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First record of the Neotropical myrmicine ant genus *Kempfidris* Fernández, Feitosa & Lattke, 2014 (Hymenoptera: Formicidae) for Peru

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Abstract: The ant genus *Kempfidris* comprises a single rarely collected species, *Kempfidris inusualis* (Fernández, 2007). The record presented here represents an extension of this species distribution in the Amazon Basin of approximately 593 km to the south. The specimens were collected in the leaf litter of a seasonally flooded area. This record consolidates the hypothesis that *K. inusualis* is a ground-dwelling species that inhabits leaf litter and probably nests in rotten logs or other dead wood. This finding highlights the importance of the choice of proper sampling methods to uncover the hidden fauna of a given locality.

Key words: Tambopata National Reserve; Amazon; Solenopsidini

The recently described ant genus *Kempfidris* Fernández, Feitosa & Lattke, 2014 (Formicidae: Myrmicinae: Solenopsidini) comprises a single rarely collected species, *Kempfidris inusualis* (Fernández, 2007). Very little is known about the natural history of *K. inusualis* and the few observations suggest these ants are ground-dwelling and use rotten logs as nesting sites (Fernández et al. 2014). The workers are similar in size though some discrete morphological variation can be found among specimens along their geographical range (Fernández 2007).

Kempfidris inusualis was originally described as a species in the genus *Monomorium* Mayr, 1855 despite its singular combination of characters, which raised questions about its position within the Myrmicinae. After further study of morphological and molecular evidence, Fernández et al. (2014) recognized this species' distinctiveness and created the new, monotypic genus *Kempfidris*. At that time, the relationships among the main lineages of Myrmicinae were poorly known, including the position of *Kempfidris*. More recently, Ward et al. (2015) presented an evolutionary study of the subfamily based on molecular markers, recovering a robust phylogeny that positions *Kempfidris* as the sister group of *Tropidomyrmex* Silva, Feitosa, Brandão & Diniz, 2009 in the newly delimited tribe Solenopsidini. Their results corroborated the artificial nature of the cosmopolitan and morphologically diverse genus *Monomorium*, already suspected as polyphyletic by various authors (Bolton 1987; Heterick 2003; Fernández et al. 2014). Additionally, although the previous placement of *K. inusualis* was in *Monomorium*, the former seems to be more closely related to *Solenopsis* than to *Monomorium*.

The known distribution of *Kempfidris* (Table 1) suggests that it is a predominantly Amazonian genus recorded from Venezuela, Ecuador, the Brazilian Amazon, and at single locality on the Atlantic Forest of northeastern Brazil (Fernández et al. 2014). Due

Table 1. Distribution records of *Kempfidris inusualis* in South America.

Localities	Latitude	Longitude	Source
Puerto Maldonado, Peru	12°51′15.4″ S	069°22′15.9″ W	New record
Barrolândia, Bahia	16°05′57″ S	039°16′14″ W	Fernández et al. (2014)
Benjamim Constant, Amazônia	04°22′28″ S	070°01′47″ W	Fernández et al. (2014)
Ecuador, Napo, Limoncocha	00°24′39″ S	076°37′26″ W	Fernández et al. (2014)
Rondônia, Porto Velho, Mutum	09°35′44″ S	065°04′00″ W	Fernández et al. (2014)
Amazonas, Maroa, Venezuela	02°43′48″ N	067°32′34″ W	Fernández et al. (2014)

to its high topographical complexity, Peru presents a great number of ecoregions and vegetation formations that include arid regions, high altitude ecosystems and rainforests (Reynel et al. 2013). Furthermore, Peruvian fauna and flora are known for its impressive diversity, rendering the country one of the most species-rich regions of the world, with high levels of endemism (Reynel et al. 2013).

Bezdecková et al. (2015) recently published a comprehensive species list of ants for Peru, which included 592 species. Guenárd and Economo (2015) presented additional records that increased the number of Peruvian ant species to 679. However, despite recent efforts to reveal the ant fauna of Peru, little collecting has been done in Peru as compared to Brazil, Colombia or Ecuador, and it is expected that Peru's diversity is under sampled. All this indicates that our knowledge of Peruvian ant diversity is inadequate and many new records, as well as taxonomic novelties, are to be expected with additional sampling. This is the case with *Kempfidris*, even though its presence was predicted by its distribution range (Bezdecková et al. 2015). In this work, we present the first record of *K. inusualis* for Peru, extending the distribution limits of this enigmatic genus in South America. We also discuss the importance of proper sampling methods to uncover the hidden ant fauna.

The specimens reported here were collected on the south bank of the Tambopata River in the Tambopata National Reserve, department of Madre de Dios, Peru. The individuals were collected along the *Condenado I* trail (12°51′15.4″ S, 069°22′15.9″ W), located in an area subject to seasonal flooding near the Sachavacayoc Centre lodge. Thirteen individuals of *Kempfidris inusualis* were collected from a leaf litter sample processed with a mini-Winkler extractor (Fisher 1996). The specimens came specifically from an area at 209 m above the sea level that known to flood during the raining season (Espinoza Villar et al. 2009). Workers were captured between 19–31 July 2012, during the field course *Curso de Hormigas Neotropicales*, organized by the Centro de Ecología y Biodiversidad (CEBIO) based in Lima. The specimens were stored for proper triage until recently, when a careful examination proved that the individuals belong to *K. inusualis*, representing the first record of the genus for Peru (Figure 1).

The specimens are now deposited in the Coleção Entomológica Padre Jesus Santiago Moure of the Universidade Federal do Paraná (DZUP), Curitiba, PR, Brazil, under the voucher code ANT-CO01K.

High resolution images presented here were obtained with a LEICA DFC295 digital camera attached to a LEICA M125 stereoscopic microscope. Photos were combined using Zerene Stacker software at the DZUP. Images were then processed as TIFF files in Adobe Photoshop CS5® to enhance parameters of brightness and contrast. The geographical coordinates were imported from Google Earth 7.0.2® after consulting previous records of *Kempfidris* in the literature and then exported to QGis 2.12.3® for generating the distribution map, using Natural Earth® free vector and raster map data (available at http://www.naturalearth.com).

The most outstanding morphological feature of *Kempfidris inusualis* (Figure 1) is the series of minute, hair-bearing tubercles or cylindrical pegs on the abdominal apex that appear to be an autapomorphy for the genus (Fernández et al. 2014). The species is also characterized by a head that is longer than wide, antennal insertions situated relatively close together, and scapes that fail to reach the vertexal border. In lateral view, the metanotal groove is very deep and well-marked. The propodeal spiracle is circular, with its opening directed posteriorly. The petiole has a well-differentiated peduncle and node, the node with subparallel anterior and posterior faces, and a convex dorsum.

The record presented here extended the distribution of *Kempfidris inusualis* in the Amazon Basin by approximately 593 km to the south from the previously known southernmost record in Porto Velho, Rondônia, Brazil (Fernández et al. 2014). The specimens were collected in an environment very similar to those from where most of the other known specimens have been recorded, i.e. in leaf litter in seasonally flooded areas. Interestingly, the workers from Peru were collected in July, the same time of the year in which all the other known specimens of *K. inusualis* were collected, which coincides with the lowest levels of rainfall for the region (5% of the mean expected annual precipitation) (Espinoza Villar et al. 2009). Fernández et al. (2014) suggested that these ants might be more active in this period, which coincides with the low level of the rivers in the Amazon Basin. It is conceivable that these ants could be migrating into the canopy during the rainy season to escape flooding and come back down again to forage on the newly exposed soil and occupy new nesting sites provided by logs and sticks that have remained as the waters recede (John Lattke, personal communication). The fact that the ants reported here were collected with Winkler extractors consolidate the hypothesis that *K. inusualis* is a ground dwelling species that inhabits the leaf litter and probably nests in rotten logs or sticks, corroborating previous observations in the field (Fernández et al. 2014). In addition, the Peruvian specimens of *K. inusualis* are relatively uniform in size and general aspect when compared to those recorded in other localities.

It is noteworthy that despite the several ant inventories historically carried out in Peru (see Bezdecková et al. 2015), *Kempfidris inusulalis* has never

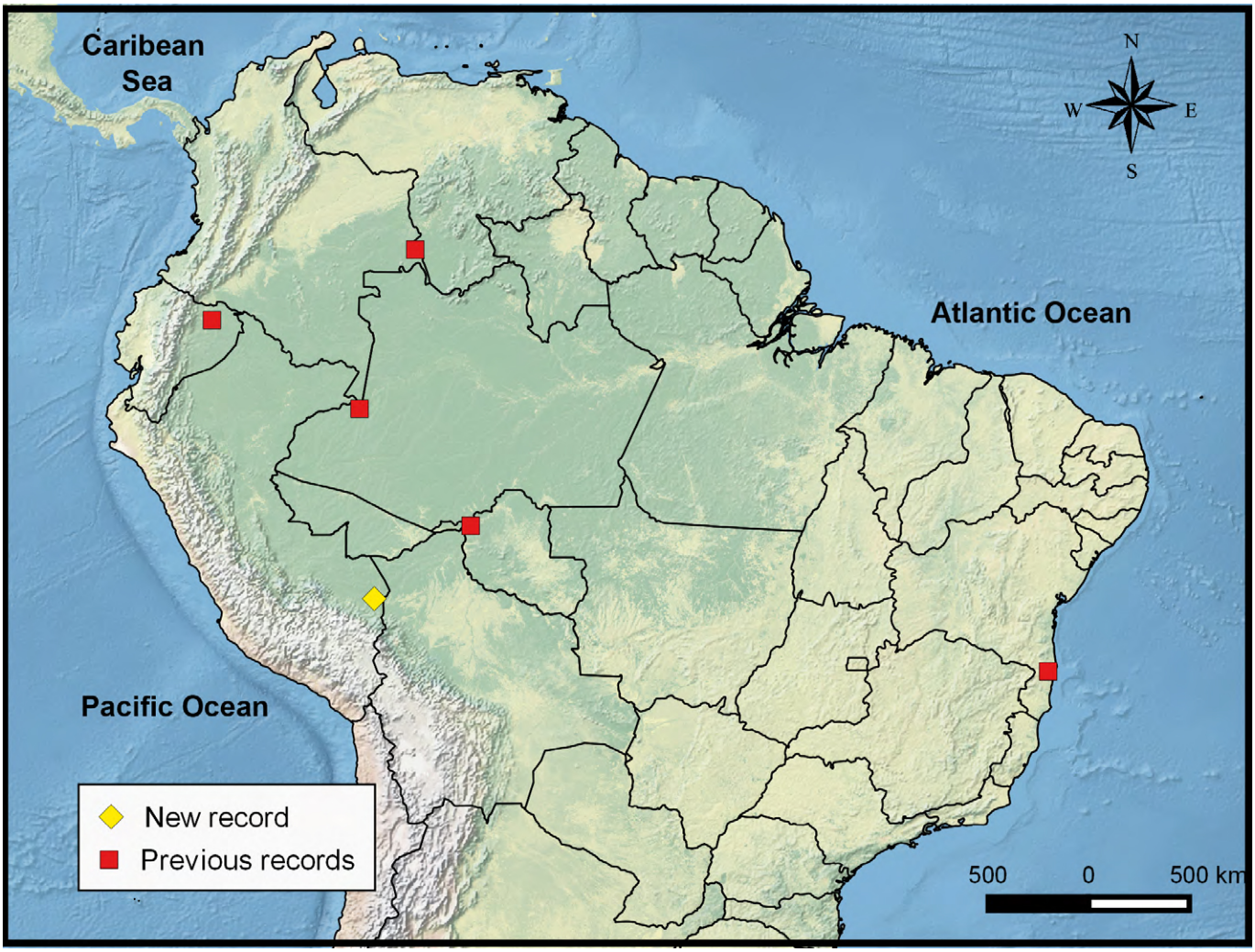

Figure 1. Distribution of *Kempfidris inusualis* in South America.

been recorded so far. Many surveys of the ant fauna use pitfall traps (e.g., Campos et al. 2011; Frizzo et al. 2012), due to their simplicity and low cost, especially when random and quantitative samples are necessary (Souza et al. 2012). However, collecting ants by the Winkler extractor has a greater potential to catch a considerable number of smaller ants and to reach a higher total species richness and ant abundance when compared to pitfall traps (Ivanov and Keiper 2009; Ivanov et al. 2010; Lopes and Vasconcelos 2008; Sabu et al. 2011; Silva et al. 2013). The first record of *K. inusualis* for Peru highlights the importance of the choice of proper sampling methods to uncover the hidden fauna of a given locality (even the well-sampled places), as well as to discover undescribed taxa. It is not possible to rule out the presence of this species in other collections, because of its morphological resemblance to species of *Solenopsis* and *Monomorium*, which can lead to misidentifications, even from experienced myrmecologists.

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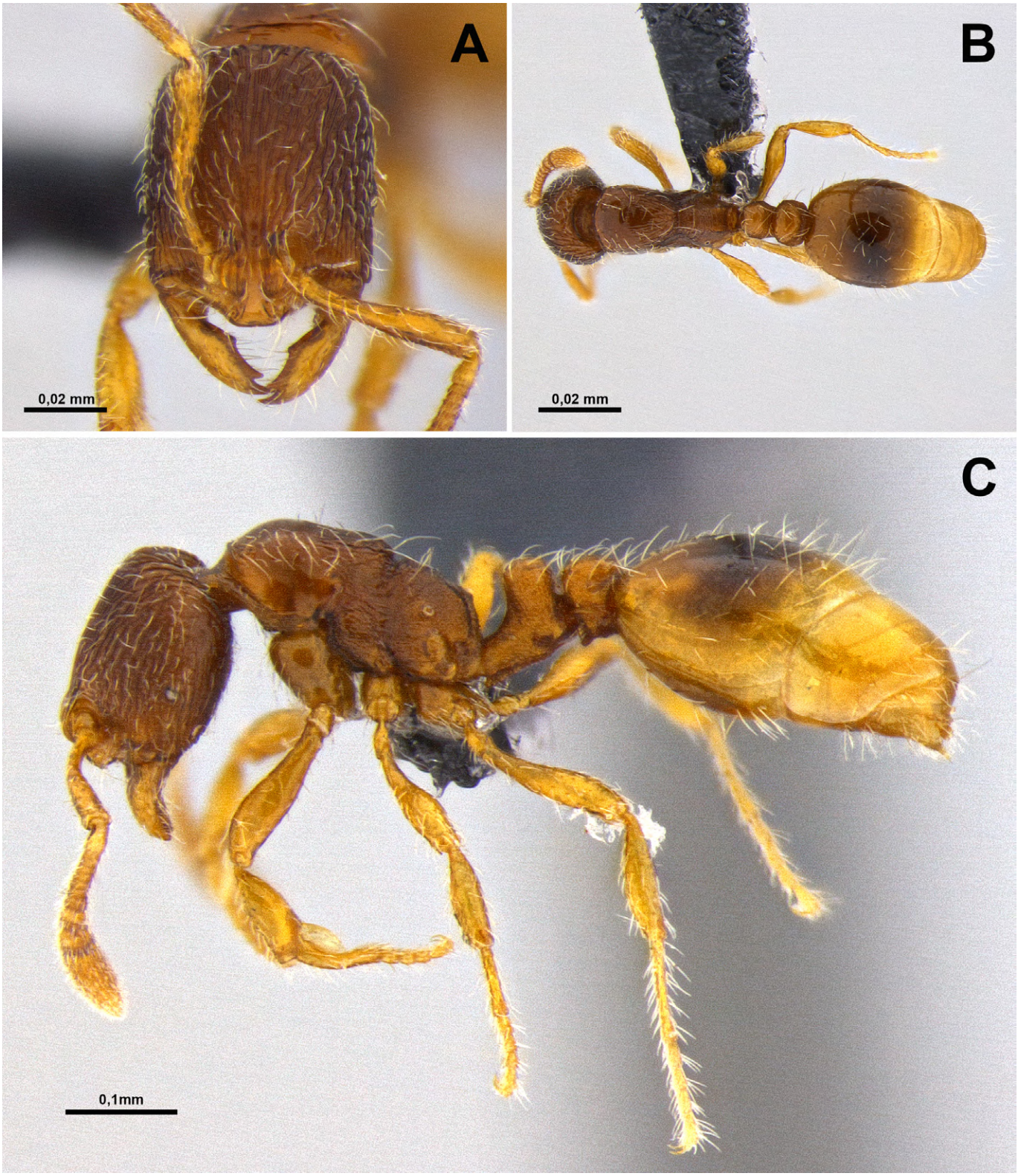

Figure 2. *Kempfidris inusualis* worker from Peru. **A:** head in frontal view; **B:** body in dorsal view; **C:** body in lateral view.

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