

**A NEW WEST AFRICAN
ANT OF THE GENUS
PLECTROCTENA WITH
ECOLOGICAL NOTES
(HYMENOPTERA: FORMICIDAE)**

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The genus *Plectroctena* contains 17 known species and is restricted in distribution to the Ethiopian Region where a majority of the species are located in the rainforest areas of West and Central Africa (Bolton 1974). Taxonomic treatments of the genus include those of Santschi (1924) and Bolton (1974), while additional accounts of included species are found, for instance, in Arnold (1915), Wheeler (1922), and Lévieux (1972). Little is known about the biology of the genus except that some of the species are cryptic or subterranean foragers, that they build nests in the earth or in «extremely rotten or collapsed logs,» and that they prey primarily upon millipedes (Bolton 1974).

On 4 June 1974, we discovered and excavated a large nest of a new species which we initially identified as *P. subterranea* Arnold. The nest was found in the soil in dense forest bordering the Bandama River at the Lamto Field Station of the University of Abidjan, Côte d'Ivoire. Lamto is situated in Guinea savanna off the main road about 50 km south of Toumodi at 6° 13'N, 5° 41' W. A description of the species follows and because so little is known about the biology of the genus, we offer also our field observations on the nest and its contents.

Methods

The nest, as it was excavated, was carefully mapped and measured. The contents of each chamber in the nest, excluding the adults, were collected separately for analysis. However, chambers I, II, and III collapsed upon one another and the contents of each of these chambers could not be separated with certainty. Thus the data for these chambers are combined. Laboratory analysis included the removal of all pupae from their cocoons.

Taxonomy of the Species

Plectroctena lygaria sp. n.
(Figs. 1, 2)

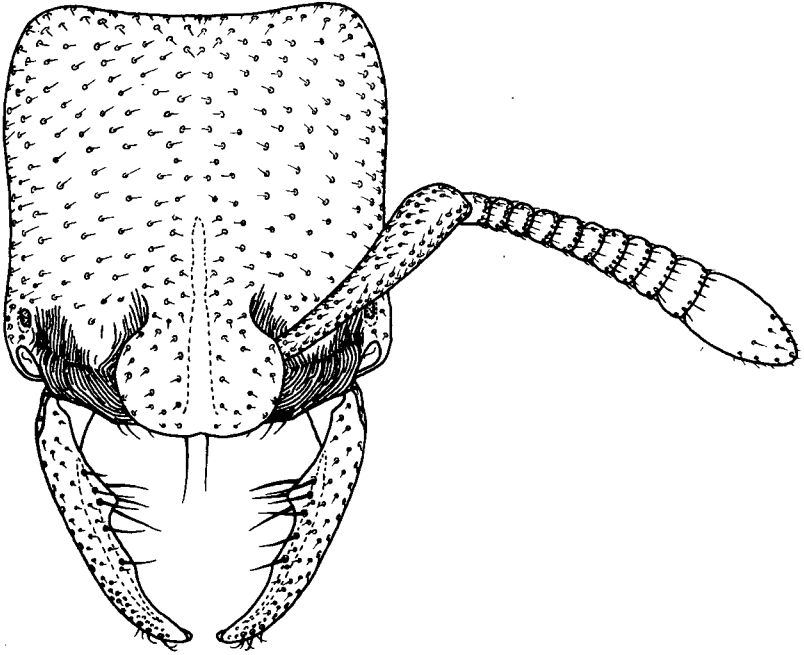


Fig. 1 — *P. lygaria* worker, head in dorsal view, right antenna omitted.

Diagnosis of Worker

Small species of *mandibularis*-group (basal tooth of mandible present, apex of mandible not swollen; first gastral tergite without a transverse groove anteriorly; CI 80; eyes present) close to *subterranea* Arnold.

Funicular segments 3-5 broader than long. Ocular diameter 0.06-0.12. Palp formula 2,2. Head without striae. Punctures on head and second gastral tergite with short but distinct appressed pubescent hairs projecting from their centres. Punctures on head not adjacent, separated by smooth shining spaces.

Further Description

Holotype worker: TL 7.0, HL 1.42, HW 1.22, CI 86, ML 1.00, MI 70, SL 0.80, PH 0.72, PL 0.66, LPI 109, DPW 0.56, DPI 85. (measurements as defined in Bolton, 1974).

Basal tooth of mandible strongly developed but lacking a more apically situated denticle although a slight prominence or convexity is present about half way between the basal tooth and the apex. Eyes small, maximum diameter 0.08. Funicular segments 2-10 much broader than long. Palp formula 2,2 (paratypes dissected) but in some fusion of the labial palpi is incomplete, giving a count of 2,3, there appearing to be a small segment between the longer basal and apical constituents. With head in full-face

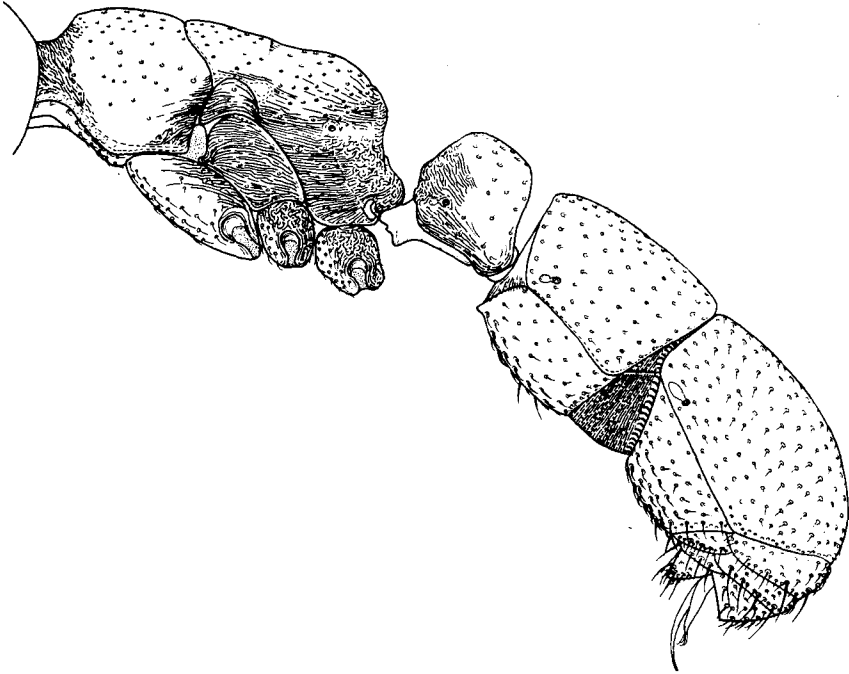


Fig. 2 — *P. lygaria* worker, alitrunk, pedicel and gaster in lateral view, legs omitted

view the occipital margin concave, the sides more or less straight but expanded slightly in front of the eyes. Promesonotal suture strong, the track of the feeble metanotal groove visible as a sculptured line across the dorsal alitrunk. In profile the alitrunk is very slightly concave in the vicinity of the metanotal groove. Propodeal lamellae broadest above the level of the spiracle, narrowing considerably below as they approach the metapleural lobes. Petiole in dorsal view with the anterior margin convex, the posterior broader and concave. Sculpture everywhere on head, dorsal alitrunk, petiole and gaster of scattered punctures which are quite broad but shallow and which are not adjacent but separated by smooth interspaces. Fine striation present on the clypeus, around the antennal insertions, on the meso- and metapleurae and on the extreme posterior portion of the pronotal sides. Faint reticulation is present on the sides of the petiole, especially the lower half. Elongate hairs present only on mouthparts and gastral apex but short appressed pubescent hairs numerous and conspicuous, projecting from the centre of each puncture. These are especially distinct on the dorsal head where they are directed towards the midline, on the lobes of the frontal carinae and on the second gastral tergite where they are directed obliquely away from the midline; hairs on the gastral sternites are longer and stouter than those on the tergites. Colour black.

Paratype workers: TL 5.5-7.7, HL 1.20-1.56, HW 1.02-1.38, CI 85-88, ML 0.88-1.12, MI 69-74, SL 0.70-0.94, PH 0.60-0.82, PL 0.56-0.74, LPI 107-112, DPW 0.50-0.62, DPI 84-91. Ocular diameter 0.06-0.12 (12 measu-

red including largest and smallest). As holotype but with considerable size variation and distinct variation in colour, ranging from dark red-brown to black. Some of the workers which are red-brown have areas which are black. Colour is not correlated to size of individual workers but may be correlated with their age.

Paratype females : Alate, the alitrunk with fully developed wings and flight sclerites. Ocelli present, the antennal scapes when laid back reaching the level of the anterior ocellus or just surpassing it. Eyes larger than in worker, maximum diameter 0.26-0.30. Colour black but the dorsal alitrunk showing patches of deep red-brown in some individuals. Slightly larger than workers but otherwise similar ; range TL 8.5-8.9, HL 1.62-1.72, HW 1.46-1.52, CI 87-89, ML 1.10-1.14, MI 72-76, SL 0.92-0.98, PH 0.84-0.88, PL 0.82-0.86, LPI 102-108, DPW 0.70-0.76, DPI 84-88 (4 measured).

Paratype males : A formal description of the male is not presented at present as males of only three other species in this genus are known (*mandibularis* Smith, *subterranea* Arnold, and *conjugata* Santschi), all of them being of southern and eastern African distribution. However, attention is drawn to their existence in the type-series of *lygaria* for the benefit of future students who may wish to study the males of this genus when more species have been collected.

Suffice to say for the moment that they fit the generic diagnosis (Bolton 1974) but have the reduced palp formula of 4,4.

Holotype worker Ivory Coast : Lamto, 4.vi.1974 forêt galerie du Bandama. (W. H. Gotwald and J. M. Leroux) in British Museum (Natural History)

Paratypes : 103 workers, 4 alate females and 15 males, with same data as holotype in British Museum (Natural History) ; Museum of Comparative Zoology, Cambridge, Mass. ; Muséum National d'Histoire Naturelle, Paris ; Naturhistorisches Museum, Basel ; Museum d'Histoire Naturelle, Geneva ; and Australian National Insect Collection, Canberra .

This small species is closely related to *subterranea* Arnold and will run out to that species in the key given by Bolton (1974). The two may be distinguished by the characters tabulated below :

<i>subterranea</i>	<i>lygaria</i>
Pits on head and second gastral tergite without projecting pubescent hairs.	Pits on head and second gastral tergite with short but distinct appressed pubescent hairs projecting from their centres.
Track of metanotal groove not indicated on dorsal alitrunk.	Track of metanotal groove indicated by a sculptured line across dorsal alitrunk.
Colour light red-brown to orange-brown.	Colour dark red-brown to black.
Larger species, HW 1.40-1.96, ML 1.28-1.76, SL 0.96-1.24.	Smaller species, HW 1.14-1.38, ML 0.88-1.12, SL 0.70-0.94.
Ocular diameter at maximum 0.14-0.20.	Ocular diameter at maximum 0.06-0.12.
Mandibles relatively slightly longer, MI 75-80.	Mandibles relatively slightly shorter, MI 69-74.

In the measurements given above the lower end of the size-range in *subterranea* appears to be close to the upper limits of *lygaria* but this is somewhat misleading as the mean values of the measurements show a marked separation in the two species. Taking HW as an example, the 103 workers of *lygaria* available for measurement gave the following range of HW values.

HW interval (mm)	No. of workers with that HW	% of total with that HW
< 1.00	0	0
1.01-1.05	3	2.91
1.06-1.10	3	2.91
1.11-1.15	14	13.60
1.16-1.20	41	39.80
1.21-1.25	30	29.13
1.26-1.30	10	9.71
1.31-1.35	1	0.97
1.36-1.40	1	0.97
> 1.40	0	0

Thus 92% of the nest population of workers in *lygaria* has HW in the range 1.11-1.30, whilst the mean HW in *subterranea* is 1.62 from a measured series of seven workers with HW range 1.40-1.96.

Ecology of the Species

The nest was located in moist soil beneath a thick layer of litter. It consisted of 8 separate chambers located at a variety of depths in the soil (Fig. 3). The floor of the deepest chamber (VII) was 7 cm below the surface. The spatial relationships between the chambers are shown in Figure 3. Portions of tunnels connecting the chambers were found, but only one, between chambers VI and VII, was completely traced (Fig. 3B). Entrances to the nest from the surface and other possible surface features were not noted and were probably disturbed when forest litter was scraped aside to expose the nest. All of the chambers, with exception of VII, were approximately 1 cm or less in height.

Lévieux (1972) discovered several colonies of *P. subterranea* nesting in the soil in both savanna and forest at Lamto, but it is probable that these colonies were actually *P. lygaria*. The nest of another species, *P. mandibularis* Smith of eastern and southern Africa, is composed of chambers usually located 2 feet or more below the surface (Arnold 1915). The entrances to this nest are generally marked by large piles of earth. This nest then differs considerably from that of *P. lygaria*, particularly in its depth in the soil.

A total of 327 adults were collected from the nest and of these there were 277 workers, 8 alate queens, and 42 alate males. Because the adults were

disturbed by the excavation, they could not be specifically identified with any of the chambers. The contents of the chambers are listed in Table 1, and consisted of larvae, pupae, and millipede eggs. Of the adults collected, 85 % were workers and 15 % reproductives, whereas among the pupae only 21 % were workers while 49 % were reproductives. Thus the developmental energies of the colony, at the time it was collected, were most heavily invested in the production of reproductive individuals. Sixty of the pupae (or 30 %) were larviform and could not be identified to sex or caste. Of the reproductives, the males outnumbered the queens in both the adults (13 % vs 2 %) and pupae (32 % vs. 17 %). No dealated queens were found in the colony. This species apparently maintains rather large colonies. Lévieux (1974, personal communication) confirmed this (if his *P. subterranea* is actually *P. lygaria*) when he unearthed one colony that contained «plusieurs centaines d'individus». *P. mandibularis* colonies, on the other hand, seldom exceed 50 individuals (Arnold 1915).

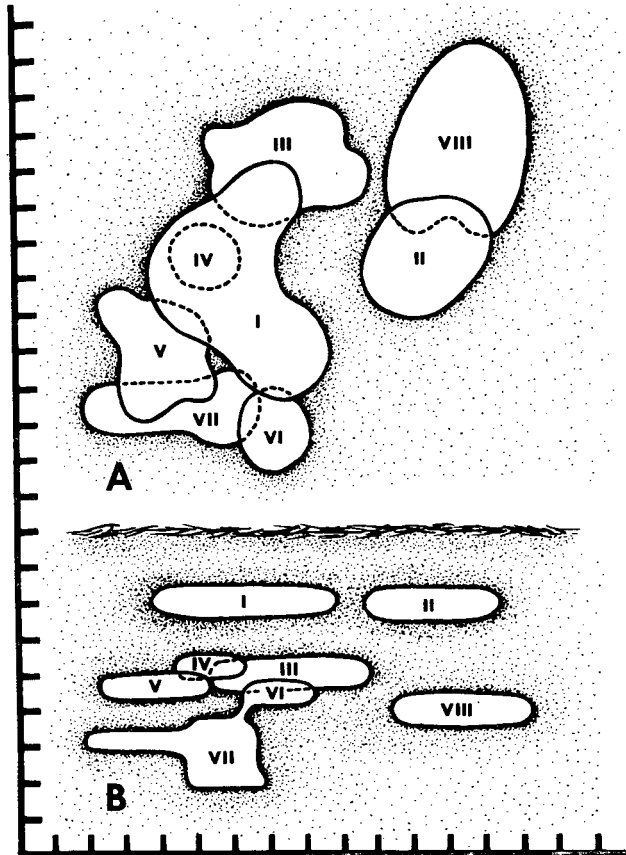


Fig. 3 — Arrangement of chambers in the nest of *P. lygaria*; (A) nest as seen from above, (B) nest in vertical section. Each unit on the coordinates equals 1 centimeter.

The pupae were concentrated in chambers I - III and V indicating that these served as brood chambers. Larvae as well were concentrated in chambers I - III. The number of larvae was low and the absence of eggs unexpected. It is possible, although we feel improbable, that other chambers remained undiscovered.

Each chamber in the nest contained millipede eggs which appeared to constitute the exclusive diet of the *P. lygaria* colony at the time it was found. No other prey or prey debris were found. Chambers VII and VIII served to contain only booty. The presence of millipede eggs confirms Lévieux's (1972) observation that *P. subterranea* (i.e. *P. lygaria*) feeds primarily on millipedes. Other ants of the subfamily Ponerinae, to which *P. lygaria* belongs, are also known to prey on arthropod eggs. The eggs are often stored in the nests in large numbers, and species of the genera *Proceratium* and *Discothyrea* have specialized in egg predation (Brown 1957, 1958). *P. lygaria*, if not specialized as an egg predator, may at least have a dietary preference for millipede eggs. It is possible that the larger species of *Plectroctena* feed upon adult millipedes while the smaller species prey upon eggs or newly emerged young. Presently only the large species (*P. minor* Emery, *P. conjugata* Santschi, and *P. mandibularis* F. Smith) are known for certain to prey on the adults.

The foraging behavior of this colony was not observed, although Bolton (1974) reported that the workers of *Plectroctena* forage singly or in small groups of 2 or 3 individuals. Arnold (1915) noted that the workers of *P. mandibularis* forage singly.

Summary

P. lygaria, a new species from West Africa, is the 17th member of its genus to be described and is closely related to *P. subterranea*.

Observations on the biology of *P. lygaria*, in the habitat and season in which the investigation occurred, may be summarized as follows:

1. The nest is relatively shallow in the soil and consists of numerous chambers, some of which are specialized to house brood and prey.
2. The developmental energies of the colony may be channeled at times to produce broods consisting primarily of reproductive individuals.
3. Colonies may be relatively large and contain in excess of 300 adults.
4. *P. lygaria* specialized primarily as a predator of millipedes, particularly of millipede eggs.

Résumé

P. lygaria, nouvelle espèce de l'Afrique occidentale, dix-septième représentant du genre à être décrit est un proche parent de *P. subterranea*.

Les observations concernant la biologie de *P. lygaria*, au lieu et à l'époque de nos recherches, peuvent se résumer comme suit:

1. Le nid est relativement peu profond dans le sol, il comprend plusieurs

chambres, certaines d'entre elles étant spécialisées pour abriter le couvain et les proies.

2. L'énergie de développement de la colonie peut être centrée, par période, sur la production de couvain comprenant essentiellement des individus reproducteurs.
3. Les colonies peuvent être relativement importantes et contenir plus de 300 adultes.
4. *P. lygaria* est principalement spécialisé dans la prédation des Myriapodes, et en particulier de leurs œufs.

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Table 1
Contents of *P. lygaria* nest

		Chamber						Total
		I-III	IV	V	VI	VII	VIII	
Larvae		37	5	0	1	0	0	43
	Larviform	13	0	47	0	0	0	60
Pupae								
	Worker	7	0	34	0	0	0	41
	Queen	5	0	28	0	0	0	33
	Male	25	1	37	1	0	0	64
Millipede eggs		731	464	32	61	65	793	2146
Total		817	470	180	63	65	793	2387

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