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Diversity of Termites (Termitoidae Latreille) of the West Burkina Faso

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Abstract

The confusion noted in the systematic of African termites, which added to the insufficiency of faunistic inventories, constitute an important limit in the evolution of knowledge on this group of insects that plays an important role in the tropical ecosystems. The aim of the study is to investigate the diversity of termites in the West of Burkina Faso. Termite sampling in different biotopes in the Parc national des deux Balé, Pa, Satiri, Bérégadougou, Wempéa permit to identified 32 species that belong to Rhinotermitidae (1) and Termitidae (31). The twelve (12) species newly recorded in the country belong to the subfamilies Macrotermitinae (*Microtermes grassei*, *Odontotermes* near *erraticus*, *O. sudanensis*, *Pseudacanthotermes militaris*), Nasutitermitinae (*Fulleritermes tenebricus*), Cubitermitinae (*Cubitermes* near *proximatus*, *Cubitermes niokoloensis*, *Noditermes cristifrons*) and Termitinae (*Amitermes truncatidens*, *Microcerotermes brachygnatus*, *Pericapritermes urgens*, *Tuberculitermes flexuosus*). Two species *Cubitermes* sp. and *Microcerotermes* sp. are potential new species. The diversity of termites in the studied sites corresponds, by the specific composition and functional groups, to the typical termite assemblage in Sudanese savannas of West Africa. Additional descriptions of species with illustrations could help to limit misidentification.

Keywords: Complementary descriptions; Functional groups; Termite fauna; Sudanese savanna

Introduction

The confusion noted in the identification of African termites by various termitologists including Grassé [1], Bodot [2], Josen [3] and Ruelle [4,5] constitute a serious limit in the progress of knowledge on these insects that play major roles in tropical ecosystems. Indeed, for many groups of termites, it is almost impossible to relate biological, ecological and ethological observations to a defined species. Many recent works on African termites show limits by the level of the identification of taxa. Faced with the difficulty of identifying the species, the authors are very often reduced to assigning them numbers or letters (sp.1, sp.2, sp.A, sp.B, etc.) or to assimilate them to morphotypes without any description or illustration.

This severe decline in the taxonomy of African termites pointed out by Eggleton [6] is the result of sketchy original descriptions of the species [4] and the incomplete state of the inventory of African termites [7], those of West Africa in particular. Uncompleted inventories in different African countries and large confusion in the species identification are great reasons to be interested in termites that have the important ecological impacts. Thus, as part of a research program on West African termites, sampling was conducted in different countries of the sub-region including Burkina Faso. According to Brossard, et al. [8], Kaiser, et al. [9], Krishna, et al. [10], Mando and van Rheenen [11], Ouédraogo, et al. [12], Traoré and Lepage [13], Traoré, et al. [14] and Josens and Deligne [15], 40 species of termites are recorded in Burkina Faso (Table 1). However, for certain species, their improbable presence in West Africa and the reliability of the identifications suggest some reservations. Thus, despite the existence of relatively important studies in Burkina Faso, compared

to other countries in West Africa, termites are still poorly unknown in the country. As part of a West African termites inventory program, and after publications on Senegal [16-18] and The Gambia [19] termite fauna, the current article deals with termites collected in West Burkina Faso (Bérégadougou, Pa, National Park of the two Balé, Satiri and Wempea). It concerns their diversity and complementary descriptions.

Family	Subfamily	Species	Authors	Distribution in Ethiopian region
Rhinotermitidae	Coptotermitinae	*Coptotermes intermedius*	Krishna, et al. (2013)	Burkina Faso, Ghana, Guinea-Bissau, Ivory Coast, Nigeria, Senegal, Sierra Leone
		Ancistrotermes cavithorax	Kaiser, et al. 2015	Cameroon, Central African Republic, DR-Congo Ghana, Guinea, Ivory Coast, Nigeria, Senegal, Sierra Leone, Uganda
		Ancistrotermes crucifer	Kaiser, et al. 2015	Angola, Cameroon, DR-Congo Ethiopia, The Gambia, Ghana, Guinea, Ivory Coast, Nigeria, Senegal, Sierra Leone, Togo
		Ancistrotermes guineensis	Kaiser, et al. 2015	Cameroon, Gambia, Ghana, Guinea, Guinea-Bissau, Ivory Coast, Nigeria, Senegal
		Macrotermes bellicosus	Krishna, et al. (2013); Mando and van Rheenen (1998); Kaiser, et al. 2015; Traoré and Lepage 2008	Angola, Cameroon, Central African Republic, Congo, DR- Congo, Eritrea, Ethiopia, Ghana, Guinea, Guinea-Bissau, Ivory Coast, Kenya, Liberia, Malawi, Mauritania, Mozambique, Niger, Nigeria, Senegal, Sierra Leone, Somalia, Sudan, Tanzania, Togo, Uganda, Yemen
Termitidae	Macrotermitinae	*Macrotermes subhyalinus*	Traoré, et al. 2012; Krishna, et al. (2013) ; Kaiser, et al. 2015; Traoré and Lepage 2009	Angola, Benin, Burundi, Central African Republic, Chad, DR-Congo, Ethiopia, Gambia, Ghana, Guinea, Guinea- Bissau, Ivory Coast, Kenya, Liberia, Malawi, Mali, Mozambique, Namibia, Nigeria, Rwanda, Senegal, Sierra Leone, Somalia, Sudan, Tanzania, Togo, Uganda, Zambia, Zimbabwe
		Microtermes havilandi[1]	Kaiser, et al. 2015	South Africa
		Microtermes lepidus	Mando and van Rheenen (1998)	Ivory Coast, Senegal
		Microtermes subhyalinus	Kaiser, et al. 2015	Guinea, Ivory Coast, Nigeria, Senegal
		Odontotermes bequaerti[1]	Ouedraogo, et al. (2015)	DR-Congo
		Odontotermes cultirarum[1-2]	Ouedraogo, et al. (2015)	DR-Congo, Kenya, Tanzania, Uganda
		Odontotermes flamminfrons[1-3] [sic]	Ouédraogo, et al. (2015)	DR-Congo, Malawi, Sudan, Zambia
		Odontotermes garambae[4]	Ouédraogo, et al. (2015)	DR-Congo
		Odontotermes magdalenae	Traore, et al. 2015	Cameroon, Central African Republic, Chad, Guinea, Nigeria,Sudan
		Odontotermes mukimbunginis[1]	Ouédraogo, et al. (2015)	DR-Congo
		Odontotermes silvaticus[1]	Ouédraogo, et al. (2015)	Cameroon
		Odontotermes smeathmani[4]	Mando and van Rheenen (1998)	DR-Congo, Eritrea, Ethiopia, Ivory Coast, Nigeria, Senegal, Sierra Leone, South Africa, Sudan

	Nasutitermitinae	*Fulleritermes coatoni*[1]	Kaiser, et al. 2015	South Africa, Zimbabwe
		Trinervitermes geminatus	Krishna, et al. (2013) ; Brossard, et al. (2007) ; Kaiser et al. 2015	Burkina Faso, DR-Congo Ethiopia, Ghana, Ivory Coast, Mali, Mauritania, Nigeria, Senegal, Sierra Leone, Sudan, Uganda
		Trinervitermes gratiosus[1]	Kaiser, et al. 2015	Angola, Burundi, DR-Congo, Kenya, Rwanda, Tanzania, Uganda, Zambia
		Trinervitermes occidentalis	Kaiser, et al. 2015	Central African Republic, DR-Congo, Ethiopia; Ghana, Guinea-Bissau, Ivory Coast, Nigeria, Sierra Leone, Uganda
		Trinervitermes oeconomus	Kaiser, et al. 2015	Benin, Central African Republic, Chad, DR-Congo, Ethiopia, Ghana, Ivory Coast, Mali, Nigeria, Senegal; Sudan, Uganda
		Trinervitermes togoensis	Krishna, et al. (2013) ; Kaiser et al. 2015	Benin, Burkina Faso, Eritrea, Ethiopia, Ghana, Guinea, Mali, Nigeria, Senegal, Sierra Leone, Sudan, Uganda
		Trinervitermes trinervius	Brossard, et al. (2007) Kaiser et al. 2015	Central African Republic, Chad, DR-Congo, Gambia, Ghana, Guinea, Guinea-Bissau, Ivory Coast, Liberia, Nigeria, Senegal, South Africa, Uganda.
	Cubitermitinae	*Cubitermes bilobatodes*	Kaiser, et al. 2015	Gambia, Guinea-Bissau, Senegal
		Cubitermes proximatus	Josens and Deligne (2019)	Gambia, Guinea
		Cubitermes sankurensis[1]	Ouédraogo, et al. (2015)	Angola, Burundi, Cameroon, Central African Republic, Congo, DR-Congo, Kenya, Malawi, Tanzania, Zambia, Zimbabwe
		Cubitermes subcrenulatus	Kaiser, et al. 2015	Ghana, Guinea, Ivory Coast, Nigeria

	Termitinae	*Amitermes evuncifer*	Kaiser, et al. (2015)	Angola, Benin, Ethiopia, DR-Congo, Eritrea, Ghana, Guinea, Guinea-Bissau, Ivory Coast, Kenya, Liberia, Nigeria, Senegal, Sierra Leone, Sudan, Chad, Togo, Uganda
		Amitermes guineensis	Kaiser, et al. 2015	Gambia, Ghana, Nigeria, Senegal
		Amitermes stephensoni[5]	Traore, et al. 2013; Kaiser et al. 2015	Guinea, Kenya, Nigeria, Sudan, Yemen, Iran, Oman, Saudi Arabia
		Amitermes messinae	Kaiser, et al. 2015	Ethiopia, Kenya, Malawi, South Africa, Senegal, Sudan, Tanzania, Zambia, Egypt, Iran, Saudi Arabia Yemen,
		Angulitermes elsenburgi[1]	Kaiser, et al. 2015	South Africa
		Eremotermes sabaeus[1-5]	Kaiser, et al. 2015	Yemen, Saudi Arabia
		Microcerotermes limpopoensis[1]	Kaiser, et al. 2015	South Africa
		Microcerotermes parvulus	Traore, et al. 2014 ; Kaiser et al. 2015	Chad, Congo, DR-Congo, Ethiopia, Ghana, Guinea, Ivory Coast, Nigeria, Senegal, Tanzania, Yemen
		Microcerotermes parvus	Kaiser, et al. 2015	Angola, Cameroon, DR-Congo, Eritrea, Ethiopia, Gabon, Ghana, Ivory Coast, Kenya, Nigeria, Senegal, South Africa, Sudan, Tanzania, Uganda
		Microcerotermes theobromae[1]	Kaiser, et al. 2015	Sao Tome and Principe
		Microcerotermes thermarum[1]	Kaiser, et al. 2015	South Africa
		Promirotermes holmgreni[1-6]	Kaiser, et al. 2015	South Africa

Table 1: Termite species recorded from Burkina Faso and their distribution in Ethiopian region.

1. Presence in Burkina Faso improbable given the known distribution of the species;
2. It Possibly *Odontotermes* [*culturarum*];
3. Possibly *Odontotermes* [*fammifrons*];
4. *Odontermes garambae* and the West African forms of *O. smeathmani*, very close to *O. erraticus*, could be synonyms; however, the current state of systematic confusions of the genus does not allow to decide. A revision of African *Odontotermes* is needed;
5. *Eremotermes sabaeus* described by Harris [20] has been reclassified into the genus *Microcerotermes* [21]. It's a species known from the Middle East;
6. Probably *Promirotermes holmgreni infera* known in Nigeria and Senegal.

Material and Methods

Termite sampling was carried out in Burkina Faso (Figure 1) in the national park two Balé, Pa, Satiri, Bérégadougou and Wempea (Figure 1).

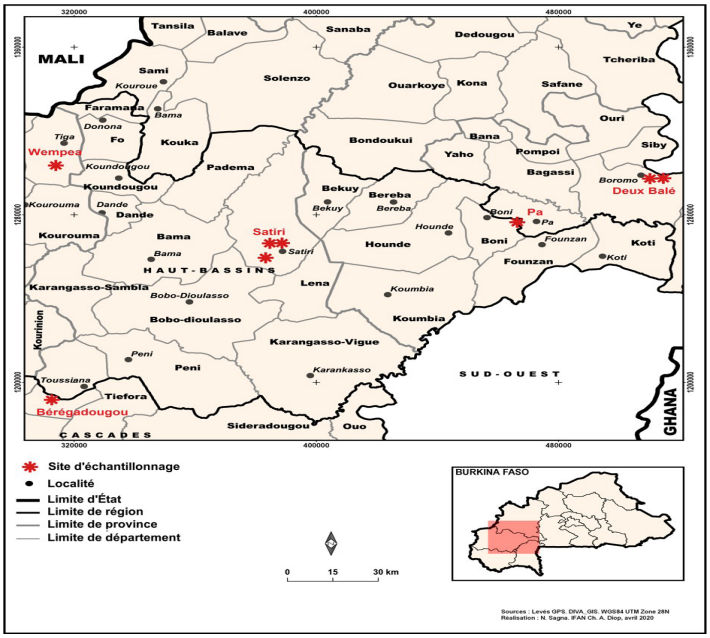

Figure 1: The location of the study sites in Boromo, Satiri, Dalena and Kayan (Burkina Faso).

Situated in the tropical domain, the general climate of Burkina Faso is characterized by an alternation of a dry and a rainy season. The average annual rainfall from 2004 to 2013 for the stations of Banfora, Bobo-Dioulasso and Boromo, which varies respectively from 737 to 1,214 mm, 775 to 1,250 mm and 815 to 1,134 mm, places the study sites in the southern Sudanian sector of Guinko [22]. It is characterized by savannas dominated by Combretaceae and various species of Acacia associated with relics of clear or dry forests [23]. The dry season lasts 6 to 7months. Average annual temperatures range from 17°C (minimum) to 36°C (maximum). Ferruginous, sandy, sandy-clayey, or clay-sandy soils, for the most part, are supported by a granite and schist socle [24].

Sampling Method

At each of the different sampling sites, the termites were sampled by 3 experienced collectors searching for termites in the soil, litter, dead wood, tree stumps, beneath the bark of trees and termite nests. The sampling unit is a transect of 20m x 100m. Each transect is explored to the end without any prior limitation of sampling time. The collected termites were kept in tubes filled with 70° ethanol with a label bearing the name of the site, the date and the micro-habitat from which the sample was taken. The samples were taken to the Laboratory of Zoology and Terrestrial Invertebrates of the Fundamental Institute of Black Africa (IFAN Cheikh Anta Diop University, Dakar) for identification and conservation.

Identification Method

For identification, termites were observed directly under a Leica EZ4 stereomicroscope with an integrated camera connected to a computer. They were compared, whenever necessary, with reference specimens identified by W.A. Sands from the IFAN collection. The works of Silvestri [25,26], Sjöstedt [27], Emerson (1928) [28], Grassé [1,29]), Bouillon and Mathot [30], Roy-Noël [31] and Sands [32,33] have also been used in the identification of species. The images taken with Leica application suite allow measurements of the length of the head, the width of the head and the length of the left mandible of the soldier. The length of the head, in dorsal view, was measured from the occiput to the base of the labrum. The width of the head corresponds to its greatest width in the dorsal view. The length of the left mandible in dorsal view is measured from the apophysis to the tip.

Results

Species Diversity

In the 5 sites, 32 species (1 Rhinotermitidae and 31 Termitidae) are identified (Table 2). The Apicotermitinae of Astalotermes-group (soldierless termites), identified as morphotypes (3 morphotypes), are not presented in the table 2. The Rhinotermidae are represented by one species, *Coptotermes intermedius* (Coptotermitinae). Termitidae include Macrotermitinae (5 genera, 10 species), Nasutitermitinae (2 genera, 7 species), Cubitermitinae (2 genera, 4 species) and Termitinae (4 genera, 10 species). At the site level, there is a greater diversity of termites in Satiri (16 species) and less important in in Pa (8 species). In Bérégadougou 15 species are reorded, in the National Park of deux Balé 14 species) and in Wempea 11 species.

Functional Classification

Depending on their diet (Table 3), the encountered termites are divided into fungus growing, (10), harvesters (6), humivorous or soil feeding (6) and xylophagous (10). Xylophagous (5 genera, 10 species) and fungus growing (5 genera, 10 species) are the most diversified termite species. Harvesters and soil feeding termites, 6 species for each group, have respectively 1 and 5 genera. Fungus growing termites were collected from epigeal and hypogeal nests, superficial galleries, soil sheetings on the ground, litter, cow dung, dead wood on the ground, trees and shrubs. Harvester termites were collected from nests (their own nest or those of Cubitermes), under stones, from grass stumps, on dead wood, litter and in tree stumps. Humivorous termites were collected from nests, under stones, from galleries at the base of trees, cow dung, litter and grass stumps. As for the xylophagous, they are found in their own nests or in those of *Macrotermes*, in the soil at the base of trees, in stumps, on trees and shrubs and in dead wood. The trophic group

diversity indicates that the sites studied belong to a buffer zone between arid and wet phytogeographical sectors. The open savannah allows development of herbs, grasses, in particular and provides niches to the fungus growing, harvester and xylophagous termites. The plant biomass produced by the wood plants and grasses of the bowal/boval (open areas in dry Sudanian savannas of West Africa [3,34]) provide niches for the development of the humivorous termites.

New termite species recorded in Burkina Faso

Comparison of the list of identified species with that of previously known species in Burkina Faso reveals an enrichment of the country's termite fauna by 12 species:

4 Macrotermitinae (*Microtermes grassei*, *Odontotermes* near *erraticus*, *Oxyothespis sudanensis*, *Pseudacanthotermes militaris*); 1 Nasutitermitinae (*Fulleritermes tenebricus*); 3 Cubitermitinae (*Cubitermes* near *proximatus*, *Cubitermes niokoloensis*, *Noditermes cristifrons*); 4 Termitinae (*Amitermes truncatidens*, *Microcerotermes brachygnatus*, *Pericapritermes urgens*, *Tuberculitermes flexuosus*).

Family	Subfamily	Genus	Species	Sites				
				Bereg adougou	Bale	Pa	Wempea	Satiri
Rhinotermitidae Frogratt, 1897	Coptotermitinae Holmgren, 1910	*Coptotermes* Wasmann, 1896	*Coptotermes intermedius* Silvestri 1912					+
Termitidae Latreille 1802	Macrotermitinae Kemner, 1934	*Ancistrotermes* Silvestri, 1912	*Ancistrotermes cavithorax* (Sjöstedt, 1889)		+			+
			Ancistrotermes guineensis (Silvestri, 1912)		+			
		Macrotermes Holmgren, 1909	*Macrotermes bellicosus* (Smeathman, 1781)					+
			Macrotermes subhyalinus (Rambur, 1842)				+	
		Microtermes Wasman, 1902	*Microtermes grassei Ghidini*, 1955		+			+
			Microtermes lepidus Sjöstedt, 1924	+	+			+
			Microtermes subhyalinus Silvestri, 1914		+			
		Odontotermes Holmgren, 1910	*Odontotermes* near *erraticus* Grassé, 1944		+			
			Odontotermes sudanensis Sjöestedt, 1924		+		+	
		Pseudacanthotermes Sjöstedt, 1924	*Pseudacanthotermes militaris* (Hagen 1858)		+			
	Apicotermitinae Grassé et Noirot, 1955	*Astalotermes*-group	Undetermined	+	+			+
	Nasutitermitinae Hare, 1937	*Fulleritermes* Coaton,1962	*Fulleritermes tenebricus* (Silvestri, 1914)				+	+
		Trinervitermes Holmgren, 1912	*Trinervitermes geminatus* (Wasmann, 1897)	+	+			
			Trinervitermes occidentalis (Sjöstedt, 1904)	+	+		+	+
			Trinervitermes oeconomus (Trägårdh, 1904)	+	+			
			Trinervitermes togoensis (Sjöestedt, 1899)	+	+	+	+	+
			Trinervitermes trinervius (Rambur, 1842)	+	+	+	+	+
			Trinervitermes sp.	+			+	+
	Cubitermitinae Weidner, 1956	*Cubitermes* Wasmann, 1906	*Cubitermes* near *proximatus* Silvestri, 1914	+		+		
			Cubitermes n. sp.			+		+
			Cubitermes niokoloensis Roy-Noël, 1969	+		+	+	+
		Noditermes Sjöstedt, 1924	*Noditermes cristifrons* Sjöstedt, 1924			+		
		Amitermes Silvestri, 1901	*Amitermes evuncifer* (Silvestri, 1912)		+		+	
			Amitermes guineensis Sands, 1992		+		+	+
			Amitermes truncatidens Sands, 1959		+			
		Eremotermes Silvestri, 1912	*Eremotermes sp*.		+			
	Termitinae Latreille, 1802	*Microcerotermes* Silvestri, 1901	*Microcerotermes brachygnathus* Silvestri, 1914	+				
			Microcerotermes parvulus (Sjöstedt, 1911)		+	+		
			Microcerotermes near. *parvus* Haviland, 1898	+				+
			Microcerotermes sp.				+	
		Pericapritermes Silvestri, 1914	*Pericapritermes urgens* Silvestri, 1914				+	
		Tuberculitermes Holmgren, 1926	*Tuberculitermes flexuosus* Roy-Noël, 1969					+

Table 2: List of termite species collected in Bérégadou, Two Balé, Pa, Wempea and Satiri (Burkina Faso).

Trophic regime	Species	Micro habitat
Fungus growing termites	*Ancistrotermes cavithorax* (Sjöstedt, 1889)	Soil, litter, dead wood, trees
	Ancistrotermes guineensis (Silvestri, 1912)	Soil (fungus-comb)
	Macrotermes bellicosus (Smeathman, 1781)	Nest
	Macrotermes subhyalinus (Rambur, 1842)	Nest
	Microtermes grassei Ghidini, 1955	Dead wood, soil, shrub, litter
	Microtermes lepidus Sjöstedt, 1924	Nest, soil, litter, cow dung, dead wood
	Microtermes subhyalinus Silvestri, 1914	Shrub, dead wood mort
	Odontotermes near *erraticus* Grassé, 1944	Tree, soil, litter, dead wood
	Odontotermes sudanensis Sjöestedt, 1924	Litter, dead wood, nest
	Pseudacanthotermes militaris	Litter, soil (fungus comb), soil
Harvester termites	*Trinervitermes geminatus* (Wasmann, 1897)	Nest
	Trinervitermes occidentalis (Sjöstedt, 1904)	Nest, dead wood
	Trinervitermes oeconomus (Trägårdh, 1904)	Nest
	Trinervitermes togoensis (Sjöestedt, 1899)	Under stones, Nest, grasses stumps, *Cubitermes* nest, tree stumps, dead wood
	Trinervitermes trinervius (Rambur, 1842)	Nest, litter
	Trinervitermes sp.	Nest
Soil feeding termites	*Cubitermes near proximatus* Silvestri, 1914	Nest
	Cubitermes niokoloensis Roy-Noël, 1969	Nest, cow dung, under stones, grasses stumps
	Cubitermes n. sp.	Nest, cow dung
	Noditermes cristifrons Sjöstedt, 1924	Nest
	Pericapritermes urgens Silvestri, 1914	Nest
	Tuberculitermes flexuosus Roy-Noël, 1969	Soil (base of tree))
	Astaloterme-group	Soil, nest
Xylophagous termites	*Amitermes evuncifer* (Silvestri, 1912)	Nest
	Amitermes guineensis Sands, 1992	Nest, ancient *Macrotermes* nest
	Amitermes truncatidens Sands, 1959	Shrub, tree stump, dead wood
	Coptotermes intermedius Silvestri 1912	Tree
	Eremotermes sp.	Soil (base tree)
	Fulleritermes tenebricus (Silvestri, 1914)	Soil (base tree, shrub, stump), nest
	Microcerotermes brachygnathus Silvestri, 1914	Dead wood
	Microcerotermes parvulus (Sjöstedt, 1911)	Dead shrub, Stump
	Microcerotermes near *parvus* Haviland, 1898	Dead wood, tree (dead branch)
	Microcerotermes sp.	Soil (base of shrub)

Table 3: Trophic regime and microhabitats of termites collected in the different sites.

Description of *Microtermes*, *Odontotermes*, *Cubitermes*, *Amitermes* and *Microcerotermes* species *Microtermes Wasmann*, 1902

Microtermes grassei

The soldier's head capsule (Figure 2) is significantly longer than it is wide. The largest width of the head is towards the posterior margin. The antennas have 13 segments. The labrum covers the mandibles over more than half their length.

Head length: 0.77-0.81 mm

Head width: 0.64-0.66 mm

Left mandible length: 0.52 mm

Figure 2: Cephalic capsule of *Microtermes grassei* soldier in dorsal view.

Microtermes Lepidus

The soldier's head capsule margins (Figure 3) are rounded. The largest width of the head is in the middle. The labrum covers the mandibles over more than 2/3 of their length. The antennas have 14 articles, III and IV being the smallest. Ethologically, the soldier's rejection of a yellowish sticky glue as a defense is characteristic.

Head length: 0.71-0.87 mm

Head width: 0.63-0.77 mm

Left mandible length: 0.47-0.5 mm

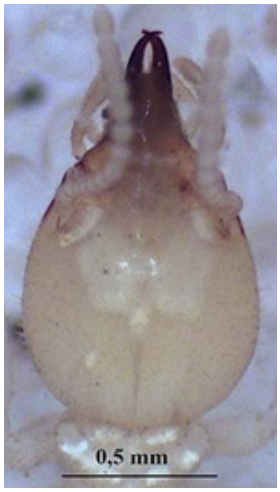

Figure 3: Cephalic capsule of *Microtermes lepidus* soldier in dorsal view.

Microtermes subhyalinus

The cephalic capsule is almost circular (Figure 4). The labrum covers the mandibles over more than half their length. The antennas have 13 segments.

Head length: 0.61 mm

Head width: 0.56 mm

Left mandible length: 0.41 mm

Figure 4: Cephalic capsule of *Microtermes subhyalinus* soldier in dorsal view Capsule.

***Odontotermes* Holmgren, 1910**

Odontotermes sudanensis

The cephalic capsule (Figure 5) is rectangular. Each of the relatively short and robust mandibles has a marginal tooth. The antennas have 16 segments.

Head length: 1.82-1.93 mm

Head width: 1.30-1.40 mm

Left mandible length: 0.97-0.99 mm

Figure 5: Cephalic capsule of *Odonototermes sudanensis* soldier in dorsal view.

Odontotermes* near *erraticus

The cephalic capsule (Figure 6) is significantly longer than broad with a more or less narrower towards the front. The blade-shaped mandibles are relatively long. The left mandible has a sharp marginal tooth towards the 1/3 upper; in the middle of the left mandible, there is a small barely visible outgrowth. The antennas have 16 or 17 segments. In the case of 16 segments, the II shows a mark of scission. Sometimes on the same individual there are 16 segments on one antenna and 17 on the other.

Head length: 1.43-1.66 mm

Head width: 1.13-1.25 mm

Left mandible lenght: 0.97-1.06 mm

Figure 6: Cephalic capsule of *Odonototermes* near *erraticus* soldier in dorsal view.

***Cubitermes* Wasmann, 1906**

Cubitermes* near *proximatus

The cephalic capsule is rectangular (Figure 7). The labrum has the lobes truncated with sharp angles (Josens, 2019). The mandibles show a certain curvature. The antennas have 15 segments.

Head length: 1.49-1.86 mm

Head width: 1.13-1.40 mm

Left mandible length: 1.14-1.34 mm

Figure 7: Cephalic capsule of *Cubitermes* near *proximatus* soldier in dorsal view.

Cubitermes niokoloensis

The rectangular cephalic capsule (Figure 8) is a little longer than it is wide. The lobes of the labrum are truncated. The relatively thin mandibles are rather straight and curved towards their tips. The antennas have 15 segments.

Head length: 1.66-1.71 mm

Head width: 1.31- .36 mm

Left mandible length: 1.44-1.48 mm

Figure 8: Cephalic capsule of *Cubitermes niokoloensis* soldier in dorsal view.

***Cubitermes* n.sp**.

Cephalic capsule (Figure 9), massive, presents a greater width towards the posterior margin. The lobes of the labrum are truncated and the fairly strong mandibles are slightly curved towards their tips. The antennas have 15 segments.

Head length: 1.55-1.84 mm

Head width: 1.39-1.55 mm

Left mandible length: 1.35-1.58 mm

Figure 9: Cephalic capsule of *Cubitermes* sp. soldier in dorsal view.

***Tuberculitermes* Holmgren, 1926**

Tuberculitermes flexuosus

The rectangular head capsule (Figure 10) shows tubercles above the insertion of the antennae. The forehead forms some sort of a forward projected tube. The gula has at its base a backward directed tubercle. The mandibles are long, straight in dorsal view; in profile, they are twisted and curved at their ends. The labrum is trilobed; the lateral lobes are thin and pointed. The antennas have 14 segments.

Head length: 1.37-1.40 mm

Head width: 1.06-1.11 mm

Left mandible length: 1.74-1.88 mm

Figure 10: Cephalic capsule of *Tuberculitermes flexuoxus* soldier in dorsal view.

***Amitermes* Silvestri, 1901**

Amitermes truncatidens

The rather thickset head capsule (Figure 11) shows a marked narrowing towards the front. The mandibles are thick and strongly curved. The antennas have 14 segments.

Head length: 1.10-1.15 mm

Head width: 0.92-0.97 mm

Left mandible length: 0.52-0.57 mm

Figure 11: Cephalic capsule of *Amitermes truncatidens* soldier in dorsal view.

Amitermes guineensis

The cephalic capsule of the soldier of *A. guineensis*, almost rectangular, shows a slight narrowing towards the front (Figure 12). The antennas have 14 segments. The anterior coxa bears spines.

Head length: 1.06-1.21 mm

Head width: 0.78-0.96 mm

Left mandible length: 0.65-0.75 mm

Figure 12: Cephalic capsule of *Amitermes guineensis* soldier in dorsal view.

Amitermes evuncifer

Amitermes evuncifer shows a lot of resemblance with *A. truncatidens*. It is distinguished in the soldier by a slightly larger size, a less marked narrowing of the cephalic capsule (Figure 13) forwards and by the less thick and less curved mandibles. The antennas have 14 segments.

Head length: 1.12-1.20 mm

Head width: 0.93-1.01 mm

Left mandible length: 0.62-0.64 mm

Figure 13: Cephalic capsule of *Amitermes evuncifer* soldier in dorsal view.

***Microcerotermes* Silvestri, 1901**

Microcerotermes* near *parvus

The cephalic capsule (Figure 14) is rectangular and the labrum pentagonal. The antennas have 14 segments. There is an irregular morphological variation of the head capsule in soldiers: some have an elongation of the head with lateral compression and others a retraction of the length of the head.

Head length: 1.07-1.39 mm

Head width: 0.65-0.81 mm

Left mandible length: 0.65-0.82 mm

Figure 14: Cephalic capsule of *Microcerotermes* near *parvus* soldier in dorsal view.

Microcerotermes brachygnathus

The soldier's cephalic capsule is rectangular with well-rounded angles (Figure 15). The mandibles are thick and relatively short. The labrum is short and rounded. The antennas have 13 segments.

Head length: 1.33-1.38 mm

Head width: 0.74-0.79 mm

Left mandible length: 0.72-0.8 mm

Figure 15: Head capsule of *Microcerotermes brachygnathus* soldier in dorsal view.

***Microcerotermes* sp**.

It is close to *Microcerotermes* near *parvus* by its size, the rectangular shape of the cephalic capsule, and the pentagonal labrum (Figure 16). It is distinguished by the thicker mandibles, the gula significantly less convex, and the number of antennae segments (12).

Head length: 1.17 mm

Head width: 0.69 mm

Left mandible length: 0.66 mm

Figure 16: Cephalic capsule of *Microcerotermes* sp. soldier in dorsal view.

Discussion

Among the 32 termite species identified, 11 are new records for Burkina Faso: *Microtermes grassei*, *Odontotermes* near *erraticus*, *Odontoterme sudanensis* and *Pseudacantotermes militaris*, *Fulleritermes tenebricus*, *Cubitermes niokoloensis*, *Noditermes cristifrons, Amitermes truncatidens*, *Microcerotermes brachygnathus*, *Pericapritermes urgens* and *Tubercuitermes flexuosus*.

With the restriction of *Microtermes vadschaggae* to East Africa [35,10], the West African specimens of the species were renamed *M. grassei* [10,17]). Before this study, *Microtermes grassei* was only cited from Gambia, Ivory Coast and Senegal [10,17-19]. *Odontotermes erraticus*, described by Grassé [29]) from Niger is known from Senegal [18]) and Gambia [19]. Its presence in Burkina Faso strengthens Ndiaye et al. [19] who believe that the species has a wide distribution in the Sudano-Sahelian savannas of West Africa, hidden by numerous misidentifications. The genus *Odontotermes*, that is the most complex of the Macrotermitinae [36] still waiting for revision. *Odontotermes erraticus* and *O. garambae*, which are not morphologically distinctive, are encountered in the same ecological zone, the Sudano-Sahelian savannah of West Africa for the first and that of the northeast (Garamba National Park) of the Democratic Republic of Congo [10,19]. West African forms of *O. smeathmani*, also known from South Africa and East Africa [10]), are also close to *O. erraticus*.

Odontotermes sudanensis, a species typically from the Sudanian savanna of West Africa, is known in Ghana, Guinea, Gambia, Ivory Coast, Nigeria and Senegal [10,19]. The presence of *O. bequaerti*, *O. mukimbunginis* and *O. silvaticus* [12]) in Burkina Faso, which would result from misidentifications, illustrates the crisis of termites taxonomy in West Africa pointed out by Korb et al. [37]. *Fulleritermes tenebricus* was probably already encountered in Burkina Faso. Indeed, the forms of *Fulleritermes coatoni*, known from South Africa and Zimbabwe [10], cited from Burkina Faso by Kaiser et al. [9] may belong to *F. tenebricus*, a well-known species in West Africa [19].

Cubitermes niokoloensis and *C. oculatus*, morphologicaly very close, are considered by Josens and Deligne [15] as two valid species. Known from Senegal in open habitats of dry Sudanian savanna [31], *C. niokolensis* has been found in the same type of environment in Burkina Faso. *Noditermes cristifrons* is known from Central Africa in Angola and RD-Congo [10] and from the Sudanian Savanna of Senegal [18] and Gambia [19]. Its presence in southwest Burkina Faso suggests that it is a common species in the Sudanian area of West Africa. Known so far from Central Africa (Angola, RD-Congo), Southern Africa (Malawi, Zimbabwe) and Eastern Africa (Tanzania, Zambia) according to Krishna, et al. [10], the presence of *Amitermes truncatidens* in Burkina Faso, Togo (B. D. Kasseney pers. com.) and Senegal (Ndiaye observations) indicates that it is a very plastic species found everywhere in sub-Saharan Africa. Its strong resemblance to *A. evuncifer* could be a source of misidentifications of West Africa specimens.

Microcerotermes brachygnathus, already known in West Africa, is cited from Guinea, Nigeria, Senegal, South Africa, Tanzania, Zambia, and Zimbabwe [26,28,17]. Described from Guinea [26], *Pericapritermes urgens* is also encountered in Senegal [38,17]), Ivory Coast [39], Ghana and Cameroon [40]. Described from eastern Senegal [31], *Tuberculitermes flexuosus* was previously known only from this country. In his list of termites from Nigeria Medler predicted its record in Nigeria [41]. This prediction, which implies a wider distribution of the species in West Africa, would find confirmation with the presence of the species in the southwest of Burkina Faso.

The specimens of *Trinervitermes* sp. are similar to those encountered in Senegal by Roy-Noël [31]) and Ndiaye [17] by their morphology. This *Trinervitermes* is morphologically different from all the other species of the genus known in West Africa. It could be a new species for science. *Cubitermes* n. sp., which belongs to the *oculatus*-group [15] is a new species (Josens

pers. com.). *Microcerotermes* sp. belongs to the *parvus*-group but is distinguished, in the soldier, from the other species of the West African by the sutures in the anterior of the head, the mandibles, the gula, the labrum and the number of antennal segments (12). However, the confusion in the systematics of *Microcerotermes* [38], those of West Africa in particular [17], don't permit to pronounce on its status.

Conclusion

The diversity of termites in the studied sites in western Burkina Faso corresponds, by the specific composition and functional groups, to the typical termite assemblage in Sudanese savannas of West Africa. Additional descriptions of species with illustrations could help to limit misidentification.

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