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New insights into the distribution of the obscure digger wasp *Sphex optimus* F. SMITH, 1856 (Hymenoptera: Apoidea: Sphecidae)

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Abstract
Until now, *Sphex optimus* F. SMITH, 1856 has been known from only the holotype which had presumably been collected in Western Africa. Here, new records of a taxon from Central America with phenotypic accordance are presented. Diagnostic characters of *S. optimus* and the Neotropical species are given and the equivalence of the two taxa is being postulated.

Keywords | Insects • taxonomy • Neotropical • Central America • *iNaturalist* • citizen science

Nouvelles connaissances sur la répartition de la Guêpe fouisseuse obscure *Sphex optimus* F. SMITH, 1856 (Hymenoptera: Apoidea: Sphecidae)

Résumé
Jusqu'à présent, *Sphex optimus* F. SMITH, 1856 n'était connu que par l'holotype qui avait vraisemblablement été collecté en Afrique de l'Ouest. De nouvelles données concernant un taxon d'Amérique centrale avec une concordance phénotypique sont présentés ici. Les caractères diagnostiques de *S. optimus* et de l'espèce néotropicale sont donnés et l'équivalence des deux taxons est postulée.

Mots-clefs | Insectes • taxonomie • Néotropical • Amérique centrale • *iNaturalist* • science participative

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INTRODUCTION

Since *Sphex optimus* was first described by British hymenopterologist Frederick SMITH in 1856, no further records of the species had ever been published (PULAWSKI, 2023), which usually indicates that a given taxon is either exceedingly rare or that its validity may in fact be dubious. In the original description, SMITH (1856) stated that the species was collected in Africa, at an unspecified location in Gambia. In 2019, while revising *Sphex* from Sub-Saharan Africa, I studied the holotype of *S. optimus* housed in the collection of the Natural History Museum in London (figure 1) as well as most other types from Afrotropical *Sphex*. In the resulting publication, I noted the lack of any additional specimens among the examined African material and the incongruity of *S. optimus* with all species groups from the continent (DÖRFEL & OHL, 2022). Based on the type's similarity to some Neotropical *Sphex* species, I expressed doubt about the

Figure 1. Holotype of *Sphex optimus* (♀).
Natural History Museum, London. Photo T. H. DÖRFEL.

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supposed locality, as mislabelings have been uncovered quite frequently in older material, and I hypothesized that *S. optimus* might be synonymous to *S. melanopus* Dahlbom, 1843.

FINDINGS

While browsing photos of Sphecidae that had been observed in Central or South America and were subsequently uploaded to the citizen science platform *iNaturalist* (www.inaturalist.org), I came across the image of a very distinct *Sphex* photographed in Costa Rica (figure 2). The sole notable identification key to include any Neotropical species of the genus only covers the fauna of Chile and Argentina (Willink, 1951) and does not contain any taxa that fit the specimen in question. Examination of the material in the collection of the Natural History Museum of Berlin (Naturkundemuseum Berlin) did not yield any similar specimens either. However, comparison with the photograph I had taken of the type specimen of *S. optimus* revealed striking similarities between the two individuals in all visible characteristics.

The most prominent detail is without a doubt the conspicuous color contrast regarding the patches of deep golden tomentum on head, collar and scutum versus the silvery-whitish one on the propodeal apex. The wings are slightly infuscate; metasomal segments I (excepting petiole), II and the anterior part of III are ferruginous, whereas the rest of the body is black, including the legs.

Subsequently, I was able to find six additional observations on the site that showed female specimens which also matched the appearance of *S. optimus*. The metadata from each record have been compiled below, and all localities are shown in figure 3.

Figure 2. Female *Sphex* with tettigoniid prey. Photo Jo de Pauw (CC BY-NC 4.0), https://www.inaturalist.org/observations/20561688, [accessed 15 December 2023], cropped.

Data of suspected *S. optimus*

- **Colombia.** Antioquia Department: San Jerónimo, 6°26'25.8"N, 75°42'50.1"W, 820 m, 27.XII.2018, John Tsinik. (https://www.inaturalist.org/observations/21216107)
- **Costa Rica.** Limón Province: Punta Uva, 9°38'05.0"N, 82°41'03.4"W, 10 m, 29.VII.2021, so-cal-bc-doc. (https://www.inaturalist.org/observations/89136281).
- **Costa Rica.** Puntarenas Province: Osa Peninsula, 8°24'17.8"N, 83°20'11.5"W, 35 m, 18.II.2019, Jo de Pauw. (https://www.inaturalist.org/observations/20561688).
- **Pánama.** Chiriquí Province: Dolega, 8°36'03.0"N, 82°25'21.9"W, 346 m, 10.XII.2023, axca. (https://www.inaturalist.org/observations/193591693).
- **Pánama.** Coclé Province: El Valle de Antón, 8°36'35.2"N, 80°07'54.1"W, 594 m, 21.XI.2021, Kai Squires. (https://www.inaturalist.org/observations/101639344).
- **Pánama.** Los Santos Province: Pocrí, 7°37'51.6"N 80°07'14.4"W, 49 m, 28.09.2020, Horacio Prado. (https://www.inaturalist.org/observations/61131135).
- **Trinidad and Tobago.** Siparia: Avocat, 10°11'51.8"N 61°32'00.8"W, 24 m, 15.09.2023, Angeli Parasramsingh. (https://www.inaturalist.org/observations/183343672).

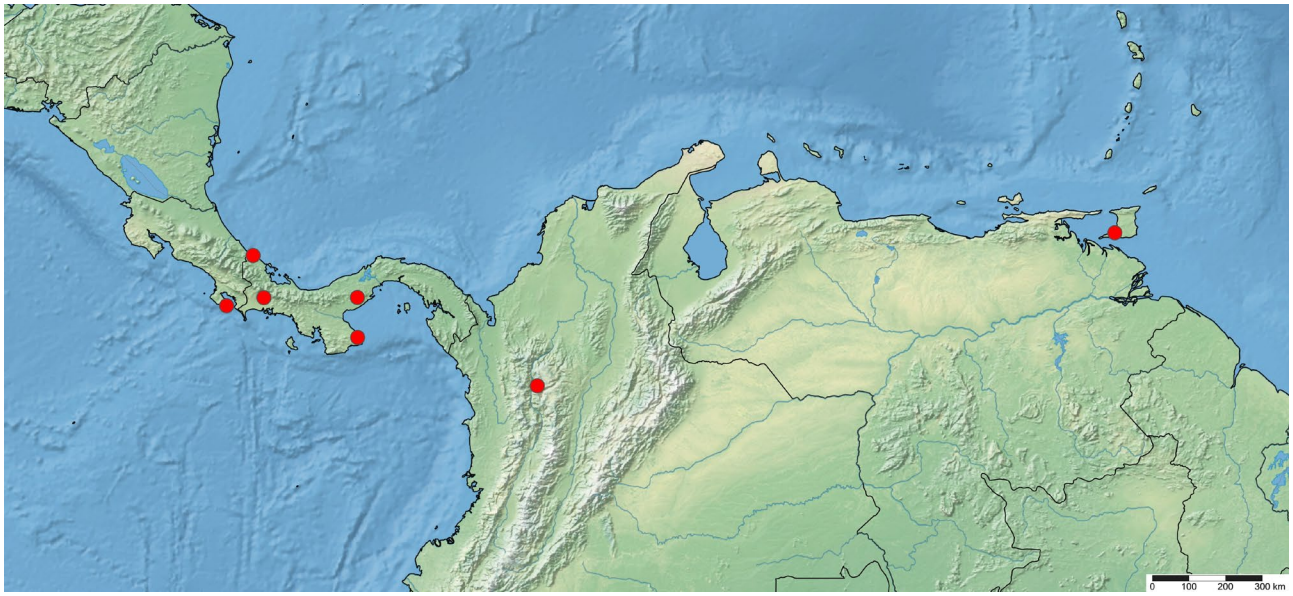

Figure 3. Known occurrences of the taxon presumed to be *Sphex optimus*. Map *SimpleMappr* (https://www.simplemappr.net/).

DISCUSSION

Due to the cited sightings of multiple specimens that match the unusual color pattern of *S. optimus*, there seems to be a certain degree of consistency in these characters, so it can be concluded that the holotype was not merely an aberrant specimen. Thus, contrary to my original hypothesis, *S. optimus* is clearly not conspecific with *S. melanopus*, as females of the latter are devoid of ferruginous coloration on the metasoma, and the mesosomal tomentum is uniformly silvery in both sexes.

While species identification based solely on photographs is not feasible for every group, particularly among insects, I would argue that it is acceptable in this special case. Though several characters that are visible only under high magnification are used when identifying species of *Sphex*, they are mostly needed when dealing with specimens that are uniformly dark in appearance. Otherwise, tomentum color is one of the best available features to distinguish members of the genus (DÖRFEL & OHL, 2022), and since sharply contrasting hues on the mesosoma are only known in a very small number of *Sphex* worldwide (one example being *Sphex pretiosus* DÖRFEL & OHL, 2015), the conspecificity of *S. optimus* with the taxon discussed here is very likely.

Nonetheless, having a specimen on hand for microscopic examination would obviously be ideal. It is conceivable that there is material of the species in the collection of the Insectopia Insect Museum, as it is situated in Puerto Jiménez (Costa Rica), less than 20 km away from one of the locations where an individual was observed. However, an inquiry to the museum has remained unanswered.

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