (male), here designated, labelled: “Spain, Cádiz distr. / Tarifa vill.env. / 36°00.494 N 05°35.322 E / 26.ii.2009, David Král lgt.”, in MNHN.

ADDITIONAL MATERIAL EXAMINED (469 specimens). Spain (Andalucía: Cádiz). Spain, (Andalusia), NW of Tarifa, Algeciras env., 25.02.2011, O. Hillert lgt., 40/42 in OHCB; Spain, (Andalusia), N of Los Barrios, Algeciras env., Sierra de Nino, 26.02.2009, O. Hillert lgt., 2/2 in OHCB; Spain, Cádiz distr., Los Barrios vill.env., 36°13.311 N 05°34.583 E, 26.ii.2009, Jan Schneider lgt., 7/1 in JSCP, 1/1 in SJCP; same data but David Král lgt., 2/2 in DKCP; Spain, (Andalusia), NW of Tarifa, Algeciras env., 25.02.2009, O. Hillert lgt., 7/13 in OHCB; Spain, Cádiz distr., Tarifa vill.env., 36°00.494 N 05°35.322

E, 26.ii.2009, Jan Schneider lgt., 9/10 in JSCP, 3/3 in SJCP; same data but David Král lgt., 2/9 in DKCP; Spain, Prov. Cadiz, Facinas env., 17.1.2009, lgt. Kylies, 2/1 in PKCS; Spain, Andalusia, Sierra de Nino, 10 km N of Barrios, Algeciras env., 05.III.2008, O. Hillert lgt., 14/20 in OHCB; Spain, Andalusia, Tarifa, 04.III.2008, O. Hillert lgt., 3/3 in OHCB; 1/1 in ERCS; Spain, Facinas-Algeciras, 14.II.2008, Klícha Jiří, 1/4 in JKCP; Spain, 5 km E of Facinas, 12.2.2008, 1/2 in PKCS, 1/1 in VTCZ; Spain, Sierra de Fates, Facinas, 3.-14.2.2007, lgt. P.Kylies, 4/1 in PKCS; Cádiz (España), Tarifa, Montehumada, 12.10.2007, 1/0 in AWCN, 1/0 in JSCP; Spain, FACINAS, 14.II.2007, KLÍCHA Jiří, 2/4 in JKCP; Spain, Andalusia, Sierra del Nino 600m, lake Embalse de Almodovar, 16.2.2006, lgt. P. Kylies, 3/2 in PKCS; Spain, Andalusia, Facinas env. 10 km Sierra de Fates, 16.2.2006, Jaroslav Žák lgt., 8/12 in JZCJ; Spain mer., Andalusia, Facinas env. E 10 km, Sierra del Nino, lgt. Pavel Jáchymek, 16.II.2006, 4/6 in PJCB; Spanien, Andalusien, Prov. Malaga, Allhaurin, 31.03.1998, Bellmann lgt., 1/0 in ABCB; Spanien, Andalusien, Prov. Malaga, Castillar, 30.03.1998, Bellmann lgt., 0/1 in JECB; Spanien, Andalusien, Prov. Cadiz, Vejer de la Frontera, 30.03.1998, Bellmann lgt., 0/2 in ABCB. Spanien (Andalusien), Sierra de Fates, bei Tarifa, 12.03.1998, O. Hillert lgt., 0/1 in ERCS; Spanien (Andalusien), Tarifa bei Algeciras, 12.03.1998, O. Hillert lgt., 6/5 in OHCB, 1/1 in HKCS, 1/0 in ERCS; Spanien (Andalusien), Vejer, (Cadiz – Algeciras), 06.03.1998, O. Hillert lgt., 1/4 in OHCB; Spanien (Andalusien), Sierra de Fates, bei Tarifa, 05.03.1998, O. Hillert lgt., 1/0 in OHCB; Spain (Cadiz), Chiclana de la Frontera, Cortijo de la Mesa, (5 km E Chiclana), 30.01.1998, Wrase lgt., 1/0 in OHCB; Spain, Cádiz, Chiclana, Carnila, 10/2/[19]95, 1/1 in VMCP; Spain, Algericas, 21.4.1993, lgt. Janata M., 1/0 in JZCB; E / Andalusia / Cadiz, Los Barrios u. Umg., Südhang, 6.3.1986, L. Hendrich lgt., 1/0 in OHCB; Spanien, Andalusien, Sierra de Fates 200m, Facinas, 22.-23.02.1985, Hendrich/Herzig lgt., 1/0 in HFCB; Espania, Malaga, Toremolinos, 1985.XII.4. Miguel Sala lgt., 3/0 in HNHM; Spanien / Andalusien, Sierra de Fates 200 m, Fascinas 22.-23.02.1985, Hendrich / Herzig lgt., 2/2 in OHCB; Spain, Andalusia, Malaga, 20.1.85, Toremolinos, M. Soler lgt., 1/1 in VMCP; Facinas bei Algeciras, 31.12.[19]83, 0/2 in HFCB; Cadiz, 1.1.[19]84, 0/1 in HFCB; Cadiz, Vejer d. l. Front., 31.12.[19]83, Fery lgt., 2/0 in HFCB; Espagne, (Cadiz), Vejer, 27.XII.[19]73, J. Baraud lgt., 1/0 in MNHN; Spanien, Cadiz, 14.3.1906, 0/1 in NMPC; Tarifa, März, 1900, 1/0 in HNHM, 1/0 in DEIC; Tarifa, Süds Spanien, Prof. G. Strobl, 1/0 in NHMW; Chiclana, Andalusien, 1890 Korb, 2/1 in ZMHB, 1/1 in HNHM; 4/3 in NHMW; Chiclana, Korb, [18]90, 2/1 in NHMW; Spanien, Cadis, Algeciras, 1/0 in NMPC; Algeciras, 3/0 in DEIC, 2/0 in HNHM, 0/1 in ZMHB; 1/0 in NHMW; Algeciras, G. Schramm, 1/1 in ZMHB, 1/3 in NMPC; Algeciras, 1/0 in SMTD; Algeciras, Hispania, D. Flach, 0/1 in NHMW; **Spain (Andalucía)**. Andalusien, 1/0 in DEIC; Andalusien, Rolph, 1/0 in ZMHB; Andalusia, 2/0 in HNHM, 0/2 in DEIC, 1/1 in SMTD; 1/1 in ZMHB; Andalusien, 0/1 in NHMW; andal., 1/0 in NHMW; Andalus, 1/1 in ZMHB; 1/0 in DEIC; Andalus., Rosh., 1/1 in ZMHB; Rtt., Algeciras, 17/4, Strobl., 1/0 in NHMW; Cadix, 1/1 in ZMHB; Espagne, 1/0 in NMPCB; Hispan., 1/1 in SMTD; Hispania, 0/1 in HNHM, 1/2 in NMPC, 1/2 in NMPCB; 1/0 in NHMW; 1/1 in VMCP; Hi., 1/0 in NHMW; Hisp. 0/1 in NHMW; 1/1 in ZMHB; Hispania, 1/0 in NHMW; Hispania, Andalusia, 0/3 in NHMW; Hispan., 1/0 in ZMHB; Spanien,



108

Fig. 108. Female habitus in dorsal aspect of *Chelotrupes momus* (Olivier), Spain: Andalucía: Algeciras env., NW of Tarifa (body length 21 mm).



11/2 in SMTD; 0/1 in NMPC; Süd Spanien, 1/0 in HHNM; 1/0 in DEIC; 0/1 in VMCP; Spain, 1/0 in HHNM; Spia, 1/0 in DEIC; S. Spanien, 2/3 in NMPC; Süd-Spanien, Simon, 1/0 in NHMW; Spanien, Strobl., 0/3 in NHMW. **Patria dubia.** Monchique, A 1 4 [18]79, 1/0 in SMTD; Syria, Dr. Rosenhr., 1/0 in ZMHB; Monchiques, 0/1 in SMTD; Portugal, 1/1 in DEIC, 1/0 in NMPC; Portugal, Kirsch, 1/1 in SMTD; Algier 0/1 in DEIC; Leon, Foncebadon – 1400m, 8.1978, Lassalle lgt., 1/0 in RCCP; Lusit., coll. E. Friv., 0/1 in HHNM; Lusitan, Andalus, Ramb, 3/3 in ZMHB; Lusitanien, 0/1 in NMPC; Lusitania, 1/0 in DEIC; Lusit., coll. E. Friv., 1/0 in HHNM.

**DESCRIPTION.** Body length 10.0–23.0 mm; strongly convex, dorsal surface black, shiny (Figs 90, 99). Maximum (hyperthelic) male with well developed pronotal horns. Head (Figs 90, 99). Clypeus broadly rounded, sides s-shaped, distinctly arcuate; posterior angles of clypeal margin weakly elevated; tubercle weakly keel-like prolonged, punctuation of clypeal disc fine, simple, sparse; oblique keels above eyes confluent with clypeal margin elevation, reaching to half of eyes; punctuation of front and vertex sparse; frontoclypeal suture absent; occiput impunctate. Eyes moderately developed weakly elliptic; canthus fine, straight in lateral aspect; intersection between eye canthus and genae not extending eyes (Fig. 9).

Pronotum (Figs 18, 27) transverse; broadest just in anterior third, entirely bordered. Lateral margin rounded, marginal carina not crenulated, weakly widened, weakly elevated; anterior angles not confluent with lateral pronotal hornlike apophyses. Lateral fovea distinctly impressed, distinctly punctate; longitudinal midline missing. Pronotal punctuation distinct on lateral margin, lateral fovea and base of hornlike apophyses. Lateral hornlike apophyses well developed; interior surface coarsely granulate from apex to basal third, interior longitudinal keel remarkably developed from apex to subapical tooth, gradually elevated from apex to area of subapical tooth; lateral surface impunctate; maximum length of apophyses more than mandibles; subapical tooth distinctly exhibited, pointed near middle of apophyses dorsally. Surface keel-like sculptured and regularly declivous from apex to subapical tooth and straight to base of apophysis. Medial pronotal apophyses weakly developed, weakly pointed, with base anteriorly in lateral view.

Scutellum plate broadly triangular, impunctate, shiny.

Elytra combined approximately as long as wide, surface shiny; between suture and humerus 8 fine complete striae, striae vaguely impresses; intervals flat, impunctate; humeral umbone distinct, humeral callus distinct (Figs 90, 99).

Micropterous, metathoracic wings narrow.

Aedeagus. Parameres as in Figs 52–54.

**VARIABILITY IN MALES.** Pronotal hornlike apophyses in medium developed and underdeveloped (hypothelic) specimens short, more or less straight with only indicated longitudinal keels and subapical teeth or without them at all, simply rounded to almost acute apically.

**FEMALE** (Fig. 108). Body length 15.0–22.0 mm. Clypeus rounded, sides s-shaped, densely, distinctly rugo-punctate; frons densely, distinctly rugo-punctate, vertex finely shallowly rugo-punctate, occiput more coarsely punctate; tubercle distinctly prominent, simple; oblique keels above eyes distinct, reaching to half of eyes (Fig. 63); eyes well developed, weakly elliptic, not separated from eye canthus, genae protruding, elevated (Fig. 72). Pronotum transverse, without medial furrow, lateral margin widened, broadest just at anterior third, anterior angles distinctly projecting anterolaterad, rounded, surface shiny, distinct deeply punctate, except of discal area, lateral apophyses prominent, distinctly pointed (Fig. 81). Surface of elytra shiny, humeral callus distinct, visible (Fig. 108).

**DIFFERENTIAL DIAGNOSIS.** Refer to the species key below.

**DISTRIBUTION.** Spain (Andalucía: Cádiz, Málaga) (Fig. 111).

**COLLECTING CIRCUMSTANCES.** Prefers sandy and/or calcareous soils (Fig. 118).

**TAXONOMIC REMARK.** Reitter (1893: 8) described in his monograph “*Bestimmungs-Tabelle der Lucaniden und coprophagen Lamellicornen des palaearktischen Faunengebietes*” *Ceratophyus*

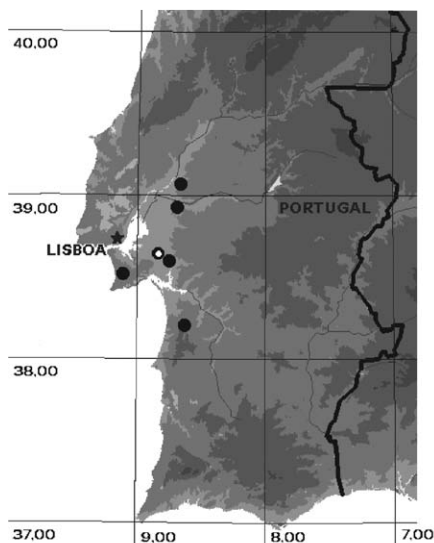


Fig. 109. Sketch map of central and southern Portugal with known distribution of *Chelotrupes brancoi* sp. nov. – circles, empty circle – type locality.

*Momus* var. *momoides* from “Südspanien” based mainly on length and direction of pronotal horns. These diagnostic characters are in terms of today’s concept of little predictive value. Boucomont (1912) and the following authors (e.g., Winkler 1929, Báguena 1967, Baraud 1992, Martín-Piera & López-Colón 2000, Löbl et al. 2006, Dellacasa & Dellacasa 2008) consider the taxon only a synonym to *Chelotrupes momus* (Olivier, 1789). According to Horn & Kahle (1935–1937), Reitter’s types are deposited predominantly in HNHM, MNHN and ZMAS. We have not found any syntype of this taxon in these three collections. As no original material of *Ceratophyus momus* var. *momoides* exists, we here designate a neotype from specimens collected in Spain (Cádiz distr. Tarifa vill.env.), that is within the area of its natural distribution, to clarify the taxonomic status of the species and for nomenclatural stability according to the Article 75.3 of the Code (ICZN 1999). We consider *Ceratophyus momus* var. *momoides* Reitter, 1893 a junior synonym of *Chelotrupes momus* (Olivier, 1789).

### Identification key to the *Chelotrupes* species

- A (B) Pronotum with three more or less prominent hornlike apophyses anteriorly (Figs 10–18, 82–99). ..... males  
 B (A) Pronotum with transversal carina anteriorly (Figs 73–81, 100–108). ..... females

**Males** (single small specimens with relatively less or almost obsolete pronotum hornlike apophyses can be clearly identified using shape of parameres only).

- 1 (4) Subapical tooth of lateral pronotal hornlike apophyses absent; lateral margin of pronotum confluent with base of lateral apophyses in lateral aspect (Figs 14, 17, 23, 26, 86, 89, 95, 98); medial furrow of pronotum weakly impressed (Figs 14, 17, 86, 89); eyes small, lenticular, distinctly separated from eye canthus in dorsal aspect (Figs 5, 8); species from Sardinia.  
 2 (3) Marginal carina of pronotum crenulate from posterior angles to base of lateral hornlike apophyses, consisting of single points; lateral pronotal hornlike apophyses ventrally impunctate; medial apophysis well developed (Figs

- 14, 23, 86, 95); clypeus strongly and densely rugo-punctate, tubercle present, shallowly but obviously keel-like shaped, reaching to half of clypeal disc; elytron surface silky, punctures near apex coarse; between suture and humeral umbone 9 striae; body surface with metallic lustre (Figs 86, 95); larger in size (18.0–25.0 mm); parameres as in Figs 40–42; Italy (Sardinia). ..... *C. hioctius* (Gené)
- 3 (2) Pronotum marginal carina sharp-edged, separate points between posterior angles and base of lateral hornlike apophyses not visible; lateral hornlike apophyses ventrally distinct punctate; medial apophyses weakly developed (Figs 17, 26, 89, 98); clypeus with distinct and noticeable distanced punctures, single points visible; tubercle nearly absent; keel between tubercle and anterior clypeal margin shallowly increase; elytron surface alutaceous, punctures near apex as well as the rest of elytra, between suture and humeral umbone 8 striae; body surface black or weakly dark cupreous (Figs 89, 98); smaller in size (15.0–21.0 mm); parameres as in Figs 49–51; Italy (Sardinia). ..... *C. matutinalis* (Baudi di Selve)
- 4 (1) Subapical tooth of lateral pronotum hornlike apophyses present; base separated from lateral margin of pronotum in lateral aspect (Figs 10–13, 15, 16, 18, 19–22, 24, 25, 27, 82–85, 87, 88, 90–94, 96, 97, 99) medial furrow of pronotum absent or subobsolete (Figs 10–13, 15, 16, 18, 82–85, 87, 88, 90); eyes large, approximately circular, reaching almost to eye canthus (Figs 1–4, 6, 7, 9); species from the Iberian peninsula.
- 5 (11) Dorsal surface alutaceous, especially elytra; lateral margin of pronotum considerably widened and elevate (Figs 83, 84, 87, 88, 92, 93, 96, 97); species relatively smaller in size (maximally 18.5–19.5 mm).
- 6 (7) Subapical tooth of lateral pronotal hornlike apophyses situated approximately in middle of its length; lateral apophyses apically and posteriorly of subapical tooth distinctly broadly emarginate in lateral aspect (Figs 15, 24, 87, 96); internal keel-like broadening of lateral apophyses situated in anterior third in dorsal aspect (Figs 15, 24); parameres as in Figs 43–45; Spain (Andalucía: Huelva, Sevilla). ..... *C. kyliesi* sp. nov.
- 7 (6) Subapical tooth of lateral pronotal hornlike apophyses situated approximately in anterior third of its length; lateral apophyses differently shaped in lateral aspect, without distinct broadening internally (Figs 11, 12, 16, 20, 21, 25, 83, 84, 88, 92, 93, 97).
- 8 (9, 10) Lateral pronotal hornlike apophyses straight, remarkably thin, filiform, approximately circular in cross-section, longer than mandibles in dorsal aspect (except of allometric forms), subapical tooth distinct, situated in anterior quarter (Figs 11, 20, 83, 92); parameres as in Figs 31–33; Portugal (Santarém, Setúbal). .... *C. brancoi* sp. nov.
- 9 (8, 10) Lateral hornlike apophyses of pronotum shorter than mandibles in dorsal aspect (also in maximum developed specimens), shape of hornlike apophysis in cross-section distinct oval in basal part; subapical tooth situated in

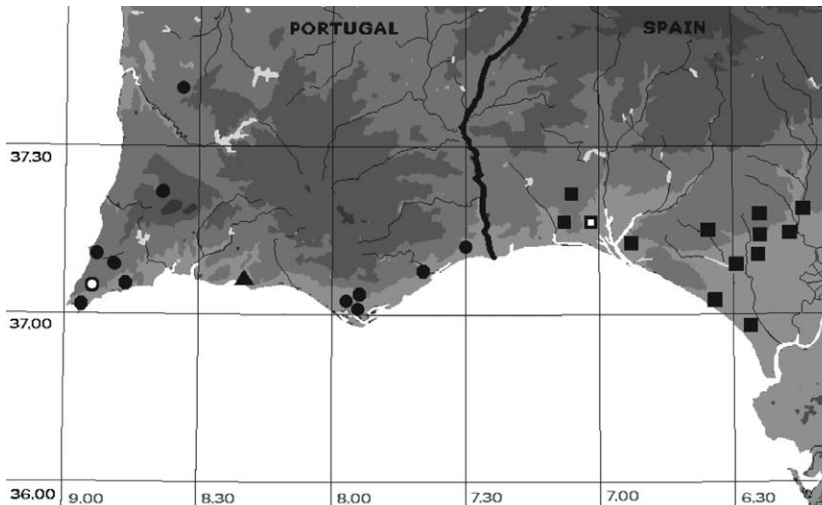


Fig. 110. Sketch map of southern Portugal and southwestern parts of Andalucía with known distribution of *Chelotrupes algarvicus* sp. nov. – circles, empty circle – type locality), *C. feryi* sp. nov. – triangle (presenting also type locality) and *C. kyliesi* sp. nov. – quadrates, empty quadrate – type locality.

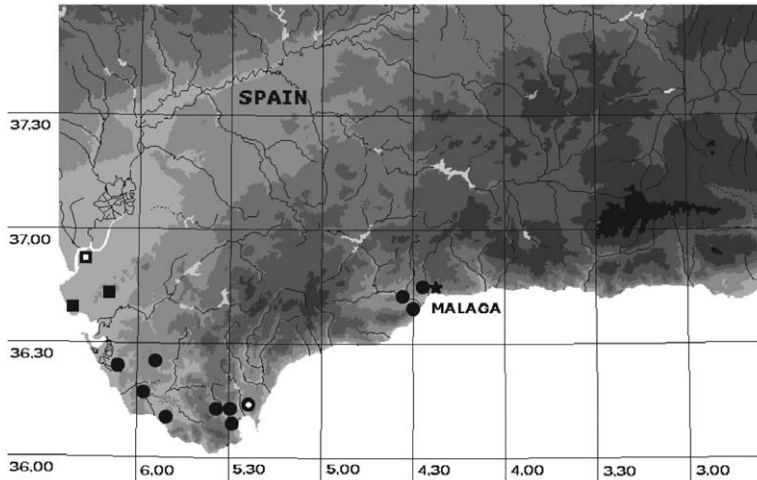


Fig. 111. Sketch map of central and eastern parts of Andalucía with known distribution of *Chelotrupes hendrichi* sp. nov. – empty circle (presenting type locality), *C. laevipennis* (Mulsant et Godart), sp. restit. – quadrates, empty quadrate – type locality and *C. momus* (Olivier) – circles.

- anterior quarter, complanated; area between base and subapical tooth elevated in similar level of subapical tooth, upper edge keel-like (Figs 12, 21, 84, 93); parameres as in Figs 34–36; Portugal (Faro). ..... *C. feryi* sp. nov.
- 10 (8, 9) Lateral hornlike apophyses of pronotum maximal length to end of mandibles or more, subapical tooth in front quarter, complanated; area between subapical tooth and base in cross-section more or less round, upper edge not keel-like (Figs 16, 25, 88, 97); parameres as in Figs 46–48; Spain (Andalucía: Cádiz). ..... *C. laevipennis* (Mulsant et Godart)
- 11 (5) Dorsal surface shiny, pronotum and elytra similarly; lateral margin of pronotum only very weakly widened (except of allometric specimens of *C. momus*) (Figs 82, 85, 90, 91, 94, 99); species relatively larger in size (maximally 22.0–23.0 mm). ..... *C. laevipennis* (Mulsant et Godart)
- 12 (13) Subapical tooth of hornlike apophyses situated approximately at half in dorsal aspect; hornlike apophyses keel-like broadened inwardly in anterior third. Lateral pronotal hornlike apophyses straight, longer than mandibles (except of allometric forms), strongly broadened inwardly in anterior third in dorsal aspect; subapical tooth situated in middle of apophyses in dorsal aspect (Figs 18, 27, 90, 99); medial apophysis developed; parameres as in Figs 52–54; Spain (Andalucía: Cádiz, Málaga). ..... *C. momus* (Olivier)
- 13 (12) Subapical tooth of hornlike apophyses situated approximately in anterior quarter in dorsal aspect; hornlike apophysis not keel-like broadened inwardly (Figs 10, 13, 19, 22, 82, 85, 91, 94).
- 14 (15) Lateral hornlike apophyses of pronotum weakly convergent, broadened and coarsely granulate internally from subapical tooth to approximately half of lateral apophyses, subapical tooth robust near apex, more thin at middle of lateral apophyses, in lateral aspect (Figs 10, 19, 82, 91); medial apophysis well developed; parameres as in Figs 28–30; Portugal (Beja, Faro). ..... *C. algarvicus* sp. nov.
- 15 (14) Lateral hornlike apophyses of straight, weakly confluent, keel-like broadened and coarsely granulate from subapical tooth to basal third inwardly, subapical tooth weakly developed near apex, becoming more robust based, with accretion of basal tooth in lateral aspect (Figs 13, 22, 85, 94); medial apophysis weakly developed; parameres as in Figs 37–39; Spain (Andalucía: Cádiz). ..... *C. hendrichi* sp. nov.

#### Females

- 1 (4) Anterior margin of pronotum distinctly emarginate, anterior angles broadly rounded reaching to middle of eye, lateral margin not widened (Figs 77, 80, 104, 107); eyes weakly developed, elliptic, distinctly separated from eye canthus (Figs 68, 71); medial furrow of pronotum present (Figs 104, 107); species from Sardinia.



Figs 112, 113. Habitats. 112 – habitat of *Chelotrupes algarvicus* sp. nov., Portugal: Faro distr., Carrapateira vill. env., February 2009 (photo by JS). 113 – habitat of *Chelotrupes brancoi* sp. nov., Portugal: Setúbal distr., Poceirão vill. env., March 2009 (photo by JS).





Figs 114, 115. Type localities. 114 – type locality of *Chelotrupes feryi* sp. nov., Portugal: Faro distr., W of Albufeira, Armação De Pêra env., February 2011 (photo by OH). 115 – type locality of *Chelotrupes hendrichi* sp. nov., Spain, Andalucía: Cádiz distr., San Roque vill. env., March 2009 (photo by JS).



Figs 116, 117. Type localities. 116 – type locality of *Chelotrupes kyliei* sp. nov., Spain, Andalucía: Huelva distr., Aljaraque vill env., February, 2009 (photo by JS). 117 – type locality of *Chelotrupes laevipennis* (Mulsant et Godart), sp. restit., Spain, Andalucía: Cádiz distr., NW of Jerez, N of Sanlucar de Barrameda, February 1998 (photo by OH).



- 2 (3) Pronotum not transversal, broadest just anteriorly of middle (Fig. 77, 104), lateral margin crenulate; clypeus tubercle simple, vertex coarsely punctate (Figs 59, 104); elytron surface alutaceous, punctures near apex coarser; area between suture and humerus with ten distinctly impressed striae (Fig. 104); Italy (Sardinia). ..... *C. hiostius* (Gené)
- 3 (2) Pronotum distinctly transverse, broadest in middle (Figs 80, 107), lateral margin not crenulate; clypeus tubercle keel-like shaped, elongate apicad; vertex finely punctate (Figs 62, 107); elytron surface satin glossy, whole surface with equally fine punctation; area between suture and humerus with nine vaguely impressed or almost vanishing striae (Fig. 107); Italy (Sardinia). ..... *C. matutinalis* (Baudi di Selve)
- 4 (1) Anterior margin of pronotum only weakly emarginate or almost straight, anterior angles more or less protruding anterolaterad, lateral margin widened (Figs 73–76, 78, 79, 91); eyes well developed, weakly elliptic or circular, not separated from eye canthus (Figs 64–67, 69, 70, 72); medial furrow of pronotum absent (Figs 100–103, 105, 106, 108); species from the Iberian peninsula.
- 5 (13) Dorsal surface alutaceous (Figs 101, 102, 105, 106); lateral margin of pronotum distinctly widened (Figs 74, 75, 78, 79, 101, 102, 105, 106).
- 6 (10) Clypeal tubercle subobsolete to entirely absent (Figs 57, 61, 102, 106).
- 8 (9) Pronotum broadest at middle, lateral margins strongly widened and elevate (Figs 79, 106); Spain (Andalucía: Cádiz). ..... *C. laevipennis* (Mulsant et Godart)
- 9 (8) Pronotum broadest just before middle, lateral margins less widened and less elevate (Figs 75, 102); Portugal (Faro). ..... *C. feryi* sp. nov.
- 10 (6) Clypeal tubercle present (Figs 56, 60, 101, 105).
- 11 (12) Pronotum distinctly transverse, lateral margin considerably widened, anterior angles very weakly protruding anterolaterad, anterior margin straight (Figs 74, 101); Portugal (Santarém, Setúbal). ..... *C. brancoi* sp. nov.



Fig. 118. Habitat of *Chelotrupes momus* (Olivier), Spain, Andalucía: Cádiz distr., Tarifa env., February 2009 (photo by JS).



- 12 (11) Pronotum weakly transverse, lateral margin weakly widened, anterior angles weakly protruding anterolaterad, anterior margin weakly emarginate (Figs 78, 105); Spain (Andalucía: Huelva, Sevilla). ..... *C. kyliesi* sp. nov.
- 13 (5) Dorsal surface considerably shiny (100, 103, 108); lateral margin of pronotum less widened (Figs 73, 76, 81, 100, 103, 108).
- 14 (15) Anterior angles of pronotum weakly protruding anterolaterad, rounded (Figs 76, 103); Spain (Andalucía: Cádiz). ..... *C. hendrichi* sp. nov.
- 15 (14) Anterior angles of pronotum distinctly protruding anterolaterad, bent laterad (Figs 73, 81, 100, 108).
- 16 (17) Anterior angles of pronotum weak, bent less laterad (Figs 81, 108); Spain (Andalucía: Cádiz, Málaga). ..... *C. momus* (Olivier)
- 17 (16) Anterior angles of pronotum robust, bent more laterad (Figs 73, 100); Portugal (Beja, Faro). ..... *C. algarvicus* sp. nov.

#### Acknowledgements

We thank to all colleagues and institutions listed in the Material and methods section for enabling us to study the material in their care. Radek Dunda (Újezd u Chcebuži, CZ) and Harald Kalz (Schlabendorf, GE) were excellent companions during our collecting trips to Sardinia, Portugal and Spain. In addition, we are indebted to the following colleagues for their kind cooperation in various matters: Dirk Ahrens (Alexander Koenig Museum, Bonn, GE), Axel Bellmann (Bremen, GE), Aleš Bezděk (Biology Centre ASCR, Institute of Entomology, České Budějovice, CZ), Tristão Branco (Porto, P), Hans Fery (Berlin, GE), Lars Hendrich (München, GE), Jiří Klícha (Praha, CZ), Petr Kyliés (Slaný, CZ), Andreas Reichenbach (Leipzig, GE), Ekehard Rößner (Schwerin, GE) and Jan Růžička (Czech University of Life Sciences in Prague, CZ). Our thanks go also to Stefan Kühne (Berlin, GE) for manufacturing of a special spade for digging dung beetles, especially Geotrupidae and Jiří Bláha (QuatroDesign, Praha, CZ) for graphic assistance. The study was supported by institutional resources of Ministry of Education, Youth and Sports of the Czech Republic for the support of science and research (DK).

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## APPENDIX 1

### Checklist of the genus *Chelotrupes*

|  |                                    |
|--|------------------------------------|
| <i>Chelotrupes algarvicus</i> <b>sp. nov.</b>                                | Portugal (Beja, Faro)              |
| <i>Chelotrupes brancoi</i> <b>sp. nov.</b>                                   | Portugal (Santarém, Setúbal)       |
| <i>Chelotrupes feryi</i> <b>sp. nov.</b>                                     | Portugal (Faro)                    |
| <i>Chelotrupes hendrichi</i> <b>sp. nov.</b>                                 | Spain (Andalucía: Cádiz)           |
| <i>Chelotrupes hiostius</i> (Gené, 1836)                                     | Italy (Sardinia)                   |
| <i>Chelotrupes kyliesi</i> <b>sp. nov.</b>                                   | Spain (Andalucía: Huelva, Sevilla) |
| <i>Chelotrupes laevipennis</i> (Mulsant et Godart, 1855), <b>sp. restit.</b> | Spain (Andalucía: Cádiz)           |
| = <i>Geotrupes andalusiacus</i> Deyrolle, 1869, <b>syn. nov.</b>             |                                    |
| <i>Chelotrupes matutinalis</i> Baudi di Selve, 1870                          | Italy (Sardinia)                   |
| <i>Chelotrupes momus</i> (Olivier, 1789)                                     | Spain (Andalucía: Cádiz, Málaga)   |
| = <i>Scarabaeus momus</i> Fabricius, 1792                                    |                                    |
| = <i>Ceratophyus momus</i> var. <i>momoides</i> Reitter, 1893                |                                    |

APPENDIX 2  
**Gazetteer**

| locality  | district | coordinates      | altitude<br>(ca. m a. s. l.) |
|---|----------|------------------|------------------------------|
| <b>Portugal</b>                                   |          |                  |                              |
| Alfarim   | Setúbal  | 38°29'N, 09°10'W | 50                           |
| Armação de Pêra                                   | Faro     | 37°06'N, 08°22'W | 25                           |
| Armação de Pera [see Armação de Pêra]             |          |                  |                              |
| Brejos de Fetal                                   | Setúbal  | 38°13'N, 08°38'W | 100                          |
| Carrapateira                                      | Faro     | 37°11'N, 08°54'W | 30                           |
| Coruche   | Santarém | 38°58'N, 08°32'W | 80                           |
| Fóia  | Faro     | 37°19'N, 08°36'W | 880                          |
| Foia [see Fóia]                                   |          |                  |                              |
| Grândola  | Setúbal  |                  |                              |
| Grandola [see Grândola]                           |          |                  |                              |
| Loulé   | Faro     | 37°08'N, 08°01'W | 160                          |
| Loule [see Loulé]                                 |          |                  |                              |
| Monchique   | Faro     | 37°19'N, 08°38'W | 440                          |
| Muge  | Santarém | 39°06'N, 08°43'W | 30                           |
| Poceirão  | Setúbal  | 38°38'N, 08°44'W | 40                           |
| Poceirao [see Poceirão]                           |          |                  |                              |
| Rio Frio  | Setúbal  | 38°37'N, 08°43'W | 50                           |
| Sagres  | Faro     | 37°00'N, 08°57'W | 30                           |
| Santa Bárbara de Nexe                             | Faro     | 37°06'N, 07°58'W | 150                          |
| Santa Rita  | Faro     | 37°8'N, 07°39'W  | 20                           |
| Sta Barbara de N [see Santa Bárbara de Nexe]      |          |                  |                              |
| Vale de Ferro                                     | Beja     | 37°41'N, 08°33'W | 180                          |
| Vale de Ferro [see Vale de Ferro]                 |          |                  |                              |
| Vila do Bispo                                     | Faro     | 37°00'N, 08°57'W | 30                           |
| <b>Spain: Andalucía</b>                           |          |                  |                              |
| Algeciras   | Cádiz    | 36°08'N, 05°27'W | 10                           |
| Aljaraque   | Huelva   | 37°16'N, 07°01'W | 20                           |
| Allhaurin [see Allhaurín de la Torre]             |          |                  |                              |
| Allhaurín de la Torre                             | Málaga   | 36°40'N, 04°33'W | 60                           |
| Almonte   | Huelva   | 37°16'N, 06°31'W | 75                           |
| Almorama  | Cádiz    | 36°19'N, 05°27'W | 350                          |
| Aznalcázar  | Huelva   | 37°18'N, 06°15'W | 65                           |
| Aznalcazar [see Aznalcázar]                       |          |                  |                              |
| Cádiz [see Cádiz]                                 |          |                  |                              |
| Cádiz   | Cádiz    | 36°32'N, 06°18'W | 10                           |
| Cádiz – San Diego                                 | Cádiz    | 36°18'N, 05°35'W | 35                           |
| Cádiz [see Cádiz]                                 |          |                  |                              |
| Castellar [see Castellar de la Frontera]          |          |                  |                              |
| Castellar de la Frontera                          | Cádiz    | 36°17'N, 05°25'W | 30                           |
| Castellar   | Málaga   | 36°37'N, 04°30'W | 70                           |
| Castillo de Castellar                             | Cádiz    | 36°19'N, 05°27'W | 230                          |
| Castillo de Castillar [see Castillo de Castellar] |          |                  |                              |
| Chiclana de la Frontera                           | Cádiz    | 36°25'N, 06°09'W | 20                           |
| Colinas   | Sevilla  | 37°14'N, 06°15'W | 20                           |
| Cortico de la Mesa                                | Cádiz    | 36°25'N, 06°09'W | 20                           |
| El Rocio [see Romeria de la San Rocio]            |          |                  |                              |
| Embalse de Almodóvar                              | Cádiz    | 36°09'N, 05°39'W | 100                          |
| Facinas   | Cádiz    | 36°08'N, 05°56'W | 140                          |
| Hinojos   | Huelva   | 37°18'N, 06°23'W | 90                           |
| Huelva  | Huelva   | 36°15'N, 06°57'W | 35                           |
| Jerez [see Jerez de la Frontera]                  |          |                  |                              |

|   |         |                  |     |
|---|---------|------------------|-----|
| Jerez de la Frontera                              | Cádiz   | 36°41'N, 06°08'W | 40  |
| La Rábida   | Huelva  | 37°12'N, 06°56'W | 20  |
| Los Barrios                                       | Cádiz   | 36°11'N, 05°30'W | 30  |
| Los Cabezudos                                     | Huelva  | 37°24'N, 06°04'W | 60  |
| Matalascañas                                      | Huelva  | 37°00'N, 06°23'W | 20  |
| Montehumada                                       |         | not located      |     |
| Romeria de la San Rocio                           | Huelva  | 37°08'N, 06°29'W | 10  |
| Rota  | Cádiz   | 36°37'N, 06°21'W | 0   |
| San Rague [see San Roque]                         |         |                  |     |
| San Roque   | Cádiz   | 36°13'N, 05°23'W | 110 |
| Sanlúcar de Barrameda                             | Cádiz   | 36°47'N, 05°21'W | 20  |
| Sanlúcar de Barrameda [see Sanlúcar de Barrameda] |         |                  |     |
| Sevilla   | Sevilla | 37°23'N, 06°00'W | 10  |
| Seville [see Sevilla]                             |         |                  |     |
| Taragutilla                                       | Cádiz   | 36°12'N, 05°24'W | 45  |
| Targuejo [see Tariquejo]                          |         |                  |     |
| Tarifa  | Cádiz   | 30°01'N, 05°36'W | 15  |
| Tariquejo   | Huelva  | 37°23'N, 07°09'W | 10  |
| Toremolinos                                       | Málaga  | 36°37'N, 04°30'W | 70  |
| Torre de la Higuera                               | Huelva  | 37°00'N, 06°23'W | 20  |
| Vejer [see Vejer de la Frontera]                  |         |                  |     |
| Vejer d. l. Front. [see Vejer de la Frontera]     |         |                  |     |
| Vejer de la Frontera                              | Cádiz   | 36°15'N, 05°58'W | 130 |
| Villamanrique [see Villamanrique de la Condesa]   |         |                  |     |
| Villamanrique de la Condesa                       | Sevilla | 37°15'N, 06°18'W | 30  |