

What is *Spasalus robustus* (Percheron, 1835)? (Coleoptera, Passalidae)

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Abstract. – *Spasalus robustus* (Percheron, 1835), *s. auct.*, is a chimerical concept, further to old confusions between several names and species of *Spasalus* Kaup, 1869, and of *Passalus* Fabricius, 1792. However, the original description is precise, illustrated and types are identified. *Passalus robustus* Percheron, 1835, comb. rev. (*Tetraracus variiphyllus* Kuwert, 1891, n. syn.) is Guyano-Amazonian (Brazil, Guyanas, Venezuela, Colombia, Ecuador, Peru) and at Trinidad. The errors, in the literature, are also related to similarities with *Spasalus crenatus* (Mac Leay, 1819) [*S. nigrinus* (Dejean, 1833), *nomen nudum*] and *S. puncticollis* (Le Peletier & Serville, 1825). Otherwise, *S. robustus*, *s. auct.*, is *S. silvarum* Kuwert, 1898, stat. rev. [*S. crenulatus* (Dejean, 1833), *nomen nudum*] and is localized in southeastern Brazil, Paraguay and north Argentina-Uruguay. *P. robustus* and *S. silvarum* are thus allo-parapatric between the southern margin of the Amazon Basin and the Brazilian Plateau.

Résumé. – **Qu'est-ce que *Spasalus robustus* (Percheron, 1835) ? (Coleoptera, Passalidae).** *Spasalus robustus* (Percheron, 1835), *s. auct.*, est un concept chimérique, suite à des confusions anciennes entre plusieurs noms et espèces de *Spasalus* Kaup, 1869, et de *Passalus* Fabricius, 1792. La description originale est néanmoins précise, illustrée et les types localisés. *Passalus robustus* Percheron, 1835, comb. rev. (*Tetraracus variiphyllus* Kuwert, 1891, n. syn.) est guyano-amazonien (Brésil, Guyanes, Venezuela, Colombie, Équateur, Pérou) et à Trinidad. Les erreurs, dans la littérature, sont aussi liées à des similitudes avec *Spasalus crenatus* (Mac Leay, 1819) [*S. nigrinus* (Dejean, 1833), *nomen nudum*] et *S. puncticollis* (Le Peletier & Serville, 1825). Par ailleurs, *S. robustus*, *s. auct.*, est *S. silvarum* Kuwert, 1898, stat. rev. [*S. crenulatus* (Dejean, 1833), *nomen nudum*], et est limité au Sud-Est Brésil, au Paraguay et au nord de l'Argentine-Uruguay. *P. robustus* et *S. silvarum* sont ainsi allo-parapatric entre la marge sud de l'Amazonie et le Plateau brésilien.

Keywords. – Passalini, taxonomy, South America, Antilles.

The genus *Spasalus* Kaup, 1869, comprises a dozen species, of which several were discovered recently. One species inhabits the Antilles, all the others are South American. In the genus is found a rare example of thelytokous parthenogenesis for the whole super-family Scarabaeoidea (BOUCHER, 2015a; BOUCHER *et al.*, 2015). *S. robustus* (Percheron, 1835) is widely distributed and is presumed one of the best known species. It is cited by most authors of the American fauna of Passalidae. However, a complete review of bibliography, of type specimens, and a study of substantial new materials show that “*S. robustus*” is a mix of two species groups within two genera, so named here *Passalus robustus*, *s. str.*, and *Spasalus robustus*, *s. auct.*

Besides *P. robustus*, *s. str.*, mixed names and species are especially six: *Passalus variiphyllus* (Kuwert, 1891), *Spasalus crenatus* (Mac Leay, 1819), *S. puncticollis* (Le Peletier & Serville, 1825), *S. silvarum* Kuwert, 1898, and the *nomina nuda* *S. crenulatus* and *S. nigrinus* (DEJEAN, 1833). The muddled situation, since the 1840's, had consequences on the knowledge of the distribution and endemism of the species.

So far, in the literature *S. robustus*, *s. auct.*, has for synonyms *S. nigrinus* and *S. silvarum*. Its presumed distribution varied in the time: at first North America and/or the Antilles (*i. e.*: *partim* BURMEISTER, 1847; SMITH, 1852; KAUP, 1868, 1869), then South America, with “Cayenne, Brazil” (KAUP, 1871). FLEUTIAUX & SALLÉ (1890) perturbed these data by asserting that the type locality, hitherto unknown, is Guadeloupe Island, from a collecting by the naturalist F. L'Herminier

(probably the son, 1802-1866). It is also after FLEUTIAUX & SALLÉ — who considered *S. robustus* and *S. crenatus* as distinct species — that remaining authors often included *S. robustus* in the fauna of the Lesser Antilles (*i. e.*: KUWERT, 1891, 1898; LENG & MUTCHLER, 1914; LUEDERWALDT, 1934; PAULIAN, 1947; HINCKS & DIBB, 1958), Trinidad, and ultimately Tobago (SCHUSTER, 1992). To finish, KUWERT (1898) added the Greater Antilles, with Cuba. On the other hand, for GRAVELY (1918), HINCKS & DIBB (1935), and especially LUEDERWALDT (1931) who studied the best the species, *S. robustus* is only reported from South America, mostly in SE Brazil. This opinion has been followed (*i. e.*: REYES-CASTILLO, 1973; BÜHRNHEIM, 1978), although other authors, such as AGUIAR & BÜHRNHEIM (1998, 2011), cited again the species from Amazonia. A last report is French Guiana, on presumed specimens housed in the Muséum national d'Histoire naturelle, Paris (MNHN) (MATOS & MERMUDES, 2014). This is surprising, because there is no *S. robustus*, *s. auct.*, from there in this collection, but most surely about 200 specimens from Brazil (all the states listed below), Argentina and Paraguay. Yet, none of them is cited in same paper. Obviously, these authors have mixed-up *S. robustus*, *s. auct.*, with *S. crenatus*, and they did not consider biogeographical data related to specific distributions. One cannot follow this method.

S. robustus, *s. auct.*, is restricted to southeastern Brazil, Paraguay and northern Argentina and Uruguay. Most part of this distribution, in Brazil, is known thanks to LUEDERWALDT (1931, 1934; see below).

MATERIAL AND METHODS

About 400 specimens were studied and are conserved at the MNHN, the Universidade Federal de Mato Grosso, Cuiabá (UFMG), and in the collections of the authors. The terminology of morphological details follows BOUCHER (2006). The total length is taken from the apex of elytra to the anterior border of evaginated labrum (or possibly to the apex of mandibles in old literature).

RESULTS

Passalus robustus* Percheron, 1835, *s. str.*, **comb. rev.*

Passalus robustus Percheron, 1835: 35.

Tetraracus variiphyllus Kuwert, 1891: 184, **n. syn.**

As usual in the first part of the PERCHERON'S *Monographie* (1835), the description of *Passalus robustus* is precise, with a good figure (for the time) of the head and the pronotum. The author introduces his species implicitly into the pentaphyllous group. However, long lamellate antennae are tetraphyllous, the first article being reduced, thus less distinct. Paradoxally, this important detail was omitted by Percheron, while the origin of his samples was unknown to him. Otherwise, the following characters, given by Percheron, prove that they cannot involve the same species than *Spasalus robustus*, *s. auct.*, nor another registered *Spasalus* species: « 10-11 lignes [22.2-24.2 mm]. ... *corps épais... de l'extrémité du tubercule* [central tubercle] *partent deux carènes ... jusqu'au bord du chaperon* [frontal border], *où elles se terminent par deux dents... le bord du chaperon ... présente au milieu deux petites épines rapprochées* [secondary mediofrontal tubercles]... *Le corselet* [pronotum] *est très bombé... le sillon marginal... du côté de la tête il s'élargit beaucoup, s'avance sur le disque, pour ensuite rejoindre le bord du corselet, et atteint presque le sillon dorsal ; les fossettes méso-sternales sont longues, presque linéaires, se joignant presque à leur extrémité antérieure ; le disque du méta-sternum est accompagné de deux bandes transverses, formées de points agglomérés ... Les élytres sont fortement striées, avec des ponctuations assez prononcées, écartées, pareilles pour toutes les stries... ».*

Consequently, the head and pronotum, pl. 3, fig. 1, are not the ones of a *Spasalus*, as shown by comparing fig. 3, « *Passalus Crenatus* » of 8 lines length (17.6 mm).

In his *Supplément*, PERCHERON (1841) maintained *P. robustus* into the pentaphylous group, but calling back a detail which distinguishes again clearly the species from *S. robustus*, *s. auct.*: « *clypeo* [frontal border], *medio spinis duabus minimis junctis* [secondary mediofrontal tubercles] ». This character state does not exist in *Spasalus*, although one species, *S. bechynei* Boucher, 2015, from Venezuela, Pacaraima, shows relictual secondary mediofrontal tubercles.

Further to FLEUTIAUX & SALLÉ (1890), we owe to CHALUMEAU & GRUNER (1974) the justified uncertainty on the origin of the type. For them, the species was not found again in Guadeloupe, neither on the nearby islands. In other words, it would never have been there. This interpretation did not take place by PAULIAN (1947), although he had also the types and probably more materials of the continent. Then CHALUMEAU (1980) designated the types (25-26 mm length), one from “Guadeloupe”, the other from “Antilles”, both in good condition, in the Chevrolat’s material (MNHN). Finally, CHALUMEAU (1983) added that the species could be only on the continent. Indeed, the description and the types of *P. robustus* do not fit with the only *Spasalus* species of the Antilles, *S. crenatus/puncticollis*, which does not exceed 20 mm length, and which was well known to Chalumeau. We see here that KAUP (1869) — indicating the total length « 8-9 lines [17.6-19.8 mm] *Nacht 10-11 lines* » (in reference to PERCHERON, 1835, see above) — deals with a clearly smaller species than the original *P. robustus*.

***Tetraracus variiphyllus* Kuwert, 1891, n. syn. for *Passalus robustus* Percheron, 1835.** — The examination of the types of *P. robustus* shows that they are conspecific with *Passalus variiphyllus* (Kuwert 1891), a Guyano-Amazonian species widely distributed and rather common. *Tetraracus variiphyllus* was described from Amazonia (KUWERT, 1891); then KUWERT (1898) added Guyana. The type (MNHN, female, see BOUCHER, 1986) corresponds accurately to the description of *P. robustus*. No author underlined this fact. *P. variiphyllus* remained for a time little known, until LUEDERWALDT (1931) indicates, apparently without error, new specimens from Brazil (Amazonas: Manaus). Later HINCKS (1950) cited Guyana, BOUCHER (1986) French Guiana, AGUIAR & BÜHRNHEIM (1992) and CASTILLO & REYES-CASTILLO (2003) other areas of Brazilian Amazonas, FONSECA & REYES-CASTILLO (2004) Brazil (Amapá, Pará, Rondônia, Roraima), AMAT-GARCÍA *et al.* (2004) and REYES-CASTILLO *et al.* (2005) Colombia (Amazonas, Guainía, Meta, Valle del Cauca), and the last authors, Peru (Madre de Dios: Tambopata). We examined about 220 specimens of the three Guyanas, Trinidad, Venezuela (Amazonas, Bolívar), Colombia (Amazonas, Meta), Peru (Loreto), Ecuador (Pastaza, Sucumbios) and Brazil (Amapá, Amazonas, northern Mato Grosso, Pará). The species is limited to low altitude (≤ 800 m), by-passing the Guyana Massif and occupying the extended Amazonian Hylaea, the Atlantic Guyanas up to Trinidad. This corresponds to the so large area of dominant Guyano-Amazonian passalids, for example the Proculini *Veturius sinuosus* (Drapiez, 1820), and to a lesser extent *V. cephalotes* (Le Peletier & Serville, 1825), as studied BOUCHER (2006).

We note finally that *Passalus robustus* does not belong to the real *Passalus* Fabricius, 1792, *s. str.*, for which started the splitting of this polyphyletic genus (BOUCHER, 2015b). The species (with others) should be transferred to another genus.

Spasalus robustus* (Percheron, 1835), *s. auct.

***Spasalus silvarum* Kuwert, 1898, n. stat.** — It is the same species than *S. robustus*, *s. auct.*, as already reported by LUEDERWALDT (1931) and HINCKS & DIBB (1935), and who were followed by the authors. The two syntypes are 17.6 mm length, young mature stages, slightly dark brown, in perfect condition and labeled by Kuwert “*silvarum* Kuw, Bahia” (ex. Musæo A. Kuwert 1894 in R. Oberthür 1952, MNHN). It is thus this species name which is appropriate, instead of *robustus*. The species is endemic of southeastern South America. From Brazil it is known

in Bahia, Espírito Santo, southern Goiás, southern Minas Gerais, Paraná, Rio, Rio Grande do Sul, Santa Catarina and São Paulo. We add southern Mato Grosso, after study of various specimens (MNHN, UFMG). The endemism of *S. silvarum* is similar to *Veturius transversus* (Dalman, 1817) and *V. sinuatus* (Eschscholtz, 1829), for example, which are widely distributed and characteristic of this biogeographical territory (*sensu* BOUCHER, 2006). In the same way, *S. silvarum* is absent in Amazonia, and consequently in the Guyanas and the Antilles. Citations of these areas result from confusions of species, mainly *S. crenatus* (which is distributed even more widely) on the continent and *S. puncticollis* in the Antilles.

***Passalus nigritus* and *P. crenulatus* Dejean, 1833, nomina nuda.** – Regarding *S. nigritus*, it is another mistake, mainly from KAUP (1871), as it is not conspecific with *S. robustus*, *s. auct.*, but with *S. crenatus*. KAUP (1871) indicates, for *S. nigritus* « *antennarum lobis longissimis aequalibus* », which corresponds to *S. crenatus*, and not to *S. robustus*, *s. auct.*, whose lamellate antennae are always shorter, especially the two first articles, as stated by LUEDERWALDT (1934). The Dejean's collection (*in* J. Thomson *in* R. Oberthür, MNHN) contains one black mature specimen, 19 mm length, in perfect condition, labeled by him "*Passalus nigrita* mihi, h. [*habitat*] Cayenne". The label corresponds to the DEJEAN's *Catalogues* (1833, 1837) and the specimen is a *S. crenatus*. Another specimen, in similar condition, is labeled "*Passalus crenulatus* mihi, h. Brasilia", which corresponds again to said *Catalogues*. This specimen is 16.5 mm length, young mature stage, slightly dark brown, and it is a *S. silvarum*.

CONCLUSION

The species previously included in the "*Spasalus robustus*" concept are finally as follows:

- *Passalus robustus* Percheron (syn. *Tetraracus variiphyllus* Kuwert), in northern South America;
- *Spasalus silvarum* Kuwert (*Passalus crenulatus* Dejean, *nomen nudum*), in southeastern South America;
- *Spasalus crenatus* (Mac Leay) (*Passalus nigritus* Dejean, *nomen nudum*), in northern South America;
- *Spasalus puncticollis* (Le Peletier & Serville), in the Antilles.

Passalus robustus and its former confusions, for almost two centuries, is an original case, but not isolated in Passalidae. There are others comparable, including supposed well-known species. Retrospectively, we shall note that DEJEAN (1833), of whom all passalid beetles are unfortunately *nomina nuda*, is the first author who separated suitably, with safe origins, the most mixed *Spasalus* and *Passalus* species.

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