A DETAILED MORPHOMETRIC STUDY OF POPULATION SAMPLES OF *ODONTOTERMES WALLOENSIS* (WASMAN) (ISOPTERA: TERMITIDAE: MACROTERMITINAE) FROM INDIA

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Specimens of *Odontoterme walloensis* (Wasman) collected from southern India, in Coimbatore and Siriguppa are presently held in private collection in Pakistan. Only a few studies on morphometric variations in termites have been made in the Indian subcontinent (Ahmad, 1949; Roonwal, 1970; Chhotani & Das, 1979; Chhotani, 1981; Akhtar & Anwar, 1991; Akhtar & Ahmad, 1991). The morphometric analysis of *O. walloensis* (Wasman**)** presented in this paper will provide a standard of comparison for specimens from different localities of the range of that species and other species of the genus. The photographs of the specimens have also been prepared to present exact morphological appearance of various taxonomic characters.

The objective of this work is to contribute to a better taxonomic knowledge of this species by means of the study of the intracolonial and intercolonial variations in the soldier caste. The study is based on the preserved material available in the collection of Prof. Dr. Muzaffar Ahmad, presently in the custody of Prof. Dr. M. Saeed Akhtar. Specimens from the samples were picked up at random and measured under stereoscopic binocular microscope with built in magnification changer. Measurements were taken with the aid of calibrated ocular micrometer. Taxonomic terms and measurements used in the present study are as explained by Emerson (1945, 1952), Ahmad (1965) and Akhtar (1975). Taxonomic terms and measurements used in the present study are as explained by Emerson (1945, 1952), Ahmad (1965), and Akhtar (1975).

Morphometrics of the Soldier include:

1. The length of mandible is the distance from the condyle to the tip.
2. The tooth from the tip is the distance from the tip to the base of the tooth.
3. The length of postmentum is the median length of the sclerotized portion.

Indices:

1. Mandibular tooth index (TLT/LLM) is the distance of tooth of left mandible from tip/Length of left mandible.
2. Head mandibular index (LLM/LHSBM) is the length of left mandible/length of head to sidebase of mandibles.
3. Head width mandibular index (LLM/MWH) is the length of left mandible/maximum width of head.

Specimens collected from the following localities were studied for morphometric variations

Material Examined:

A. 24.ii.1913, Coimbatore, soldiers and workers, coll. C.N., determined by M. Feroz.
B. 13.ix.1912, Siriguppa ($15^0$41'N & $76^0$53'E), soldiers and workers, coll. T.B. Fletcher, from mound, determined by N. Holmgren

***Odontotermes wallonensis* (Wasmann)**

Termes obesus subsp. *Wallonensis*: E. Wasmann, 1902;
Cyclotermes brunneus subsp. *Wallonensis*: Holmgren, 1914.
Termes (Termes) brunneus var. *wallonensis*: Lal and Menon, 1953.
Odontotermes (Odontotermes) wallonensis: Snyder, 1949; Ahmad, 1958.
Odontotermes wallonensis: Mathur and Chhotani, 1960; Mathur and Thapa, 1963; Roonwal, 1970; Thakur, 1976; Roonwal and Verma, 1977; Chhotani and Das, 1979; Verma and Thakur, 1982; Bose and Das, 1982; Rajagopal, 1983; Thakur, 1981; Chhotani, 1997 (considers *O. brunneus kushwahai* Roonwal and Bose as junior synonym of *O. wallonensis*).
Odontotermes brunneus kushwahai: Roonwal and Bose, 1964; Thakur, 1981.

Imago: Head capsule subcircular, much broader than long. Fontanelle minute, round, slightly raised. Eyes large, broadly oval; situated equidistant from lower margin of head and antennae. Ocelli broadly oval; separated from eyes by about ½ short diameter. Postclypeus greatly swollen; length slightly less than ½ of width. Pronotum subtrapezoidal; anterior margin faintly wavy, slightly raised medially and weakly notched medially; posterior margin faintly to appreciably incurved medially. Length to base of mandibles, 1.08-2.13mm; width with eyes 2.5-3.08mm; maximum diameter of eye, 0.73-0.95mm; minimum diameter of eye, 0.65-0.90mm; long diameter of ocellus, 0.33-0.40mm; short diameter of ocellus, 0.20-0.30mm; ocellus from eye, 0.10-0.15mm; length of postclypeus, 0.55-0.58; width of postclypeus, 1.20-1.25mm; length of pronotum, 1.20-1.40 mm; width of pronotum, 2.10-2.75mm (from Chhotani, 1997).

Soldier: (Image 1[w]; Tables 1-3). The soldier of *O. wallonensis* is characterized by not uniformly coloured antennae; head subrectangular, longer than broad; widest near the posterior, sides weakly arched, mandibles long, sickle-shaped; length about 2/3 head length. Left mandible with a medium sized anteriorly directed tooth lying near the distal end of one third position. Postmentum flat, longer than broad; widest near the anterior one-fourth.

Length of head to sidebase of mandibles: It varied from 1.60-1.86mm. Two population samples A and B have mean values 1.74 and 1.78mm, respectively. The coefficient of variability varied from 3.25-5.36 (Table 1). The two population samples were non-significantly different (t-value, 0.84; d.f., 13; P>0.05) from each other.

[w] See Image 1 in the web supplement at www.zoosprint.org

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Table 1. Internest morphometric variations in taxonomic parameters of the soldier caste of* Odontotermes wallonensis*. Samples followed by similar letters indicate non-significant differences in mean values by 't'-test (P>0.05).

Nest Sample	N	O.R	$\overline{X}$	S.D.	S.E.	95% C.I	C.V
			Length of head to sidebase of mandibles				
A[a]	10	1.60-1.85	1.7470	0.0937	0.0296	1.6800-1.8140	5.36
B[a]	5	1.70-1.86	1.7860	0.0581	0.0260	1.7138-1.8582	3.25
			Width of head at sidebase of mandible				
A[a]	10	0.82-0.96	0.8820	0.0447	0.0141	0.8500-0.9140	5.06
B[a]	5	0.77-0.96	0.8640	0.0716	0.032	00.7750-0.9530	8.28
			Width of head at the posterolateral ends of antennal carinae				
A[a]	10	1.07-1.17	1.1270	0.0383	0.0121	1.0996-1.1544	3.39
B[a]	5	0.96-1.15	1.0700	0.0696	0.0311	0.9835-1.1565	6.50
			Maximum width of head				
A[a]	10	1.40-1.52	1.4480	0.0391	0.0124	1.4200-1.4760	2.70
B[a]	5	1.32-1.57	1.4240	0.0929	0.0415	1.3086-1.5394	6.50
			Length of left mandible				
A	10	1.07-1.23	1.1310	0.0522	0.0165	1.0937-1.1683	4.61
B	5	0.93-1.03	0.9940	0.0410	0.0183	0.9431-1.0449	4.12
			Tooth of left mandible from tip				
A	10	0.47-0.49	0.48600	0.00843	0.00267	0.47997-0.49203	1.73
B	5	0.35-0.38	0.36800	0.01643	0.00735	0.034759-0.38841	4.46
			Length of pronotum				
A	10	0.59-0.72	0.6400	0.0447	0.0141	0.6080-0.6720	6.98
B	5	0.64-0.72	0.6920	0.0303	0.0136	0.6543-0.7247	4.37
			Width of pronotum				
A	1	01.05-1.19	1.1130	0.0395	0.0125	1.0848-1.1412	3.54
B	5	0.93-1.12	1.0240	0.0786	0.0352	0.9264-1.1216	7.86
			Length of postmentum				
A	10	1.03-1.15	1.0720	0.0413	0.0131	1.0424-1.1016	3.85
B	5	0.86-0.99	0.9400	0.0579	0.0259	0.8681-1.0119	6.15
			Width of postmentum				
A[a]	10	0.59-0.72	0.6590	0.0415	0.0131	0.6293-0.6887	6.29
B[b]	5	0.64-0.70	0.6960	0.0358	0.0160	0.6576-0.7404	5.14

N - Number of samples; O.R. - Observed range; X - Mean; S.D. - Standard Deviation; S.E. - Standard Error; C.I. - Confidence Interval; C.V. - Coefficient of variance

Width of head at sidebase of mandibles: The width of head at sidebase of mandibles varied from 0.77-0.96mm. Population samples A and B have mean values 0.88 and 0.86mm, respectively. The coefficient of variability varied from 5.06-8.28 (Table 1). Two population samples were highly non-significantly (t-value, 0.60; d.f., 13; P>0.05) different from each other.

Width of head at the posterolateral ends of antennal carinae: It varied from 0.96-1.17mm. Two population samples i.e., A and B have mean values 1.13 and 1.07mm, respectively. The coefficient of variability varied from 3.39-6.50 (Table 1). Two population samples were non-significantly (t-value, 2.08; d.f., 13; P>0.05) different from each other.

Maximum width of head: The maximum width of head varied from 1.32-1.57mm. Population sample A and B have mean values 1.44 and 1.42mm, respectively. The coefficient of variability varied from 2.70-6.50 (Table 1). Two population samples were highly non-significantly different (t-value, 0.72; d.f., 13; P>0.05) from each other.

Length of left mandible: The length of left mandible varied from 0.93-1.23mm. Population sample A and B have mean values 1.13 and 0.99mm, respectively. The coefficient of variability varied from 4.12-4.61 (Table 1). Again, two population samples were significantly different (t-value, 5.10; d.f., 13; P<0.05) from each other.

Tooth of left mandible from tip: It varied from 0.35-0.49mm. Population sample A and B have mean values 0.48 and 0.36, respectively. The coefficient of variability varied from 1.73-4.46 (Table 1). Two population samples were highly significant (t-value, 18.73; d.f., 13; P<0.05) from each other.

Length of pronotum: The length of pronotum varied from 0.59-0.72mm. Population sample A and B have mean values 0.64 and 0.69mm, respectively. The coefficient of variability varied from 4.37-6.98 (Table 1). However, two population samples were significantly different (t-value, 2.32; d.f., 13; P<0.05).

Width of pronotum: The width of pronotum varied from 0.93-1.19mm. Population sample A and B have mean values 1.11 and 1.02mm, respectively. The coefficient of variability varied from 3.54-7.86 (Table 1). Again, two population samples were significantly different (t-value, 2.98; d.f., 13; P<0.05) from each other.

Length of postmentum: It varied from 0.86-1.15mm. Population sample A and B have mean values 1.07 and 0.94mm, respectively. The coefficient of variability varied from 3.85-6.15 (Table 1). Again, two population samples were significantly different (t-value, 5.12; d.f., 13; P<0.05) from each other.

Width of postmentum: The width of postmentum varied from 0.59-0.72mm. Population sample A and B have mean values 0.66 and 0.69mm, respectively. The coefficient of variability varied from 5.14-6.29 (Table 1). However, two population samples were non-significantly different (t-value, 0.72; d.f., 13; P>0.05) from each other.

Indices:

(i) Mandibular Tooth Index (TLT/LLM): The index value varied from 0.30-0.46. The mean values were 0.43 and 0.34 for samples A and B, respectively. Sample from locality B (Siriguppa) has the highest value of coefficient of variability (C.V. = 7.38) (Table 3).

Table 2. Statistics for various parameters used in this study for* Odontotermes wallonensis, *all localities combined.

Parameters	N	O.R.	$\overline{X}$	S.D.	S.E.	95% C.I.	C.V.
Length of head to sidebase of mandibles	15	1.60-1.86	1.7600	0.0835	0.0216	1.7138-1.8062	4.74
Width of head at sidebase of mandible	15	0.77-0.96	0.8760	0.0532	0.0137	0.8466-0.9054	6.07
Width of head at the posterolateral ends of antennal carinae	15	0.96-1.17	1.1080	0.0557	0.0144	1.0771-1.1389	5.02
Maximum width of head	15	1.32-1.57	1.4400	0.0599	0.0155	1.4068-1.4732	4.15
Tooth of left mandible from tip	15	0.35-0.49	1.0853	0.0818	0.0211	1.0400-1.1307	7.53
Length of left mandible	15	0.93-1.23	0.4467	0.0586	0.0151	0.4142-0.4791	13.10
Length of pronotum	15	0.59-0.72	0.6573	0.0468	0.0121	0.6314-0.6833	7.12
Width of pronotum	15	0.93-1.19	1.0833	0.0682	0.0176	1.0456-1.1211	6.29
Length of postmentum	15	0.86-1.15	1.0280	0.0788	0.0203	0.9844-1.0716	7.66
Width of postmentum	15	0.59-0.72	0.6713	0.0424	0.0109	0.6478-0.6948	6.31

(ii) Head Mandibular Index (LLM/LHSBM): The index value varied from 0.56-0.69. The mean values were 0.64 and 0.60 for samples A and B, respectively. Sample from locality A (Coimbatore) has the highest value of coefficient of variability (C.V. = 5.29) (Table 3).

(iii) Head Width Mandibular Index (LLM/MWH): The index value varied from 0.73-0.80. The mean values were 0.77 and 0.75 for samples A and B, respectively. Sample from locality B (Siriguppa) has the highest value of coefficient of variability (C.V. = 2.73) (Table 3).

***Table 3. Statistics of various indices used in this study for* Odontotermes wallonensis**

Nest Sample	N	O.R.	$\overline{X}$ *	S.D.	S.E.	95% C.I	C.V
i) Mandibular Tooth Index (TLT/LLM)							
A	10	0.41-0.46	0.43	0.01636	0.00517	0.42-0.44	3.77
B	5	0.30-0.36	0.34	0.0251	0.0112	0.31-0.37	7.38
*Average mean value = 0.38.							
ii) Head Mandibular Index (LLM/LHSBM)							
A	10	0.60-0.69	0.64	0.0341	0.0108	0.62-0.67	5.29
B	5	0.56-0.62	0.60	0.0230	0.0103	0.57-0.62	3.83
*Average mean value = 0.62							
iii) Head Width Mandibular Index (LLM/MWH)							
A	10	0.76-0.80	0.77	0.01398	0.00442	0.76-0.78	1.81
B	5	0.73-0.77	0.75	0.02049	0.00917	0.73-0.78	2.73
*Average mean value = 0.76							

Discussion: For different morphological parameters, mean values were non-significantly different at 0.05 percent level of probability, except for length of left mandible, tooth of left mandible from tip; length of pronotum; width of pronotum; length of postmentum (Table 1). Pooled data reveal that the samples are more variable (C.V. = 13.10) for tooth of left mandible from tip (Table 2) as compared to other parameters. Maximum width of head is less variable character (C.V. = 4.15) for this species. Thakur (1981) and Chhotani (1997) consider *O. brunneus kushwahai* Roonwal and Bose as junior synonym of *O. wallonensis* (Wasmann). I also agree with the above authors in this report. Specimens collected by Fletcher and determined by Holmgren are larger (Image 1[w]). Specimens from locality A (Coimbatore) have larger distance of tooth of left mandible from tip.

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VET BRIEF **ZOOS' PRINT JOURNAL 21(11): 2482**

EGG BINDING IN AN ALEXANDRINE PARAKEET *PSITTACULA EUPATRIA*

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Egg binding or obstruction of oviduct occurs in all avian species. Hypocalcaemia may be an important factor in seed eating cage birds. This is an emergency condition that must be dealt with rapidly (Fowler, 1985). The present paper reports a case of egg binding in an Alexandrine Parakeet *Psittacula eupatria*.

A female parrot aged about 15 years was presented to the surgery clinic of Orissa Veterinary College with prolapse of cloaca. History revealed that the parrot was depressed with ruffled feathers and standing straddle-legged on the floor of the cage, restlessly moving back and forth. On examination an egg wrapped in the oviduct and presented through the cloacal opening was marked (Image 1[w]).

The condition was diagnosed as a case of egg binding and it was decided to release the egg by surgery. The parrot was restrained manually. One hand was used to hold the head securely by placing thumb and forefinger on the lateral surface of mandible, while the other hand was used to control the body and legs. The prolapsed cloaca was irrigated with cold normal saline. Then the terminal part of the oviduct covering the egg and a portion of cloacal wall was given a small nick with a sterile b.p. blade (Image 2[w]) and the egg was released by gentle manipulation without breaking the shell (Image 3[w]).

The oviduct and cloacal walls were left unsutured which relapsed to their normal position (Image 4[w]). Multivitamin 2 drops (ABDEC drop 15ml, Pharmapake, Pfizer India Ltd, Mumbai) was administered orally thrice daily for five days along with oral cephalexin powder 30mg (Ceff DT 125mg, Lupine Lab, Mumbai) for three days. The parrot recovered uneventfully.

In the present case as the bird was depressed, physical restraint was used to control the parrot without chemical restraint. Immediate operation by incising the terminal oviduct wall and cloacal wall released the egg binding and saved the life of the parrot as obstruction of oviduct is an emergency situation in which immediate death may result from compression of large blood vessels of intestine or ureteral blockage as suggested by Fowler (1985). Since it was a caged parrot eating soaked peanuts, maize and seasonal fruits, the diet might have resulted in hypocalcaemia thereby causing egg binding.

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