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RESEARCH ARTICLE

A preliminary checklist of the ant (Hymenoptera, Formicidae) fauna of Senegal

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Abstract: This work presents the first checklist of the ant species of Senegal, based on a review of the literature and on recent thorough sampling in Senegalese orchard agrosystems during rainy and dry seasons. Eighty-nine species belonging to 31 genera and 9 subfamilies of Formicidae are known. The most speciose genera were *Monomorium* Mayr, 1855, and *Camponotus* Mayr, 1861, with 13 and 12 species, respectively. The fresh collection yielded 31 species recorded for the first time in Senegal, including two undescribed species. The composition of the ant fauna reflects the fact that Senegal is in intermediate ecozone between North Africa and sub-Saharan areas, with some species previously known only from distant locations, such as Sudan.

Key words: Ants, checklist, new records, sub-Saharan country, Senegal.

Introduction

Information on the ant fauna of Senegal is mostly known from scattered historical records, and no synthetic list has been published. The first record dates from 1793 while the most recent was in 1987 (see Table 1). Presence data can also be deduced from papers studying the ecology and/or the behaviour of some ant species (Agbogba 1991; 1992; Agbogba & Howse 1992; Gillon *et al.* 1984). Other have reported the participation of ant species in the diet of animals such as Chimpanzees (Bogart & Pruetz 2011; McGrew *et al.* 2005).

The two Senegalese agroecosystems known as the *"Niayes"*: (Mboro, Noto and Ndoyène localities in the maps) and "*Plateau de Thiès*": (Thiès, Pout and Sindia localities in the maps) (Fig. 1) represent two major fruit and vegetable production areas in Senegal. Plant diseases and damage caused by fruit flies are becoming common to these two agroecosystems (Diatta *et al.* 2013; Diamé *et al.* 2015). Ants are important components of ecosystems (Hölldobler & Wilson 1990; Passera & Aron 2005) and are even considered as ecosystem engineers (Folgarait 1998). Because of their predatory behaviour, ants can be helpful auxiliaries in pest control (Philpott & Armbrecht 2006; Van Mele *et al.* 2007; Dwomoh *et al.* 2008). A meta-analysis of studies in agroecosystems has found that generalist predators (single- and multiple-species assemblages) controlled herbivore abundance (79% of studies) and reduced plant damage and increased plant yields (65% of studies) (Symondson *et al.* 2002).

A detailed description of the ant fauna of the "*Niayes*" and "*Plateau de Thiès*" agroecosystems has thus been undertaken, and might usefully improve the current scattered knowledge of the ant fauna of Senegal. Actually, there are already some regional treatments of ant faunas in Africa. For instance, in the last decades, several works have been undertaken in many parts of Africa including countries such as Ghana (Belshaw & Bolton 1993), Nigeria (Taylor 1977), Tanzania (Robertson 1999), Gabon (Fisher 2004), Kenya (Hita Garcia *et al.* 2009, 2013), Cameroon (Deblauwe & Dekoninck 2007). Since a more complete inventory of African ants is needed and even essential to advance understanding their distribution throughout Africa and take full advantage of their demonstrated value, this paper presents a more recent list of the ant species of Senegal based on a review of the literature and on material we collected in the "*Niayes*" and "*Plateau de Thiès*" orchard agroecosystems. Senegal is an African western country with an arid climate generated by the sudano-sahelian climatic conditions that occur in that part of the continent. It is mainly a low-lying country, with a semi-desert area in the north and northeast and forests in the southwest. The largest rivers include "The Senegal" in the north and "The Casamance" in the southern tropical climate region.

Material and methods

Our literature review is based on historical taxonomic papers as well as other ant-related papers. A large part of this literature review, as well as additional data, was available from the second author's web site on the ants of Africa (Taylor 2014a). The new investigations were conducted in orchard agroecosystems of the "*Niayes*" and "*Plateau de Thiès*". These regions are characterized by ferralic arenosols and a sudano-sahelian climate with unimodal rainfall from July to September. Although climate is sudano-sahelian for these agroecosystem zones, temperatures are lower in the west, especially in the northern coast than in the center of the country. For instance, the '*Niayes*" localities benefit to winds ocean influence that permit them to record more longer low temperatures than localities of '*Plateau de Thiès*'(Fig. 1).

Ants were sampled in 51 orchards in 2012, during both the dry and rainy seasons, using pitfall traps (40 in each orchard) distributed on the ground over all microhabitats (sun exposed habitats, shaded habitats and hedges), hand collection (on ground, tree trunks, dead woods etc.) and dietary baits (tuna fish). There was no specific period of the ant sampling in the month. The pitfall traps were placed randomly in order to last 48 hours in the orchard before we completed the survey the day of picking up the traps, during both the dry (May - July) and rainy (August-October) seasons. Ants were placed in plastic vials filled with 80°

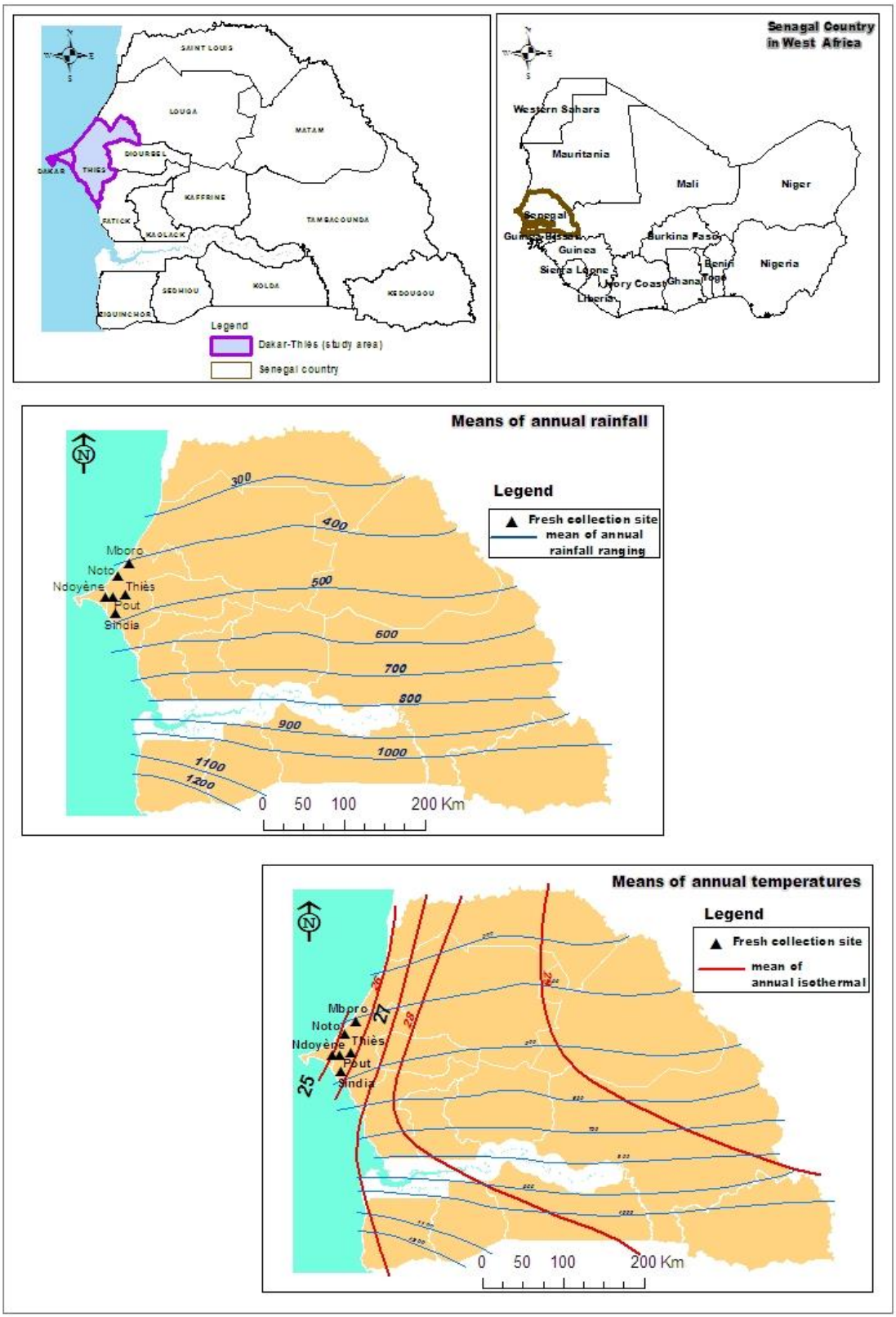

Figure 1. Maps presenting Senegal in West Africa (topright), the "*Niayes*": (Mboro, Noto and Ndoyène localities) and "*Plateau de Thiès*": (Thiès, Pout and Sindia localities), two agroecosystem zones in Senegal where fresh collection of ants was carried out (topleft), and the averages of annual rainfall (middle) and annual temperatures (bottom) in the country (source: Sagna & Leroux, 2000).

alcohol. Once in the laboratory, each sample was sorted and the specimens classified into morphospecies. Specimens of each morphospecies were examined and identified by Dr Brian Taylor. The original specimens as mounted and identified by Brian Taylor are held by him and will be deposited in the Oxford University Museum of Natural History (Taylor 2014b). The species list (Table 1) is arranged in alphabetic order by subfamily, genus and species. The nomenclature largely follows the Bolton online catalogue of the ants of the world (AntCat) (Taylor 2014c). In most cases, type images are available on-line from the Antweb.org project of the California Academy of Sciences.

Results

The ant species list of Senegal (Table 1) contains 89 described species. Two among them are undescribed and new to science. They belong to the genera *Monomorium* Mayr, 1855 and *Tetramorium* Mayr, 1855. The 89 species are distributed across 31 genera belonging to 9 subfamilies: Aenictinae, Amblyoponinae, Cerapachyinae, Dolichoderinae, Dorylinae, Formicinae, Myrmicinae, Ponerinae, and Pseudomyrmecinae. While the authors are aware of the work of Brady *et al.* (2014), B. Taylor, as the prime taxonomist, considers that subsuming the Aenictinae, Amblyoponinae and Cerapachyinae under Dorylinae, is unhelpful in the context of identification based on morphology. The most speciose subfamily is Myrmicinae and the most speciose genera is *Monomorium* with 41 and 11 species respectively (Table 1).

Table 1. Checklist of the ant species of Senegal. The list is arranged alphabetically by subfamily, genus and species. Names in bold refer to species recorded in Senegal for the first time. Species with an asterisk have been recorded in our survey of orchard agroecosystems in the "*Niayes*" and "*Plateau de Thiès*".

Subfamilies	Scientific valid name, author descriptor and year of species description	References of collection or the last report of the species in Senegal	Checked and type images: e.g AntwebCASENT+code number
AENICTINAE	*Aenictus furculatus* Santschi, 1919	Santschi (1920a)	Type location Senegal; CASENT0911425
	Aenictus fuscovarius Gerstäcker, 1859	Wheeler (1922); as *Aenictus fuscovarius* ssp *magrettii*	Type location Mozambique; no type images; *magrettii*, CASENT0903755, from Sudan
	Aenictus humeralis Santschi, 1910	Santschi (1910); as ssp *chevalieri*	Type damaged, see subspecies (male) *chevalieri*, CASENT0911429, from Senegal
	Aenictus soudanicus Santschi, 1910	Santschi (1913)	Type location Mali, male, CASENT0911441
AMBLYOPONINAE	*Stigmatomma santschii* Menozzi, 1922	Menozzi (1922); genus revived by Yoshimura & Fisher (2012)	Type location Senegal; no type images; type not obviously sighted by Yoshimura & Fisher (2012)
CERAPACHYINAE	***Cerapachys noctambulus*** (Santschi, 1910)		Type location Tunisia; first record of the worker morph; tentative attribution of workers is by comparison with the type male, CASENT0911262
DOLICHODERINAE	***Tapinoma demissum*** Bolton, 1995		Type location Zimbabwe; syntype worker, CASENT0903071
	Tapinoma melanocephalum (Fabricius, 1793)		Type location French Guyana; no type images but well documented tramp species, e.g. CASENT0903063
	Technomyrmex senex Bolton, 2007		Type location Gabon, CASENT0903054

DORYLINAE	***Dorylus aegyptiacus** Mayr, 1865 **(stat. rev.)**	Revived status here; workers reported here	Type location Egypt; male, CASENT095641; workers checked against ssp; workers checked against ssp *abyssinicus*, CASENT0903696
	Dorylus affinis Shuckard, 1840	Santschi (1914)	Record here postulated as *D. aegyptiacus*. The holotype *D. affinis* is a male, CASENT0901948, as are all the holotypes of the various "subspecies" listed by Bolton (1995).
	Dorylus burmeisteri Santschi, 1912	Santschi (1912); Bogart & Pruetz (2011)	Type location Sierra Leone, no type images; workers of ssp *hybridus*, type location Senegal, CASENT0911309
	Dorylus fulvus Westwood, 1839	Santschi (1914)	Type location unknown, CASENT0901593
	Dorylus striatidens Santschi, 1910	Santschi (1910)	Type location Senegal, CASENT0911344
FORMICINAE	*Camponotus acvapimensis* Mayr, 1862	Mayr (1895)	Type location Ghana; type minor worker, CASENT0249859
	Camponotus aegyptiacus Emery, 1915	Santschi (1926)	Type location Egypt; ssp *claveaui* type location Senegal, CASENT0911888
	Camponotus bituberculatus André, 1889	André (1889)	Type location Senegal, CASENT0911829
	Camponotus compressiscapus André, 1889	André (1890)	Type location Sierra Leone, CASENT0910468
	Camponotus foraminosus Forel, 1879	Forel (1879)	Type location Senegal; no type images but other Forel workers e.g. CASENT09010477
	Camponotus ilgii Forel, 1894	Santschi (1913)	Type location Ethiopia, CASENT0910497
	Camponotus maculatus Fabricius, 1782	Emery (1892)	Type location West Africa; no type images but very common species
	***Camponotus oasium** Forel, 1890		Type location North Africa; type images are of a queen, CASENT0249885; BT has other workers associated with a matching queen
	Camponotus sericeus Fabricius, 1798	Santschi (1914)	Type location Senegal; no type images but see ssp *sulgeri*, CASENT0911867
	Camponotus chilon Emery, 1925	Forel (1901) as *Camponotus maculatus* race *solon* n. var.*chilon*	Type location Senegal, CASENT0910267. New status here as readily separable from *Camponotus solon* Forel, 1886 (type location Angola)
	***Camponotus vestitus** **(**F Smith, 1858)		The correct species name is in need of clarification as the type queen of Smith's *Formica vestita* is a species of *Anoplolepis* and not a *Camponotus*.
	Camponotus vividus Forel, 1886	Santschi (1914)	Type location Sierra Leone, CASENT0903485
	***Cataglyphis abyssinica** Forel, 1904		Type location Ethiopia; minima worker verified against cotype CASENT0246892
	Cataglyphis congolensis (Stitz, 1916)	Santschi (1929) as *Cataglyphis bicolor* Fab. Stirps *abyssinica* For. v. *congolensis* Stitz. New species status here, original name *Myrmecocystus bicolor* F. v. *congolensis* n.v.	Type location Chad, CASENT0104614
	***Cataglyphis savignyi** (Dufour, 1862)		Type location Egypt; specimen matches a Santschi identified worker, at CASENT0249854. A purported "type" at CASENT0915501 appears to be have been wrongly labelled at a later date
	***Lepisiota acholli** (Weber, 1943)		Type location South Sudan, CASENT0903162
	Lepisiota canescens	Santschi (1914)	Type location Somalia, CASENT0905153

	(Emery, 1897)		
	Lepisiota capensis (Mayr, 1862)	Mayr (1895), this may have been a misidentification as verifiable records appear to be from south of the Equator	Type location South Africa, CASENT0915714. Note the dark erect hairs
	**Lepisiota laevis* (Santschi, 1913) revived status	Santschi (1913)	Type location Senegal; CASENT0912373
	**Oecophylla longinoda* (Latreille, 1802)	Santschi (1914)	Type location Sierra Leone; no type images of major worker; minor described as *Oecophylla brevinodis* André, 1890, CASENT0913754
	**Paratrechina longicornis* (Latreille, 1802)	Latreille (1802)	Type location Senegal; no type images; well recognised tramp species
	Paratrechina subtilis (Santschi, 1920)	Santschi (1920b)	Type location Senegal, CASENT0912308
	****Tapinolepis simulans*** (Santschi, 1908)		Type location Tunisia, CASENT0912357
	****Tapinolepis pernix*** (Viehmeyer, 1923)		Type location Sudan, (Antweb) FOCOL2894
MYRMICINAE	*Atopomyrmex mocquerysi* André, 1889	André (1889)	Type location Senegal, CASENT0101460
	Carebara sicheli Mayr, 1862	Mayr (1862)	Type location Senegal, CASENT0919628 (queen)
	Carebara silvestrii Santschi, 1914	Santschi (1914)	Type location Guinea, specimens labelled type by Santschi are not from Guinea but Ghana, e.g. CASENT0913522
	****Cardiocondyla emeryi*** Forel, 1881		Type location Virgin Is., tramp species, CASENT0101216
	****Crematogaster brunneipennis*** André, 1890		Type location Sierra Leone, CASENT0902089
	**Crematogaster censor* Forel, 1910	Forel (1910)	Type location Senegal, CASENT0908511
	Crematogaster coelestis Santschi, 1911	Santschi (1939)	Type location Senegal, CASENT0912662
	Crematogaster depressa Latreille, 1802	Mayr (1895)	Type location Guinea, no type images; ssp *fuscipennis*, CASENT0904471
	**Crematogaster kneri* Mayr, 1862	Santschi (1914)	Type location Ghana, CASENT0919670
	**Crematogaster senegalensis* Roger, 1863	Roger (1863)	Type location Senegal, no type images; ssp *devincta*, CASENT0912722
	Melissotarsus emeryi Forel, 1907	Santschi (1914)	Type location Ethiopia, CASENT0101465
	****Meranoplus magrettii*** André, 1884		Type location Sudan, CASENT0915400
	**Messor galla* (Mayr, 1904)	Santschi (1914), Bolton (1982); Gillon et al. (1984)	Type location Ethiopia, CASENT0904127
	**Monomorium areniphilum* Santschi, 1911	Santschi (1919)	Type location Tunisia, CASENT0249829
	**Monomorium bicolor* Emery, 1877	Santschi (1914)	Type location Ethiopia, CASENT0904601
	**Monomorium dakarense* Santschi, 1914	Santschi (1914)	Type location Senegal, CASENT0913570
	****Monomorium osiridis*** Santschi, 1915		Type location Kenya, CASENT0913828
	Monomorium pharaonis (Linnaeus, 1758)	Santschi (1914)	Type location Egypt; no type images, well known tramp species
	Monomorium rosae Santschi, 1920	Bolton (1987) "Senegal, C. Agbogba"	Type location Democratic Republic of Congo, CASENT0010826
	****Monomorium salomonis*** (Linnaeus, 1758)		Type location Egypt; no type images, well known tramp species

	Monomorium senegalense Roger, 1862	Roger (1862)	Type location Senegal; no type images; uncertain status
	Monomorium subopacum (Smith, 1858)	Santschi (1913, as var. *senegalensis*, 1921, same collection but as var. *liberta*)	Type location Madeira, CASENT0010949; Jun. syn. *liberta* type location Senegal, CASENT0913857
	***Monomorium vonatu** Bolton, 1987		Type location Ghana, CASENT0902248
	***Monomorium** **sp**	Undescribed new species	
	Myrmicaria opaciventris Emery, 1893	Forel (1909)	Type location Angola, CASENT0904466
	**Pheidole aeberlii* Forel, 1894	Santschi (1914)	Type location Senegal, CASENT0907803
	***Pheidole andrieui** Santschi, 1930		Type location Mali, CASENT0913264
	***Pheidole bequaerti** Forel, 1913		Type location Democratic Republic of Congo, CASENT0907845
	**Pheidole megacephala* (Fabricius, 1793)	Santschi (1914)	Type location unknown, "Isle de France" (a suburb of Paris); no type images; well known tramp species
	***Pheidole mentita** Santschi, 1914		Type location Guinea, CASENT0913348
	**Pheidole rugaticeps* Emery, 1877	Santschi (1914)	Type location Eritrea, CASENT0904214
	**Pheidole termitophila* Forel, 1904	Santschi (1914)	Type location South Sudan, CASENT0907853
	***Pheidole welgelegenensis** Forel, 1913 **(stat. rev.)**	New status here; raised from race of *P. sculpturata*	Type location Democratic Republic of Congo, CASENT0249075
	***Tetramorium angulinode** Santschi, 1910		Type location Congo, (Antweb) ZFMKHYM20096255
	***Tetramorium muscorum** Arnold, 1926		Type location Mozambique, CASENT0901145
	***Tetramorium rothschildi** Forel, 1907		Type location Ethiopia, CASENT0915429
	**Tetramorium sericeiventre* Emery, 1877	Bolton (1980)	Type location Eritrea, CASENT0102073
	***Tetramorium simillimum** (F Smith, 1851)		Type location Great Britain, tramp species, no type images
	***Tetramorium** **sp.**	Possibly a *Temnothorax* species but unlike all North African species other than *T. barryi* Cagniant, 1971, from which it is easily separated	
	***Trichomyrmex mayri** **(**Forel, 1902)		Type location India, CASENT0249904
	**Trichomyrmex oscaris* (Forel, 1894)	Forel (1910)	Type location Ethiopia, CASENT0908712
PONERINAE	***Anochetus bequaerti** Forel, 1913		Type location Democratic Republic of Congo, (Antweb) RMCAENT000017738
	***Anochetus rothschildi** Forel, 1907		Type location Somalia, CASENT0907412
	**Anochetus sedilloti* Emery, 1884	Santschi (1923)	Type location Tunisia, CASENT0900511
	**Brachyponera sennaarensis* (Mayr, 1862)	Santschi (1921)	Type location Sudan, CASENT0902474
	Leptogenys longiceps Santschi, 1914	Santschi (1914)	Type location Senegal, no type images
	Megaponer analis (Latreille, 1802)	Santschi (1914); Bogart & Pruetz (2011)	Type location Ghana, no type images
	Mesoponera caffraria (F Smith, 1858b)	Agbogba (1991;1992); Agbogba and Howse (1992)	Type location South Africa, queen CASENT0902479

	Mesoponera senegalensis (Santschi, 1914)	Santschi (1914)	Type location Senegal, CASENT0915273
	**Paltothyreus tarsatus* (Fabricius, 1798)	Santschi (1914)	Type location Senegal, no type images
PSEUDOMYRMECINAE	**Tetraponera claveaui* Santschi, 1913	Santschi (1913)	Type location Senegal, CASENT0915524

Note: Unless no type images are available, which mainly applies to very early descriptions, all specimens collected by the authors have been checked against the type photographs on Antweb. It needs to be recognised that the Antweb images almost always have a prevalent magenta tint and the apparent colours may vary from the type descriptions.

After comparing our material with the data available in the literature, we have found that 29 species had previously not been reported from Senegal. These 29 species and the two undescribed species are listed below.

List of the 29 described species recorded in Senegal for the first time (all determinations by B. Taylor)

Anochetus bequaerti Forel, 1913, Pout (14°45'N; 17°03W – 37m), 21.V.2012; Thies (14°47'22.16''N; 16°57'57.16''W – 78m), 28.VII.2012, collect. L. Diamé. Record extends range north from Guinea; seemingly commonest in semi-deciduous forest. Ground-nesting ant.

Anochetus rothschildi Forel, 1907, Peyckouk (14°45'31.88''N; 16°52'56.31W – 53m), 12.VIII.2012; Pout (14°45'28.14''N; 17°03'02.78W – 36m), 06.VIII.2012; Thies (14°47'22.16''N; 16°57'57.16''W – 78m), 28.VII.2012, collect. L. Diamé, workers and queen collected. Record extends known range right across from Somalia, Ethiopia and Kenya. Ground-nesting ant.

Camponotus (Myrmosericus) vestitus (Smith, 1858), Ndoyenne (14°45'47.79''N; 17°09'09.35''W – 49m), 04.V.2012, collect. L. Diamé. Note: the nomenclature is as presently understood but appears to be in need of revision. Record adds to the known range of the workers of a pan-African species. Ground-nesting ant.

Camponotus (Tanaemyrmex) oasium Forel, 1890, Ndoyenne (14°45'46.32''N; 17°09'21.17''W – 49m), 29.VI.2012; Thies (14°47'22.16''N; 16°57'57.16''W – 78m), 28.VII.2012, collect. L. Diamé, minor workers collected. Record extends known distribution across the Sahel region. Ground-nesting ant.

Cardiocondyla emeryi Forel, 1881, Notto (14°59'07.76''N; 17°00'04.10''W – 24m), 13.IV.2012; Thies (14°47'22.16''N; 16°57'57.16''W – 78m), 28.VII.2012, collect. L. Diamé.

Cataglyphis abyssinica (Forel, 1904), Thies (14°47'22.16''N; 16°57'57.16''W – 78m), 28.VII.2012; Ndoyenne (14°45'47.79''N; 17°09'09.35''W – 49m), 04.V.2012 collect. L. Diamé. Record extends known range right across from Ethiopia and Eritrea. Ground-nesting ant.

Cataglyphis savignyi Dufour, 1862, Sindia (14°34'53.84''N; 17°02'24.52''W – 30m), 20.II.2012; Thies (14°47'22.16''N; 16°57'57.16''W – 78m), 28.VII.2012 collect. L. Diamé. Record extends known range right from Egypt and Tunisia. Ground-nesting ant.

Cerapachys noctambulus (Santschi, 1910), Peyckouk (14°45'35.02''N; 16°52'56.19''W – 59m), 12.VIII.2012; Sindia (14°34'53.84''N; 17°02'24.52''W – 30m), 20.II.2012; Ndoyenne (14°45'09.95''N; 17°03'43.49''W – 48m), 21.VI.2012; collect. L. Diamé. First record outside Tunisia and Egypt. Probably a ground nesting ant.

Crematogaster (Cr.) brunneipennis André, 1890, Ndoyenne (14°45’09.95’’N; 17°03’43.49’’W – 48m), 21.VI.2012, collect. L. Diamé. Record extends known range north from Senegal. Arboreal nesting ant.

Dorylus (D.) aegyptiacus Mayr, 1865, **stat. rev.**, Pout sigelec (14°45’40.38’’N; 17°02’25.40’’W – 43m), 21.VI.2012; Ndoyenne (14°45’09.95’’N; 17°03’43.49’’W – 48m), 21.VI.2012, collect. L. Diamé, media workers collected. Regarded here as meriting revived status. Record extends known range right across from Egypt, Sudan and Ethiopia. Ground-nesting ant.

Lepisiota acholli Weber, 1943, Ndoyenne (14°46’05.25’’N; 17°09’04.54’’W – 50m), 07.IV.2012; Thies (14°47’22.16’’N; 16°57’57.16’’W – 78m), 28.VII.2012, collect. L. Diamé. Record extends published range from South Sudan, although B. Taylor has specimens from right across the Sahel. Probably ground nesting but known to forage on plants.

Meranoplus magrettii André, 1884, Pout (14°45’28.14’’N; 17°03’02.78W – 36m), 06.VIII.2012; Thies (14°47’22.16’’N; 16°57’57.16’’W – 78m), 28.VII.2012, collect. L. Diamé. Record adds to known range of a pan-African species. Ground nesting ant.

Monomorium osiridis Santschi, 1915, Sindia (14°34’54.52’’N; 17°02’23.12’’W – 30m), 20.II.2012; Pout (14°45’N; 17°03W – 37m), 21.V.2012, collect. L. Diamé. Record is a suprising extension of the range of a species otherwise known only from Kenya, although M.J. Lush (pers.comm.) has collected it from Gambia. Possibly due to human transportation. Ground foraging and probably nesting.

Monomorium salomonis (Linnaeus, 1758), Notto (14°58’54.28’’N; 17°00’26.19W – 31m), 22.VI.2012; Thies (14°47’22.16’’N; 16°57’57.16’’W – 78m), 28.VII.2012, collect. L. Diamé. Record adds to the known range of an essentially North African species. Ground nesting ant.

Monomorium vonatu Bolton, 1987, Pout (14°45’35.95’’N; 17°03’23.58’’W – 34m), 21.VII.2012; Thies (14°47’22.16’’N; 16°57’57.16’’W – 78m), 28.VII.2012, collect. L. Diamé. Sole prior record is from the type location in Ghana. Ground foraging and probably nesting.

Monomorium sp. undet. [*Trichomyrmex mayri* (Forel, 1902)], Ndoyenne (14°47’54.14’’N; 17°08’30.99’’W – 45m), 24.V.2012, collect. L. Diamé.

Pheidole andrieui Santschi, 1930, Pout (14°45’30.12’’N; 17°03’26.81’’W – 34m), 21.VII.2012; Thies (14°47’03.77’’N; 16°58’04.41’’W – 84m), 20.IV.2012, collect. L. Diamé, minor workers collected. Record extends published range from Mali, although B. Taylor has specimens from right across the Sahel. Probably ground nesting but likely to forage on plants.

Pheidole bequaerti Forel, 1913, Ndoyenne, (14°46’22.08’’N; 17°03’49.90’’W – 45m), 21.VI.2012; Thies (14°47’03.77’’N; 16°58’04.41’’W – 84m), 20.IV.2012; Pout (14°45’28.14’’N; 17°03’02.78W – 36m), 06.VIII.2012, collect. L. Diamé, minor workers collected. Record extends published range from DRCongo, although B. Taylor has other specimens from Senegal and Benin. Ground nesting ant.

Pheidole mentita Santschi, 1914, Sindia (14°34’23.13’’N; 17°02’17.44’’W – 30m), 20.II.2013; Thies (14°47’03.77’’N; 16°58’04.41’’W – 84m), 20.IV.2012; Peyckouk (14°45’35.02’’N; 16°52’56.19’’W – 59m), 12.VIII.2012, collect. L. Diamé, major and minor workers collected. Otherwise recorded only from the type location in Guinea. Probable ground nesting ant.

Pheidole welgelegenensis Forel, 1913, **stat. rev.**, Thies (14°47’03.77’’N; 16°58’04.41’’W – 84m), 20.IV.2012; Ndoyenne, (14°46’22.08’’N; 17°03’49.90’’W – 45m), 21.VI.2012; Pout (14°45’30.12’’N; 17°03’26.81’’W – 34m), 21.VII.2012; Thies (14°47’03.77’’N;

16°58’04.41’’W – 84m), 20.IV.2012; Notto (14°58’54.28’’N; 17°00’26.19W – 31m), 22.VI.2012, collect. L. Diamé, minor workers collected. Regarded here as meriting species status, elevated from a stirps or subspecies of *Pheidole sculpturata* Mayr, 1886. Record extends known range from DRCongo west through Ivory Coast and Guinea. Ground-nesting species.

Tapinolepis pernix (Viehmeyer, 1923), Thies (14°47’22.16’’N; 16°57’57.16’’W – 78m), 28.VII.2012, collect. L. Diamé. Record extends published range from Sudan, although B. Taylor has other specimens from Benin. Probably ground nesting but known to forage on plants.

Tapinolepis simulans (Santschi, 1908), Thies (14°47’03.12’’N; 16°58’02.10’’W – 84m), 28.VII.2012; Peyckouk (14°45’35.02’’N; 16°52’56.19’’W – 59m), 12.VIII.2012, collect. L. Diamé. Sole prior records are from Tunisia and Algeria, although B. Taylor has a specimen from Sudan. Ground-nesting desert species.

Tapinoma demissum Bolton, 1995, Pout (14°45’13.62’’N; 17°03’07.71’’W – 38m), 26.IV.2012; Thies (14°47’22.16’’N; 16°57’57.16’’W – 78m), 28.VII.2012, collect. L. Diamé. Sole prior published records are from Zimbabwe, although B. Taylor has a specimen from Tanzania. Ground-nesting ant.

Tapinoma melanocephalum (Fabricius, 1793), Ndoyenne (14°46”18.15’’N; 17°03’44.90’’W – 47m), 07.IV.2012; Thies (14°47’22.16’’N; 16°57’57.16’’W – 78m), 28.VII.2012, collect. L. Diamé. Commonly recorded as a pan-tropical tramp species. Forages on ground and in buildings, nesting in crevices.

Technomyrmex senex Bolton, 2007, Notto (14°56’26.62’’N; 17°01’31.66W – 23m), 18.VI.2012, collect. L. Diamé. Prior records from Ghana and the Congo Basin, a leaf litter inhabiter (Bolton, 2007).

Tetramorium angulinode Santschi, 1910, Pout (14°45’21.30’’N; 17°03’14.35’’W – 35m), 08.V.2012; Thies (14°47’22.16’’N; 16°57’57.16’’W – 78m), 28.VII.2012, collect. L. Diamé. Record adds to known range of a pan-African species. Nests among roots of grasses and low plants.

Tetramorium muscorum Arnold, 1926, Pout sigelec (14°45’52.52’’N; 17°02’49.36W – 40m), 27.IV.2012; Thies (14°47’22.16’’N; 16°57’57.16’’W – 78m), 28.VII.2012, collect. L. Diamé. Record adds to known range of a pan-African forest species.

Tetramorium rothschildi Forel, 1907, Notto (14°58’12.42’’N; 17°01’27.28W – 29m), 18.VI.2012; Pout (14°45’21.30’’N; 17°03’14.35’’W – 35m), 08.V.2012; Thies (14°47’22.16’’N; 16°57’57.16’’W – 78m), 28.VII.2012, collect. L. Diamé. Record adds to known range from Ethiopia, Kenya and Ghana, in dry or semi-desert areas (Bolton, 1976).

Tetramorium simillimum F Smith, 1851, Ndoyenne (14°45’38.85’’N; 17°08’51.95W – 44m), 24.V.2012, collect. L. Diamé. Widely distributed tramp species. Ground and tree crevice nesting known to forage on plants.

The two undescribed species

Monomorium sp., Pout (14°45’30.12’’N; 17°03’26.81’’W – 34m), 21.VII.2012; Thies (14°47’22.16’’N; 16°57’57.16’’W – 78m), 28.VII.2012, collect. L. Diamé, det. B. Taylor.
Image:
http://antsofafrica.org/ant_species_2012/monomorium/monomorium_nsp_diame_senegal/monomorium_nsp_diame_senegal.htm.

Tetramorium species, Pout (14°45’30.12’’N; 17°03’26.81’’W – 34m), 21.VII.2012; Thies (14°47’03.12’’N; 16°58’02.10’’W – 84m), 28.VII.2012, collect. L. Diamé, det. B. Taylor.

This may be a species of *Temnothorax* but differs from the described members of that genus, notably the large-eyed *T. megalops* (Hamann & Klein, 1967) and *T. barryi* (Cagniant, 1967) from Algeria. It also has distinct frontal carinae, expressly stated by Bolton (2003) as absent in *Temnothorax* species.
Image:
http://antsofafrica.org/ant_species_2012/tetramorium/tetramorium_nsp_diame_senegal/tetramorium_nsp_diame_senegal.htm.

Discussion

With 89 species recorded, the ant fauna of Senegal can be considered as relatively diverse compared to the other neighbouring Sahelian countries such as Mali, or Niger, where 33 and 10 species respectively are now known (Taylor website), especially in view of the size of the country and that several important zones were not investigated. In particular, samples collected in the fruit-based agroecosystems from the "*Niayes*" and "*Plateau de Thiès*" regions have shown a high relative ant diversity. The climatic preferences of the species listed in this paper show Senegal to be an intermediate ecozone between North Africa and the sub-Sahara area. Our results show additions to the published ranges about Sahelian ant faunas and probably semi-arid ant species across sub-Saharan Africa.

Ants may be useful auxiliaries in pest management because of the many relationships they have with other components of ecosystems. Using ants for biological control has gained some ground over the last 10 years in Africa, due to the intensification of damage by fruit flies since the arrival of *Bactrocera dorsalis* (Hendel) in the western part of the African continent. The knowledge of the ant diversity in underlined agroecosystems may prove useful for developing sustainable pest management programs. For instance, ant species such as *Oecophylla longinoda* for mango and *Citrus* fruit flies (Van Mele *et al.* 2007; Sinzogan *et al.* 2008), *Pachycondyla analis* (Latreille, 1802) (now revised to *Megaponera analis* (Latreille, 1802)) against termites pests (Yusuf *et al.* 2013; Yusuf *et al.* 2014) can be suitable biocontrol agents into developed IPM (Integrated Pest Management) programs in view of the problems generated by flies and termites in such agroecosystems. However, some ant species can be suspected as possible problematic species for crops in the orchards. *Pheidole megacephala*, for instance, was reported to compete with *O. longinoda*, a biological control agent against fruit flies, for occupation of the canopy (Seguni *et al.* 2011). Diamé *et al*. (2015) showed also that *Monomorium salomonis* which is highly anthropophile, is the dominant ant species in certain orchards. Its dominance among other species makes it susceptible to rear crop pests such as Coccidae scale insects.

It is likely that the total number of ant species for Senegal is actually higher since our collection campaigns concerned only the western part of the country crossing Saint-Louis, Thies, Dakar and Casamance regions. First, just the survey in the orchard agroecosystems of the "*Niayes*" and "*Plateau de Thiès*" in 2012 revealed 29 species new to Senegal, i.e. about one third of the published ant fauna of Senegal. Similar sampling efforts conducted in other localities such as Ferlo, Djolof, Sine Saloum or Niokolo Koba ecosystems could detect many additional species. For instance,the richness of the Ponerinae subfamily in Guinean ant fauna (48 species), Ivory Coast ant fauna (36 species) or Ghana ant fauna (58 species), suggests this should be richer for Senegal if intensive sampling was carried out in forested landscape located in the south part of country as well as Casamance region. Second, from north to south, the country is crossed by four vegetation types induced by the Sahel, the Sudano-sahelian Savannah, the Sudan Savannah and the south Guinea Savannah climates which can

promote various ant fauna. Indeed, ant community composition and diversity vary according to climatic zones. For instance, energy-speciation induced by available local resources (Kaspari *et al.* 2004), the gradient of the altitude and latitude (Ward 2000) or the sea elevation (Lach *et al.* 2010) are geographic parameters often indexed as influencing ant fauna.

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