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Front cover: Red mangrove landscape in the Gambia. © M. Keita.

Ants nesting in red mangroves of The Gambia (West Africa)

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Abstract

Ants are an important component of most terrestrial ecosystems, where they perform a wide variety of ecological functions and often dominate the arthropod community. Red mangroves (*Rhizophora* spp.) grow in and adjacent to shallow brackish water in subtropical and tropical estuaries around the world, providing an arboreal habitat for ants, often completely isolated by water from any terrestrial habitat. We surveyed ants nesting in dead vegetation of red mangroves, including twigs, small branches, air roots, and prop roots, at six sites (10 samples per site) in The Gambia. We collected a total of nine ant species, including three possibly undescribed species: *Cataulacus traegaordhi* Santschi, 1914, *Crematogaster coelestis* Santschi, 1911, *Crematogaster gambiensis* André, 1889, *Crematogaster kneri dakarensis* Santschi, 1914, *Crematogaster* sp. 1, *Lepisiota canescens* (Emery, 1897), *Monomorium trake* Bolton, 1987, *Tapinoma* sp.1, and *Tapinoma* sp. 2. All nine species appear to be native. Protecting red mangroves in The Gambia will help conserve native species living in this unique habitat.

Keywords: biodiversity, exotic species, native species

Introduction

Ants are an important component of most terrestrial ecosystems, where they perform a wide variety of ecological functions and often dominate the arthropod community (Hölldobler & Wilson, 1990). Red mangroves (*Rhizophora* spp.), which grow in and adjacent to shallow brackish water in subtropical and tropical estuaries around the world (Spalding *et al*. 2010), provide a unique arboreal habitat for ants, often completely isolated by water from any terrestrial environment. Many ant species commonly nest in the dead, hollow vegetation of red mangroves (Simberloff & Wilson, 1969, 1970; Simberloff, 1976). Some ant species living in red mangroves are rare or absent neighboring terrestrial environments (Wetterer, 2018a, b). For these ant species, red mangroves appear to provide an important refuge from terrestrial predators and competitors.

In the present study, we surveyed ants nesting in red mangroves of the West African nation of The Gambia (Fig. 1), where mangroves extend approximately 200 km along the shores of the Gambia River and its tributaries, covering 580 km^2, about 5.8% of the land area of the country (Spalding *et al*. 2010). We were particularly interested in evaluating whether we would find any undescribed native ant species that were potentially red mangrove specialists, and whether any non-native arboreal ants have invaded this habitat.

Methods

In November 2022, we collected samples of dead vegetation of red mangroves, including twigs, small branches, air roots, and prop roots, at six sites (10 samples per site) that we accessed on foot (Fig. 1). We placed each vegetation samples into separate one-liter plastic bags. Within a site, we collected each sample from a separate mangrove or group of mangroves, usually at least 5 m from any other sample. We cut open twigs and branches lengthwise in a Davis sifter, recording the ants from each of the 60 samples.

Ants were identified based on keys in Bolton (1974, 1982, 1987) and Fisher and Bolton (2016), and comparison with specimens in the Kiko Gómez personal collection (KGAC) and with the type images available at Antweb. We deposited voucher specimens in the US National Museum of Natural History (NMNH) and KGAC.

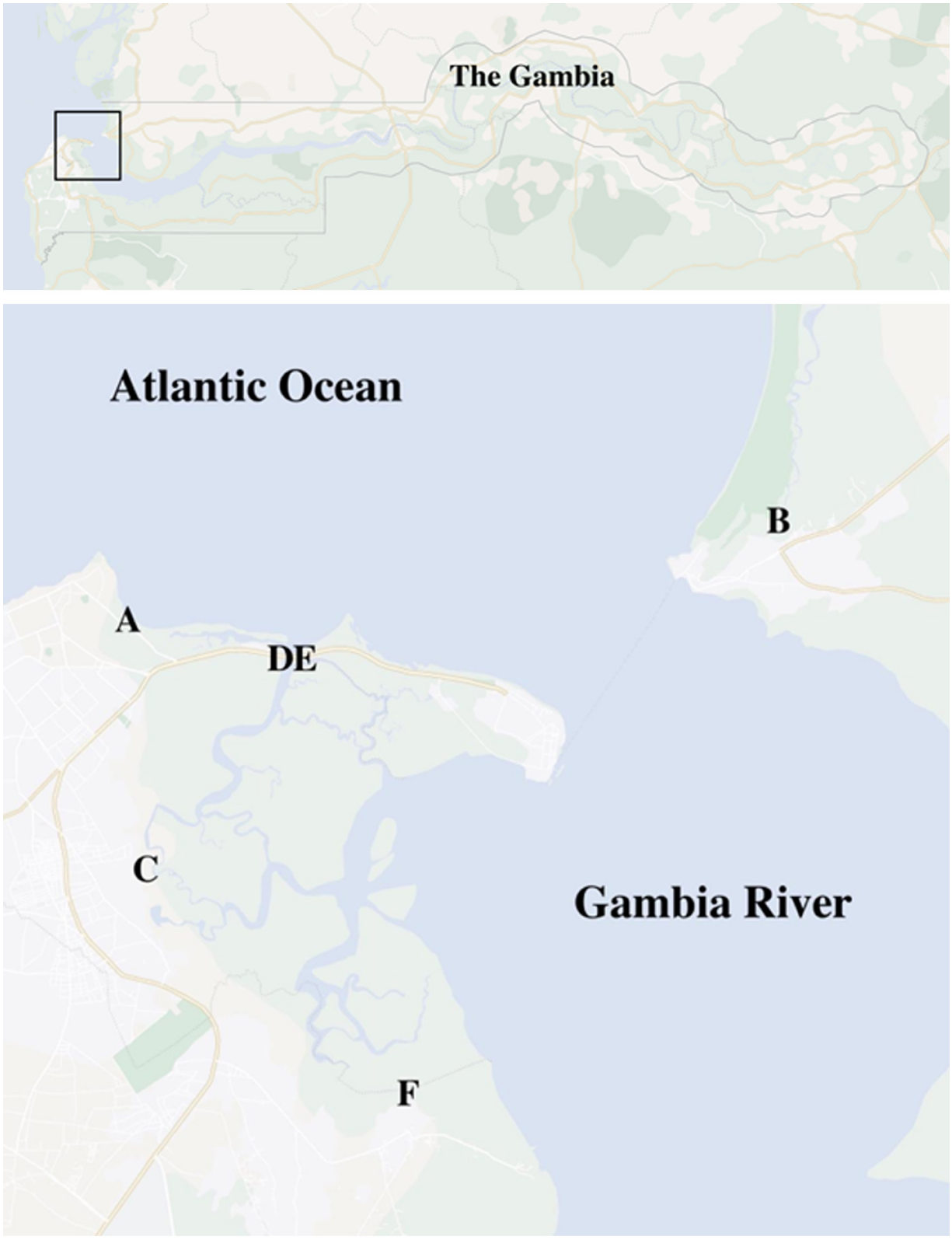

Fig. 1. Study area near the mouth of the Gambia River (rectangle above); six study sites (A-F below). Map data from Google Maps.

Results

We collected nine ant species nesting in the red mangroves (Table 1; Figs 2-7) at six sites (geo-coordinates, date, and collectors in parentheses): A: Tanbi Wetlands National Park (13.475, -16.662; 17-Nov-22; JKW & MK), B: Essau (13.493, -16.524; 19-Nov-22; JKW), C: Tallinding (13.422, -16.657; 18-Nov-22; JKW & MK), D: Denton Bridge west side (13.468, -16.629, 18-Nov-1022, MK), E: Denton Bridge east side (13.467, -16.628,19-Nov-1022; MK), F: Mandinari (13.383, -16.603; 15-Nov-22 & 21-Nov-22; JKW & MK). We recorded two to six species per site (Table 1). Because ant species commonly dominated some sites but were absent at nearby sites, samples within sites were not statistically independent of each other.

Table 1. Number of red mangrove vegetation samples collected at six sites in the Gambia with different ant species present (ten samples collected per site). A, Tanbi. B, Essau. C, Tallinding. D, Denton Bridge west. E, Denton Bridge east. F, Mandinari.

	A	B	C	D	E	F	Total
Cataulacus traegaordhi	2	4	4	2	2	2	16
Crematogaster gambiensis	-	-	4	1	3	8	16
Crematogaster sp 1	7	3	-	-	2	-	12
Tapinoma sp 1	3	5	-	-	1	3	12
Tapinoma sp 2	2	-	-	-	2	-	4
Lepisiota canescens	-	4	-	-	-	-	4
Crematogaster kneri dakarensis	-	3	-	-	-	-	3
Crematogaster coelestis	2	-	-	-	-	-	2
Monomorium trake	1	-	-	-	-	-	1

Discussion

Based on their known geographic distribution (see antmaps.org), all ant species we found living in red mangroves appear to be native to the Afrotropics (Table 1). These include three morphospecies for which we could not, at present, assign a specific name and may be candidates for new species (Figs 4, 6, 7).

In earlier studies using the same sampling methods, Wetterer (2018a, b) found 22 ant species nesting in red mangroves at 98 sites along the east coast of Florida, and 18 ant species nesting in red mangroves at 30 sites along the southeast coast of Jamaica. The Florida ants included ten native species, eight exotic species (four Old World, four New World), and four New World species whose status in Florida is uncertain. The Jamaican ants included 13 native species and 5 Old World exotics). Thus, even with a much lower sampling effort in The Gambia, we found almost as many native ant species as in these earlier studies. Strikingly, we found no non-native ants in the Gambian red mangrove, despite sampling in highly accessible sites. We do not know whether this is due to the exclusion of non-native ants by the resident native ants or if non-natives species may have not yet invaded the sites where we surveyed.

The nine Gambian mangrove ant species are placed in five genera. Ants in three of these genera (*Crematogaster, Monomorium,* and *Tapinoma*) are common in red mangroves of Florida and Jamaica (Wetterer, 2018a, b). The other two ant genera we found in Gambian mangroves have morphological analogs in Florida and Jamaica: *Cataulacus traegaordhi* is analogous to *Cephalotes* spp., and *Lepisiota canescens* is analogous to *Nylanderia* spp. Among the species of arboreal ants notably absent from our Gambian samples are arboreal carpenter ants (*Camponotus* spp. and *Colobopsis* spp.) and twig ants (*Tetraponera* spp.). It seems likely that multiple species in these genera await discovery in the red mangroves growing at other sites in The Gambia.

Our surveys represent just a preliminary study in one small part of The Gambia (Fig. 1). Additional ant surveys conducted in the many other mangrove areas, both pristine and disturbed, elsewhere in The Gambia are needed to understand better the importance of mangroves to ant species diversity. It would be particularly interesting to survey ants in the most pristine mangrove areas in The Gambia that are accessible only by boat.

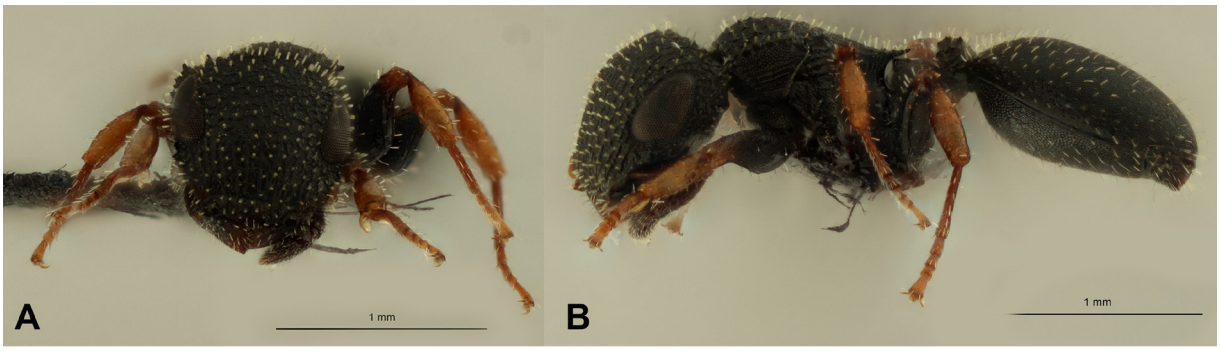

Fig. 2 *Cataulacus traegaordhi* Santschi, 1914, worker. [KGCOL02497]. A, frontal view. B, lateral view. © J. Lalanne

Fig. 3 *Crematogaster gambiensis* André, 1889, worker [KGCOL02459]. A, frontal view. B, lateral view. © J. Lalanne

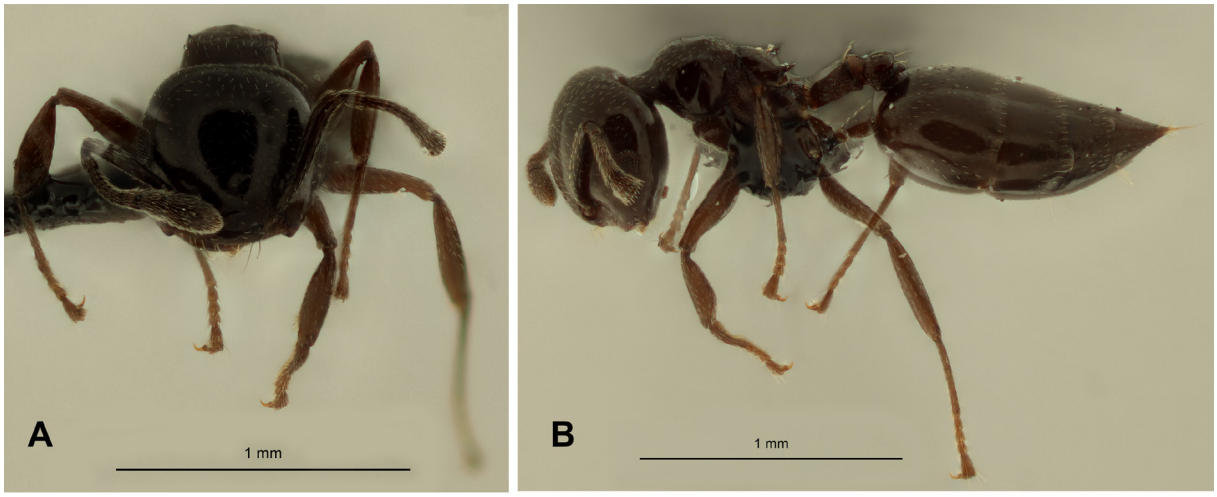

Fig. 4 *Crematogaster sp 1* worker [KGCOL02455]. A, frontal view. B, lateral view. © J. Lalanne

Fig. 5 *Lepisiota canescens* Emery, 1897, worker [KGCOL02501] . A, frontal view. B, lateral view. © J. Lalanne

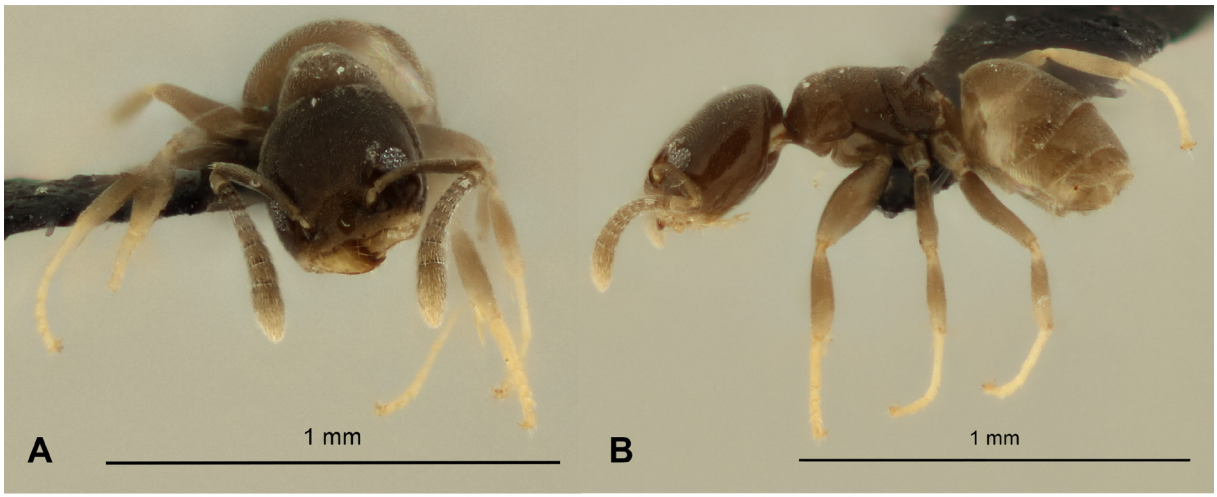

Fig. 6 *Tapinoma sp 1* worker [KGCOL02590]. A, frontal view. B, lateral view. © J. Lalanne

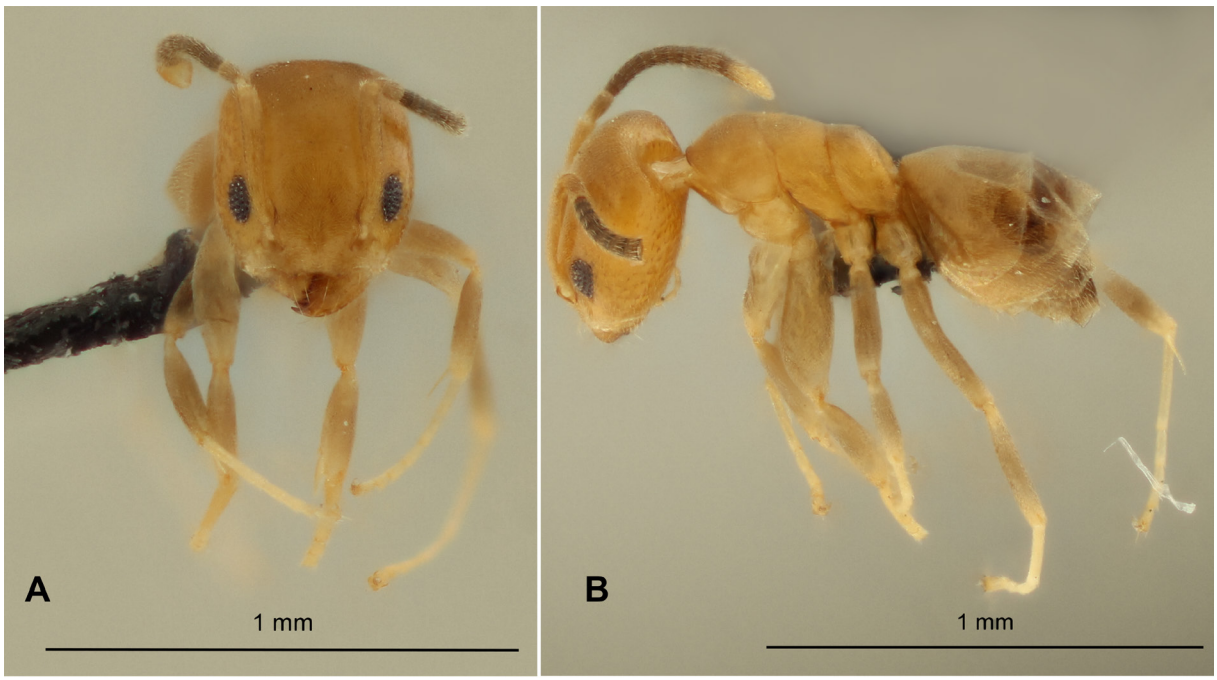

Fig. 7 *Tapinoma sp 2* worker [KGCOL02535]. A, frontal view. B, lateral view. © J. Lalanne

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