

The *Psilothrix* KÜSTER, 1850 of the group *viridicoerulea* GEOFFROY, 1785 (Coleoptera: Melyridae: Dasytinae)

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Abstract

The *Psilothrix viridicoerulea* group includes three similar species: *P. viridicoerulea* (GEOFFROY, 1785), *P. melanostoma* (BRULLÉ, 1832) and *P. illustris* (WOLLASTON, 1854). Anatomical differences between the three species, for both males and females, are reported and illustrated. The group's taxonomy is reviewed, based on old descriptions and specimens. A neotype is designated for *Dasytes melanostoma* BRULLÉ, 1832. *Psilothrix melanostoma* was described from the Balkan Peninsula in its apterous form and turned out to be the senior synonym for *P. aureola* (KIESENWETTER, 1859) syn.n., a name currently used for the winged form widespread in the central Mediterranean area, and for *P. smaragdina* (LUCAS, 1846) syn.n., a brachypterous form that has been found in Sardinia and in Algeria near Algiers. The known distribution of the three species is illustrated and commented.

Key words: Cleroidea, Dasytidae, taxonomy, synonymy, *Psilothrix illustris*, *Psilothrix melanostoma*, *Psilothrix aureola*, *Psilothrix smaragdina*, Mediterranean, fauna, Illiger, Hellwig, Rossi.

Zusammenfassung

Die *Psilothrix viridicoerulea*-Gruppe umfasst drei ähnliche Arten: *P. viridicoerulea* (GEOFFROY, 1785), *P. melanostoma* (BRULLÉ, 1832) und *P. illustris* (WOLLASTON, 1854). Anatomische Unterschiede zwischen diesen drei Arten werden für Männchen und Weibchen beschrieben und illustriert. Die Taxonomie der Gruppe wird, basierend auf alten Beschreibungen und Exemplaren, kritisch besprochen. Ein Neotypus für *Dasytes melanostoma* BRULLÉ, 1832 wird designiert. *Psilothrix melanostoma* wurde von der Balkanhalbinsel in ihrer flügellosen Form beschrieben. Sie hat sich als das ältere Synonym von *P. aureola* (KIESENWETTER, 1859) syn.n. – ein Name, der für die im zentralen Mittelmeerraum weit verbreitete geflügelte Form verwendet wurde – und von *P. smaragdina* (LUCAS, 1846) syn.n. – eine brachyptere Form, die auf Sardinien und in Algerien bei Algier gefunden wurde – herausgestellt. Die bekannte Verbreitung der drei Arten wird dargestellt und kommentiert.

Introduction

The genus *Psilothrix* was first proposed by KÜSTER (1850: 9) for *Dasytes protensus* GENÉ, 1836, which became the type species of the genus. The senior name *Lasius* MOTSCHULSKY, 1845 (type species *Lasius nobilis* ILLIGER, 1798) cannot be used for homonymy with *Lasius* FABRICIUS, 1804, a genus of ants. The name *Psilothrix* is feminine because of the Greek origin noun ending in -thrix (ICZN 1985: 222).

Psilothrix includes about 20 species distributed in Europe, Asia, Africa, and North America, and has been the subject of a few recent papers dealing with the descriptions of new Iberian species (BAHILLO DE LA PUEBLA & LÓPEZ-COLÓN 2014) and the rare *P. severa* (KIESENWETTER, 1859) (COACHE & CONSTANTIN 2006). The North American species *P. foveicollis* (KIRBY, 1837) has been transferred from *Dolichosoma* STEPHENS, 1830 to *Psilothrix* (GIMMEL & MAYOR 2019).

The herein proposed “*P. viridicoerulea* group” is a set of three similar species: *Psilothrix viridicoerulea* (GEOFFROY, 1785), *P. illustris* (WOLLASTON, 1854), and *P. melanostoma* (BRULLÉ, 1832). The latter species includes a winged form up to now named *P. aureola* (KIESENWETTER, 1859), a brachypterous one named *P. smaragdina* (LUCAS, 1848), and an apterous form named *P. melanostoma*. These three species are rather well known and often found in collections because specimens are easily spotted by field entomologists: brilliant green coloured, widespread in Europe and North Africa, and common on flowers, at least in the Mediterranean area. They are rather small (their body length ranging from 3.5 to 7 mm), more or less parallel-sided, with convex dorsum, and with rough, randomly punctured integument and loosely covered with stiff, black setae (Figs. 1–4). In general appearance, they look similar to certain green Prionoceridae species (notably to *Lobonyx aeneus* FABRICIUS, 1787) living in the Iberian peninsula and in Morocco, which can be spotted on flowers too and with which they have been confused at times. Also rather similar, at a first glance, is *Dasytes (Metadasytes) caeruleus* DEGEER, 1785; the authors suspect that, in the past, confusions with this species might have taken place, too.

The similarity of the species of the *P. viridicoerulea* group (and the resemblance with other species as well) easily leads to confusion so that the need arises for better morphological definitions for males and females. Furthermore, as it often happens with conspicuous and common similar species, the related nomenclature is rich in names and very confusing at times.

In an attempt to clarify both systematics and nomenclature of the *P. viridicoerulea* group, we here supply the main differential characters between the three species and a critical summary of the related bibliography. We also propose to rename the heretofore called *Psilothrix aureola* into *Psilothrix melanostoma* due to the principle of priority and to consider both the winged (known as *P. aureola*) and the brachypterous to apterous forms (known as *P. melanostoma* and *P. smaragdina*) as morphs of the same species.

Material and methods

The materials studied in the course of this work amount to many thousand specimens from all over Europe and North Africa, this number having being accumulated – and (a fraction of it) dissected – during decades of researches by the first author. Provenance localities of the materials studied are not listed.

All dissections were carried out in water, under a stereomicroscope at variable magnification (usually 15× to 30×), with the thinnest micro-pins found on the market (0.1 mm), suitably hooked at the sharp extremity and fitted with a wooden handle at the other. The insects were softened by immersion in a solution of ethyl-alcohol in water (5–10%) for at least 10–12 hours before the abdomen was carefully detached. Afterwards the abdomen was further softened by boiling for 1–2 minutes in diluted potassium hydroxyde solution (1–2%), its dorsal integument opened, the whole content (including both last sternite and tergite) drawn out and boiled again for 1–2 minutes in the same KOH solution. The

empty abdomen was glued onto the insect cardboard. Eventually, the sclerotized genitalia and terminalia components – namely median lobe of aedeagus with internal sac, tegmen, spicular fork, pygidium, and last sternite – were separated from each other and mounted in DMHF on a small transparent cellulose acetate label pinned under the insect cardboard (see LIBERTI 2005 for further details on this procedure).

This rather cumbersome procedure has been considered necessary to avoid damages to the insect and to allow the very fragile internal sac (of median lobe) to remain unbroken and well visible after mounting. Examination of the internal sac is useful because of the reliable differential character between *P. viridicoerulea* and *P. illustris*.

All drawings were made with the aid of a grid 10× eyepiece, at variable magnifications (for median lobes mostly 50×).

Photographs are original and have been taken by means of a camera mounted on the microscope and – to extend the focusing depth – stacked with a suitable software (Helicon Focus 6).

Anatomical notes: Anatomical terms used in descriptions can be found either in the glossary of COOTER (2006) or in CONSTANTIN & LIBERTI (2011: 14–22). However, for easier reading, a short list is duplicated in the following:

Abdomen: In the family Dasytidae, it consists of eight segments, but looking at the insect ventrally, only the last six are visible (CONSTANTIN & LIBERTI 2011: 17).

Aedeagus: The assemblage of two sclerotized organs: median lobe (carrying the inner structure named internal sac) and tegmen, which, in the family Dasytidae, is placed astride the median lobe (CONSTANTIN & LIBERTI 2011: fig. 28).

Internal sac: It is a membranous organ located inside the median lobe. In *Psilothrix* (as well as in several other Dasytinae) it is structured as a long, tubular thin membrane dangling out from the median lobe's base and bearing a large number of sclerotized small spines, well visible when genitalia are embedded in a transparent medium like DMHF.

Pygidium: In *Psilothrix*, the last, or 8th (6th visible) tergite (Figs. 8–10 for ♀♀, Figs. 14–16 for ♂♂) carries very important diagnostic characters in both males and females.

Last sternite: The 8th (6th visible) sternite, which in *Psilothrix* is always fitted with a thin and long central process, is shorter in males than in females (Figs. 11–13 for ♀♀, Figs. 17–19 for ♂♂). Its shape is important, among others, to distinguish females of *P. melanostoma* from *P. illustris*.

Abbreviations for citing labels: hw. = handwritten; pr. = printed; / = line break.

Results

Species delimitation

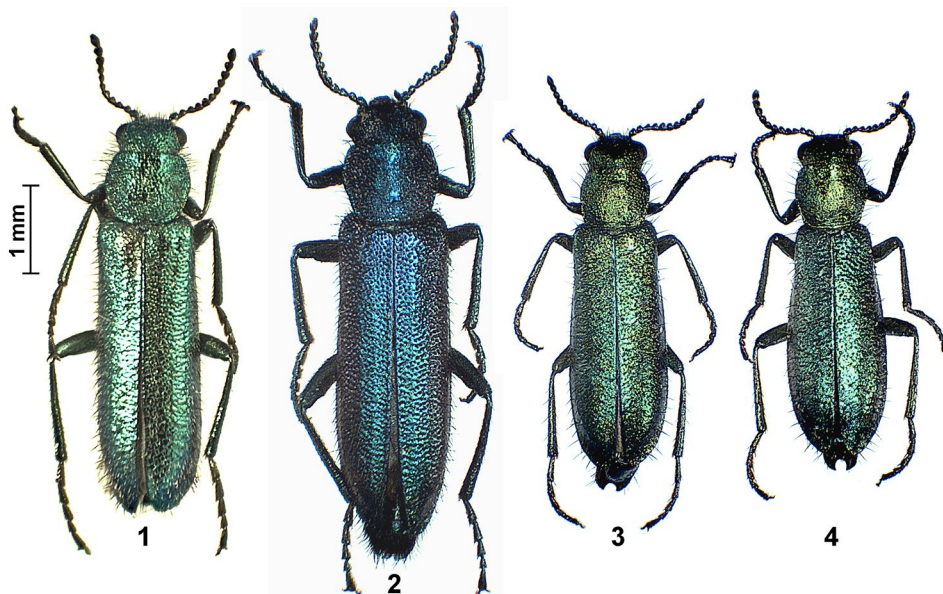
The members of the *P. viridicoerulea* group are entirely brilliant green (at times with a bluish or reddish glare or hue) coloured and possess balanced to transverse pronota. Another similarly coloured species, which is distributed in North Africa, Sicily and southern Sardinia, and which is also wingless, is *P. protensa* GENÉ, 1836 – but the latter possesses a pronotal shape that is much longer than wide (see CONSTANTIN & LIBERTI 2011: pl. 6, fig. 23).

Tab. 1: Synoptic table for the differential diagnostic characters between the three species of the *Psilothrix viridicoerulea* group.

Character	<i>P. viridicoerulea</i>	<i>P. illustris</i>	<i>P. melanostoma</i>
Size	total length = 5.5–7.0 mm	total length = 3.8–5.0 mm	total length = 3.5–5.0 mm
Pronotum shape and sculpture	feebly transverse to balanced; rough (Fig. 7)	clearly transverse; rough (Fig. 5)	feebly transverse to balanced, moderately rough, often with smooth, alutaceous zone on disc (Fig. 6)
Elytral pubescence	double; long upright black setae and short, decumbent, brown (not well visible) setae	double; long upright black setae and short, decumbent, whitish (colour variable) setae	simple; long upright black setae only (if present, decumbent setae sparse and hardly visible)
♂ pygidium	hind margin with clearly visible V-notch (Fig. 14)	hind margin at most slightly emarginated (Fig. 15)	hind margin with distinct, large U-notch (Fig. 16)
♀ pygidium	hind margin with moderate V-notch; shape feebly transverse (Fig. 8)	hind margin only slightly indented; shape elongate to balanced (Fig. 9)	hind margin only slightly indented; shape transverse (Fig. 10)
♂ last sternite	hind margin strongly emarginated (nearly rectangular shape) (Fig. 17)	hind margin strongly emarginated (nearly rectangular shape) (Fig. 18).	hind margin strongly and roundly emarginated (Fig. 19)
♀ last sternite	more or less balanced, sub-trapezoidal; sides feebly rounded; apex rounded (Fig. 11)	slightly transverse to balanced, sub-trapezoidal; sides straight; apex feebly emarginated (Fig. 12)	strongly transverse, rounded; apex very feebly emarginated (Fig. 13)
♂ penultimate sternite	apical margin strongly emarginated	apical margin strongly emarginated	apical margin feebly rounded, nearly straight
♂ median lobe	as in Fig. 20	as in Fig. 21	as in Fig. 22
♂ internal sac	very long; entirely fitted with many very small, brown spines	very long; only the basal half fitted with many very small, brown spines	very long, entirely fitted with many very small, brown spines; these are randomly placed in distal half and mainly along sides in basal half

Psilothrix viridicoerulea is immediately recognizable by larger size (total length 5–7 mm) and a V-shaped indentation on the posterior margin of the pygidium in both males and females (Figs. 8, 14). The other two species are both smaller (total length 3.5–5 mm), but otherwise very similar to *P. viridicoerulea*. However, *P. melanostoma* (formerly named either *P. aureola*, *P. melanostoma*, or *P. smaragdina*) is characterized by a large U-shaped notch on the posterior margin of the pygidium in males (Fig. 16), whereas the male of *P. illustris* possesses a rounded pygidium (Fig. 15). There are other important differential characters summarized in Table 1.

As can be seen from Table 1, females – although very similar – are often recognizable by size, pronotal sculpture, elytral pubescence and the shapes of last tergites and sternites. However, in some cases, *P. viridicoerulea* and *P. illustris* appear very similar and are hardly distinguishable from each other, for instance, in certain Morocco populations. The median lobes of these two species are very similar and even the pygidium shape is



Figs. 1–4: Habiti: (1) *Psilothrix illustris* (from Madeira, Punta das Gaivotas); (2) *P. viridicoerulea* (from Sardinia, Quartu Sant’Elena); (3) *P. melanostoma* winged (morph *aureola*) (from Sicily, Trapani); (4) *P. melanostoma* wingless (from Apulia: Otranto).

not always as distinct as reported above. In such cases, the spinules of the internal sac become the only reliable difference.

***Psilothrix illustris* (WOLLASTON, 1854)** (Figs. 1, 5, 9, 12, 15, 18, 21, 23)

Dasytes illustris WOLLASTON, 1854: 252, Loc. typ. Madeira Island; KIESENWETTER 1859: 178 (*Dolichosoma* subg. *Psilothrix illustre*); KIESENWETTER 1863: 644 (note); KIESENWETTER 1867a: 119; KIESENWETTER 1867b: 137, 139; SCHILSKY 1894b: N. 47 (*Psilothrix illustris*); RAGUSA 1896: 77 (doubtful in Sicily); JACOBSON 1911: 706; PORTA 1929: 123; KOCHER 1956: 66; LINDBERG 1963: 52.

Notes: No types of this species have been studied but a long series of topotypes have been available for study and, given that no other *Psilothrix* species is known from Madeira, the description is sufficiently accurate to allow a reliable identification.

In the historical collections of the Museum für Naturkunde, Berlin, a small series of five specimens (1 ♂, 4 ♀♀) of *P. illustris* has been found: They bear the number 32581 (without individual labels) and a collective box-floor label: “Nobilis / N[obis]. / Lagr[ia]. viridis / R[ossi]. minor * / Ital[ien]. Lusit[anien].” hw. (by Illiger?). This label clearly shows that Illiger renamed as “*nobilis*” the “var. *minor*” of Rossi, as he published in 1807, but unfortunately, nine years earlier, in 1798, he used the same name *nobilis* in a less clear context, possibly referring to *P. viridicoerulea* (see below).

With old materials, things are tangled up. In spite of the identification label, all the five specimens proved to belong to *Psilothrix illustris* (certainly collected by Hoffmannsegg while travelling in Portugal, as privately communicated by Bernd Jaeger). No specimens are present of the true *Lagria viridis minor* from Italy – the one so named in litteris by Rossi and re-named *Dasytes nobilis* by ILLIGER (1807) (see discussion below).

It is easy to believe that Illiger was deceived by the similarity of the two forms. Of course that raises a few doubts both on the real meaning of the Illiger name *nobilis* and on the priority of the Wollstone name *illustris*. However, the authors believe that for both substantial doubts on the name *nobilis* (see below, under *P. melanostoma*, the discussion of the name *Dasytes nobilis* ILLIGER) and nomenclature stability, usage of the Illiger name should be avoided.

We have seen specimens of *Psilothrix illustris* from Madeira, Spain, Portugal, and Morocco (Fig. 23). There are no records for the Canary Islands.

***Psilothrix melanostoma* BRULLÉ, 1832** (Figs. 3, 4, 6, 10, 13, 16, 19, 22, 23)

Dasytes melanostoma BRULLÉ, 1832: 150, pl. 37, fig. 5 (locality not clearly indicated, probably Peloponnesus); KIESENWETTER 1859: 177, pl. 1 fig. 11 (*Dolichosoma* subg. *Psilothrix*; syn. of *Dasytes lucidulus* BRULLÉ); KIESENWETTER 1863: 644 (note); KIESENWETTER 1867b: 137, 139; BAUDI A SELVE 1873: 303 (= *Dasytes elegans* PARREYSS, Corfu); SCHILSKY 1894a: 235 (in *Psilothrix*); SCHILSKY 1894b: N. 48; RAGUSA 1896: 76; JACOBSON 1911: 706; PORTA 1929: 123; PIC 1937: 109 (in *Lasius*); LIBERTI 1995a: 21 (listed as syn. of *Psilothrix viridicoerulea* GEOFFROY).

(?) *Dasytes lucidulus* BRULLÉ, 1832: 150 (loc. typ. not clearly indicated, probably Peloponnesus); KIESENWETTER 1859: 177 (syn. of *melanostoma*); PIC 1937: 109 (as *Lasius melanostoma* ab. *lucidulus*).

Dasytes smaragdinus LUCAS, 1846: 195 (loc. typ. Algeria); KIESENWETTER 1867b: 137, 139 (as *Dolichosoma* subg. *Psilothrix smaragdinum*; = *aureolum* KIESENWETTER); ROTTENBERG 1870: 243 (in *Dolichosoma*); BAUDI A SELVE 1873: 303 (as *Dolichosoma smaragdinum*; = *splendidulus* DAHL.; = *Dolichosoma nobile* ILL. var. *minor*); SCHILSKY 1894a: 230, 235 (*Psilothrix smaragdinus*); SCHILSKY 1894b: 49; RAGUSA 1896: 76; JACOBSON 1911: 706; PORTA 1929: 123; PIC 1937: 110 [*Lasius*]; LIBERTI 1995a: 21 (*smaragdina*; syn. of *aureola*); LIBERTI 2009b: 350, 366, figs. 22, 27 (as *P. aureola*).

Dolichosoma (subg. *Psilothrix*) *aureolum* KIESENWETTER, 1859: 178 (loc. typ. not indicated; see next reference); KIESENWETTER 1863: 644 (note; in central Italy, which may be taken as typical locality); KIESENWETTER 1867b: 139 (syn. of *smaragdinum*); SCHILSKY 1894a: 230, 236 (*Psilothrix aureolum*; not syn. of *smaragdinus* because winged; = *splendidus* SCHAUF.); SCHILSKY 1894b: N. 50; RAGUSA 1896: 76; HOLDHAUS 1911: 12 (442); JACOBSON 1911: 707; PORTA 1929: 123; PIC 1937: 108 (in *Lasius*); SCHATZMAYR 1942: 72; TEMPÈRE 1974: 226 (found on Corsica); ANGELINI 1991: 198; BORDONI 1995: 38; LIBERTI 1995a: 21 (as *P. aureola*); LIBERTI 1995b: 501; ANGELINI 1996: 68; SPARACIO 1997: 106, fig. 37; LIBERTI 1997: 183; LIBERTI 2009b: 350, 366, fig. 22; CONSTANTIN & LIBERTI 2011: 41, pl. 6 fig. 24; CONSTANTIN 2014: 470.

Lagria viridis minor ILLIGER, 1807: 302 (nomen nudum) [Rossi in litteris: *Lagria viridis* Rossi 1792 in part, var. *minor* in litteris; = *Dasytes nobilis*; loc. typ. supposed in Tuscany].

Dasytes nobilis ILLIGER, 1807: 302 (but not ILLIGER 1798: 308) (nomen nudum).

Dolichosoma splendidus SCHAUFUSS, 1867: 81, loc. typ. Mallorca (Spain); SCHILSKY 1894a: 236 (syn. of *P. aureola*); PIC 1937: 108 (in *Lasius*).

Notes: The original description of *Psilothrix melanostoma*, although not entirely meaningful, corresponds well to the species here discussed (although, unfortunately nothing can be inferred relating to wing development), but might apply to small specimens of *P. viridicoerulea* as well. Additionally, Brullé, describing this species, under the heading “Hab[itat].” reports “Communiqué par M. de Laporte”. That is disappointing because it leaves a shade of doubt on the type locality. Indeed only the (many) species – among those described in the same Brullé paper – collected by the people participating at the “Expédition scientifique de Morée” certainly come from the Peloponnesus. We however



Figs. 5–7: Pronota of (5) *Psilothrix illustris* from Madeira, Punta das Gaivotas; (6) *P. melanostoma*, winged morph from Sicily, Trapani; (7) *P. viridicoerulea* from Sardinia, Quartu Sant’Elena.

reasonably assume this locality as typical: our wingless *Psilothrix* can actually be found in the Peloponnesus, at times in numbers, and the subsequent authors’ usage of the name *melanostoma* confirms this assumption.

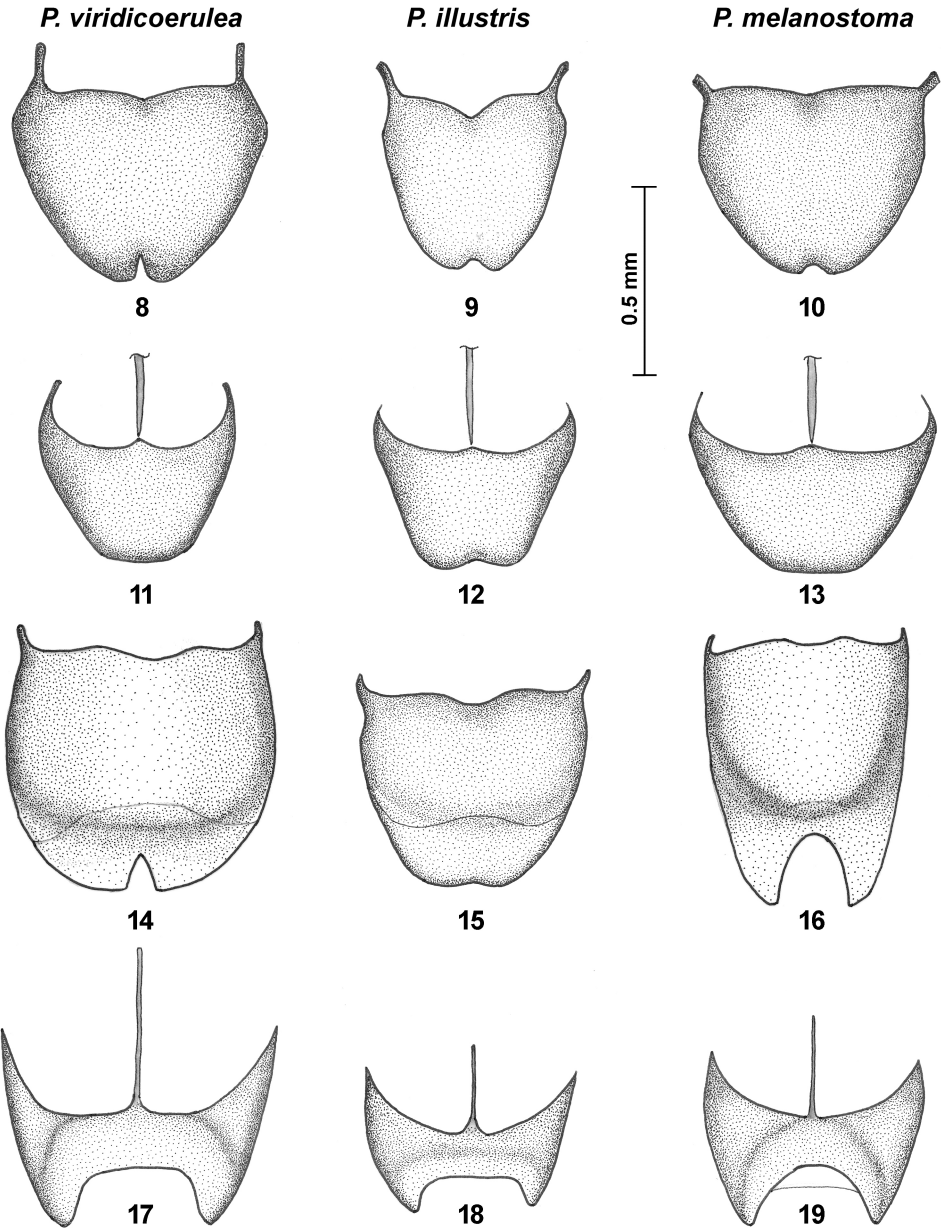
BRULLÉ (1832) described four “*Dasytes*” species working on materials “Communiqué par M. de Laporte” (among them also *Dasytes lucidulus*, discussed below). None of the relevant types have been found in the Museum Nationale d’Histoire Naturelle, in Paris. Presumably, they were returned after description. The Laporte de Castelnau collection ended up, in part, at the Melbourne Museum, in Australia. An attempt to find the types there failed. Indeed, to our enquiry, we received a kind reply (Melbourne Museum, message dated February 8th, 2010) that no type specimens were found in the Laporte de Castelnau collection. Unfortunately, all these types should be considered lost. Given the need to have a name-bearing specimen to settle the complicated nomenclature of these species, the need has been felt to define a neotype, as follows:

N e o t y p e (hereby designated): 1 ♂, labelled: “Greece, Lakonia / Githio / beach of Skutari / 36°41’N, 22°31’E, 10m / 18.IV.2002, R Constantin” pr. (out of a small series of 6 specimens – 3 ♂♂, 3 ♀♀ – kindly supplied by R. Constantin), deposited in Museo Civico di Storia Naturale, Milano (Italy).

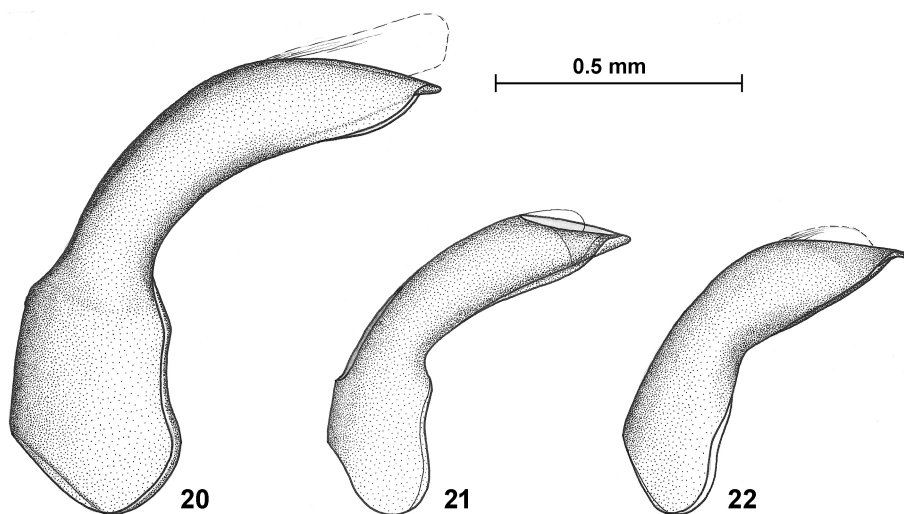
Based on the principle of priority (ICZN 1999), taking into account that the conditions for reversal of precedence (ICZN 1999: art. 23.9) with the other synonyms do not occur, Brullé’s name *melanostoma* should be considered as the valid one for this *Psilothrix* species.

We supply, here below, a short discussion of all the synonyms of *P. melanostoma* listed above:

***Dasytes nobilis* ILLIGER, 1798, *Dasytes nobilis* ILLIGER, 1807, and *Lagria viridis minor* ILLIGER, 1807:** Karl Wilhelm Illiger (1775–1813) was a student (and son in law) of Christian Ludwig Hellwig (1743–1831). Both had excellent relationships, among others, with Pietro Rossi (1738–1804), professor at the Pisa University, exchanging with him letters and materials. ILLIGER (1798: 308) wrote the inventory of all *Melyris* present in the Hellwig collection: among them he lists “...– *Nobilis* (*Lagria viridis* Rossi) –...” [sic], so named in litteris by Hellwig as we can guess, without any description. As SCHÖNHERR (1817: 14)



Figs. 8–19: Terminalia of both sexes: (8–10) last tergite (pygidium) of female; (11–13) last sternite of female; (14–16) last tergite (pygidium) of male; (17–19) last sternite of male. (8, 11, 14, 17) *P. viridicoerulea* (♀ from Apulia, Masseria Santoro; ♂ from Liguria, Montemarcello); (9, 12, 15, 18) *P. illustris* (♀ from Lisboa, Linda a Velha; ♂ from Madeira, Ponta das Gaivotas); (10, 13, 16, 19) *P. melanostoma*, winged morph *aureola* (♀ from Emilia Romagna, San Leo; ♂ from Malta, Gozo Island).



Figs. 20–22: Median lobes of aedeagi in lateral view: (20) *P. viridicoerulea* (from Liguria: Montemarcello); (21) *P. illustris* (from Madeira, Punta das Gaivotas); (22) *P. melanostoma* winged (morph *aureola*).

indeed reports, *Melyris nobilis* ILLIGER, 1798 is a synonym of *Lagriia viridis* ROSSI, 1792 (namely *P. viridicoerulea*). But it is impossible to know what Illiger actually saw in the Hellwig collection under the name *nobilis*: one species or two – either *P. melanostoma*, see below, or *P. viridicoerulea*, or both. Indeed nine years later, ILLIGER (1807: 302) wrote: “Von ihm [meaning *Melyris cyanea* (sic!) OLIVIER, namely *Psilothrix viridicoerulea* GEOFFROY] ist aber *D. nobilis*, die *Lagriia viridis minor* Rossi, als Art verschieden”. That is, he renamed *L. viridis minor* ROSSI, in litteris, as *Dasytes nobilis*, correctly stating it was a good, different species. Both names (*nobilis* and *minor*) have been listed, again, without any associated description. It might well be that the 1798 meaning of the name *nobilis* is different from the 1807 one. As witnessed by ILLIGER (1807: 302), the name *minor* goes back to Pietro Rossi, an excellent entomologist, who understood the presence of the two forms and, when describing his *Lagriia viridis* (ROSSI 1792: 36) – later synonymized with *Psilothrix viridicoerulea* GEOFFROY, 1785 – stated “...Variat magnitudo duplo minori...” [“...It varies in size down to half...”]. No doubts Rossi had, under his eyes, both *Psilothrix* species: *P. viridicoerulea* and *P. melanostoma* (the winged morph), both very common in Tuscany. Unfortunately, the case is further complicated by the presence of a third species: In the historical Hellwig collection (Museum für Naturkunde Berlin), under the name “*nobilis*” only five *Psilothrix illustris* specimens from Portugal have been found (see discussion above under the latter species). It is well possible that Illiger had, under his eyes (in 1798 and / or in 1807), not just *P. melanostoma* and / or *P. viridicoerulea* but also *P. illustris* from Portugal. As a conclusion, the species epithets *nobilis* ILLIGER, 1798 and *minor* ILLIGER, 1807 are unavailable as nomina nuda. The writers propose to give up their usage.

***Dasytes lucidulus* BRULLÉ, 1832:** This species was also described by Brullé on materials “Communiqué par M. de Laporte”. It was subsequently synonymized with *melanostoma* by KIESENWETTER (1859: 177). The reasons why Brullé, a very good entomologist, might have described the same species (provided they actually were!) twice, one after the other,

are obscure. As KIESENWETTER (1859: 177) points out, the two descriptions are indeed nearly identical. Two characters however may be relevant: *D. lucidulus* is smaller (3 vs. 4 mm) and its elytral apical half is somewhat transparent. Again KIESENWETTER (1859: 178), commenting the synonymy, hypothesized that such transparency could be regarded as individual variation. Unfortunately, also the types of *D. lucidulus* are unavailable (see comments above). The problem of what *Dasytes lucidulus* could really be, seems very difficult to solve. For the time being, it is wise to accept the Kiesenwetter point of view and consider it as a synonym of *P. melanostoma*.

***Dasytes smaragdinus* LUCAS, 1846:** This name refers to the wingless (or wing-reduced) morph, often showing elytra more or less widened in apical half and humeral swelling more or less reduced (comp. Fig. 4). What we presume to be the typical series of *Dasytes smaragdinus* has been found in the Museum Nationale d'Histoire Naturelle in Paris, box no. 18 of the set named "Exploration scientifique de l'Algérie". It consists of eleven specimens (two of which directly pinned, all others glued on very small cardboard labels), the first labelled "Dasytes / elegans Parrss. [Parreyss] / smaragdinus Dej.", the pin also bearing a small, blue, and numbered paper disc. All other specimens are without labels but the blue, numbered disc. Three of them bear the number "1442" and the other eight the number "1405". The search for these numbers in the collection registers kept by the Entomology Department was unsuccessful. All these specimens have strongly reduced wings and, no doubt, they correspond to the brachypterous morph of *P. melanostoma*.

***Dolichosoma* (subg. *Psilothrix*) *aureolum* KIESENWETTER, 1859:** This name refers to the fully winged morph with parallel elytra and well developed humeral swelling (comp. Fig. 3), whose distribution is reported below. The name *Psilothrix aureola* was in use for this species until now. The Kiesenwetter collection was largely destroyed in the Second World War and its types should be considered lost. However, there are no doubts that this name applies to our smaller *Psilothrix* species in its winged form. Indeed, in its typical locality (central Italy) only this form can be found, meeting the description.

***Dolichosoma splendidus* SCHAUFUSS, 1867:** Schaufuss' description applies well to our *P. melanostoma* in its winged morph, which is actually present on Mallorca Island. It was synonymized with *P. aureola* by SCHILSKY (1894a: 236).

Psilothrix melanostoma is geographically limited to the central and eastern Mediterranean regions and exists in two forms, differing in hind-wing development.

In the subfamily Dasytinae, hind-wing development is often variable: In several species, both fully winged and wingless populations are known, for example, in *Danacea viticollis* SCHILSKY, 1897 (LIBERTI 2009a), *Dasytiscus hebraicus* BOURGEOIS, 1883 (MAJER 1988), or *Danacea sardoa mancinii* PIC, 1927b (winged) versus *D. sardoa renosensis* CONSTANTIN & LIBERTI, 2006 (apterous). More closely related examples of hind-wing loss can be found in *Dolichophron* KIESENWETTER, 1867 (all three species apterous) and in *Psilothrix protensa*.

As it can be often observed, also in *P. melanostoma* the reduction of hind wings is associated with a change of elytral shape: The humeral swelling is underdeveloped and the elytra tend to widen in the apical half. The resulting oval elytral shape is pronounced in females, but often also noticeable in males (compare Figs. 3 and 4).

Apparently, in *Psilothrix melanostoma* the wing reductions and modifications follow a geographical pattern (detailed below and in Fig. 23). It is important to note that the range

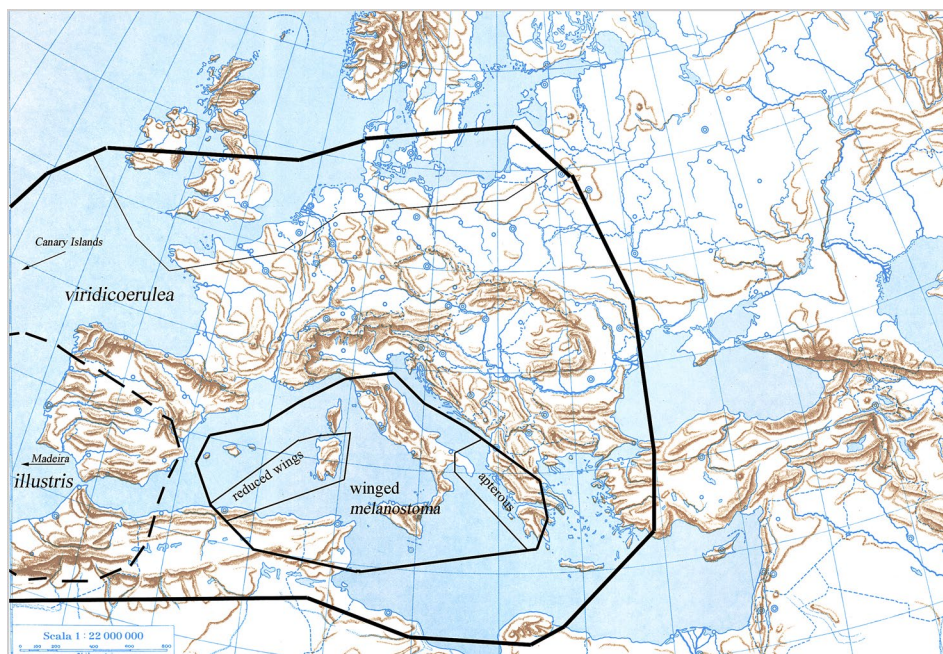


Fig. 23: Approximate distributions: (heavy line) *P. viridicoerulea* (the northern region delimited by the thinner line shows where *P. viridicoerulea* lives only along the coast), Canary Islands are outside the map; (thin line) *P. melanostoma* (the two subregions delimited by the thinnest line show the discontinuous range of the apterous or brachypterous morphs respectively); (broken line) *P. illustris*. Madeira Island is outside the map.

of the brachypterous to apterous forms is composed of two disjointed parts. Also for this reason, the authors concluded that the two forms should be considered as morphs rather than subspecies. Despite that, the name *aureola* might still be used as a label to indicate the winged form of *P. melanostoma*.

The fully winged form occurs on Corsica Island, the Balearic Islands, in Italy (central and southern peninsular Italy and Sicily; not in the Lecce province of Apulia and not in Sardinia), Malta, Tunisia, and in a part of Algeria (Fig. 23). The actual North African distribution of the two forms is not well known and should be further studied. The only one certainty is that the wingless form is present around the city of Algiers. As mentioned above, the distribution range of the wingless morph includes two apparently disjointed areas, an eastern and a western one: The first ranges from the Ionic side of the Balkans (we have seen specimens from Greece, Albania, and Montenegro) to a small part of Apulia (Italy); the second one includes North Africa (at least the coastal zone around Algiers) and Sardinia (Fig. 23). To explain such a distribution, we suppose that wing reduction (or disappearance) has taken place independently in both areas but, given the poor knowledge of the North African distribution, there is certainly room for doubts. For whatever reasons, it is well known that the coasts of Ionian Sea (in Greece and Albania) on one side and Apulia on the other side have many plant and animal species in common, and there are faunistic similarities between Algeria and Sardinia as well.

***Psilothrix viridicoerulea* (GEOFFROY, 1785)** (Figs. 2, 7, 8, 11, 14, 17, 20, 23)

- Cicindela viridicoerulea* GEOFFROY, 1785, loc. typ. Paris area; REICHE 1863: 132 (*Dolichosoma* subg. *Psilothrix viridi-caeruleus* [sic], = *nobile* ILL.); ROTTENBERG 1870: 243 (*Dolichosoma viridicoeruleum*); DEVILLE 1908: 217 (*Psilothrix viridicoeruleus*, = *cyaneus* OL.); JACOBSON 1911: 706; PIC 1937: 110 (in *Lasius*); KOCHER 1956: 66 (in *Psilothrix*); FIORI 1963: 283 (biology, larval development); CONSTANTIN 1965: 93; FIORI 1971: 3 (larva, biology); KLOET & HINKS 1977: 55; ALLENSPACH & WITTMER 1979: 110; MAJER 1986: 127; LIBERTI 1988: 12 (drawing of aedeagus); MAJER 1990: 97 (as *viridicoerulea*, female anatomy); ANGELINI 1991: 198; CONSTANTIN 1991: 404; LOHSE 1992: 22; LIBERTI 1995a: 21; ANGELINI 1996: 69; CONSTANTIN & KLAUSNITZER 1996: 196 (as *viridicoeruleus*, larval anatomy); LIBERTI 1997: 183 (as *viridicoerulea*); BORDONI & ROCCHI 2000: 31; LIBERTI & FOCARILE 2005: 29, 35; LIBERTI 2009: 350, 366, fig. 23; VORST 2010: 120; LIBERTI & CONSTANTIN 2011: 97, pl. 6, fig. 21; TAMUTIS et al. 2011: 251; CONSTANTIN 2014: 470.
- Tillus aeneus* MARSHAM, 1802: 230 (loc. typ. unknown; synonymized with *nobilis* ILL. by SCHÖNHERR 1817: 14); KIESENWETTER 1863: 645; PIC 1937: 110 (as *Lasius viridicoeruleus* var. *aeneus*).
- Dasytes caeruleus* STEPHENS, 1830: 319 [not DEGEER 1774] (listed as synonym by KLOET & HINKS 1977: 55); STEPHENS 1839: 195 (as *coeruleus* [sic]).
- Melyris cyaneus* OLIVIER, 1790: 21 (loc. typ. unknown; synonymized with *nobilis* ILL. by SCHÖNHERR 1817: 14); ILLIGER 1798: 309 (as *Lagria cyanea*); LAPORTE DE CASTELNAU 1840 [= *nobilis* ILL.]; DEVILLE 1908 (syn. of *viridicoeruleus* GEOFF.); SEIDLITZ 1891a: 489 [footnote 4] (in *Psilothrix*); SEIDLITZ 1891b: 522 [footnote 1] (*Lagria viridis* ROSSI a different species); SCHILSKY 1894a: 235; SCHILSKY 1894b: N. 46; RAGUSA 1896: 76; CECCONI 1908: 17; PIC 1908: 46 (in *Psilothryx* [sic!]); REITTER 1911: 286; HOLDHAUS 1911: 12 (442); PIC 1918: 3; HOLDHAUS 1923: 96; PIC 1924: 58, 84; PORTA 1929: 123; SCHATZMAYR 1942: 72; SCHATZMAYR 1943: 118; HORION 1953: 138; KASZAB 1955: 116, fig. 40 P (as *P. cyanea*); LOHSE 1960: 79 (as *P. cyaneus*); FREUDE et al. 1979: 80; LUCHT 1987: 153; BORDONI 1995: 38; MACHADO & OROMI 2000: 57.
- Psilothrix cyaneus* var. *fulminans* SCHILSKY, 1894b: N. 46 (loc. typ. ?; listed as a synonym by MAYOR 2007: 408); RAGUSA 1896: 76; PIC 1908a: 47; PORTA 1929: 123.
- Psilothrix cyaneus* var. *violaceipennis* PIC, 1908a: 47 (loc. typ. Palavas near Montpellier; listed as a synonym by MAYOR 2007: 408); PORTA 1934: 165; PIC 1937: 111 (as *Lasius viridicoeruleus* var. *violaceipennis*).
- Melyris nobilis* ILLIGER, 1798: 308 (nomen nudum; new name proposed for *Lagria viridis* ROSSI); ILLIGER 1807: 302 (new name for *Lagria viridis minor* ROSSI in litt.: see above), loc. typ. Tuscany (supposedly); SCHÖNHERR 1817: 14 (confirmation of the synonymy with *Lagria viridis* ROSSI); BRULLÉ 1832: 150; LAPORTE DE CASTELNAU 1840: 281 (in *Dasytes*); LUCAS 1846: 195; ROSENHAUER 1856: 155; KIESENWETTER 1859: 178 (in *Dolichosoma* subg. *Psilothrix nobile*); KIESENWETTER 1863: 644; KIESENWETTER 1867a: 119; MULSANT & REY 1868: 177, tab. X (in *Psilothrix*); BAUDI A SELVE 1873: 303 (in *Dolichosoma*); CROWSON 1964: 320 (in *Psilothrix*).
- Lagria viridis* ROSSI, 1792: 35 (loc. typ. Tuscany; synonymized with *nobilis* ILL. by SCHÖNHERR 1817: 14); KIESENWETTER 1863: 644 (syn. of *nobilis*); SEIDLITZ 1891a: 489 [footnote 4]; SEIDLITZ 1891b: 522 [footnote 1] (rejects synonymy with *nobilis*); KLOET & HINKS 1977: 55 (as synonym of *viridis* STEPHENS, nec ROSSI); STEPHENS 1829: 136 (in *Dasytes*); STEPHENS 1830: 319; STEPHENS 1839: 196; PIC 1927a: 375 (as *Psilothrix cyaneus* ab. *viridis*); PIC 1937: 111 (as *Lasius viridicoeruleus* var. *viridis*).

The synonymy between *Melyris cyaneus* OLIVIER and *Lagria viridis* ROSSI [= *P. viridicoerulea*] was already known by ILLIGER (1798: 308) – and Hellwig as well – although this author might have been deceived by the name *caeruleus*. Later SCHÖNHERR (1817: 14) confirmed it, assuming that *Dasytes nobilis* is the valid name for *Psilothrix viridicoerulea* in the present sense. The synonymy between *Melyris cyaneus* and *Psilothrix viridicoerulea* is further corroborated by the study of the historical Hellwig collection (Museum für Naturkunde, Berlin). In this collection, a set of eleven specimens of *Psilothrix viridicoerulea* bear a

common box-floor label: “Cyaneus / n[obis]. / Melyris cyanea / Ol[ivier]. / Lagria coerulea R[ossi] * / Lag[ria]. viridis R[ossi]. major / Ital[ien]. Lusit[anien].” hw (by Illiger?). They bear the number 32578; although without individual labelling, one specimen which bears handwritten, difficult to read label, “Sizilien / Dahl.”

As detailed above, the name *nobilis* ILLIGER, as first established in 1798: 308, is unavailable because nomen nudum. Understanding the bibliography related to the synonymization of *Lagria viridis* ROSSI, 1792; *Melyris* (or *Dasytes*, or *Lagria nobilis* ILLIGER, 1798 and *Melyris cyaneus* OLIVIER, 1790 with *Cicindela viridicoerulea* GEOFFROY, 1785 seems to be an entangled matter, probably further complicated by the first glance similarity with *Telephorus* [= *Dasytes*] *caeruleus* (DEGEER). Attempts to get further inside this problem have been deemed to be unnecessary because the meaning of the Geoffroy senior name looks reasonably sure.

Psilothrix viridicoerulea is among the few dasytine species whose biology is well known, because it was studied by FIORI (1971) near Sassari, in Sardinia. The larvae initially feed on dead insects' integuments they find on the ground and, later, they become phytophagous and bore galleries in the stems of tall annual weeds (*Ferula*, *Magydaris*, *Carlina*, *Cirsium* etc.) with a marrow of sufficient size to hold the fully grown larva. The metamorphosis takes place late in winter within the same stem (the weed being now dead, the stem may no longer be in upright position) and, eventually, the adults leave the pupal cell in early spring by boring an oval hole in the stem walls.

We have seen specimens from a large part of Europe (in the north only along the Atlantic sea side) and Mediterranean area, plus Canary Islands (Fig. 23). The thousands of *P. viridicoerulea* specimens which have been available for study to the first author come from the following countries: England (in the north up to north Wales), France, Spain, Portugal, Canary Islands, Italy, Malta, Slovenia, Croatia, Montenegro, Albania, Bulgaria, Greece (including Crete), Turkey, Morocco, Algeria, Libya.

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