TERMITES (ISOPTERA) OF MACARONESIA

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With 34 figures and 1 table

ABSTRACT

Termites found on NE Atlantic Islands are described and discussed in terms of their distribution and possible origins. *Postelectrotermes barretoi* (Grassé) is represented as a junior synonym of *P. praecox* (Hagen), from Madeira; new measurements are added to the published record of *Kalotermes* dispar Grassé, from the Canary *Islands* (Kalotermitidae). Madeiran specimens of *Reticulitermes lucifugus* (Rossi) (Rhinotermitidae: Heterotermitinae) are described in detail and ? *Nasutitermes canariensis* (Czerwinsky) (Termitidae: Nasutitermitinae) freshly documented.

RESUMO

Térmites existentes nas Ilhas do NE do Atlântico, são descritas e discutidas em termos da sua distribuição e possíveis origens. *Postelectrotermes barretoi* (GRASSÉ) é tratada como um sinónimo mais recente de *P. praecox* (HAGEN) da Madeira; novas medidas são adicionadas ao registo publicado sobre *Kalotermes dispar* GRASSÉ das Ilhas Canárias (Kalotermitidae). Os espécimes madeirenses de *Reticulitermes lucifugus* (ROSSI) (Rhinotermitidae: Heterotermitinae) são descritos detalhadamente e ? *Nasutitermes canariensis* (CZERWINSKY) (Termitidae: Nasutermitinae) documentados com dados recentes.

INTRODUCTION

Macaronesian termites recognised to date number only five species. One of these is here reduced to synonymy, unusual features of another are described and a species name previously regarded as dubious is reconsidered.

The geology of the Cape Verde Islands, the Canary Isles and the Madeira archipelago suggests that the area has existed as a potential termite habitat only since very late in the Tertiary, probably since no more than three million years ago (Watkins 1973; G. P. L. Walker pers. comm.). Termites have not been recorded from the islands of the Azores group.

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Consideration of this record raises broad questions of the origin and dispersal of the termite fauna, questions which are briefly discussed below (see p. 62).

Ceballos & Ortuno (1951) ond other authors listed by Kunkel (1976) describe the surface features of most of the Canary Isles. Figs. 1 and 2, with Table 1, give a broad view of Madeira's climate and phytogeography in relation to the distribution of termites on the island.

THE TERMITE FAUNA

FAMILY KALOTERMITIDAE

Genus *Postelectrotermes*

Synonymy

Postelectrotermes barretoi was described by Grassé (1939) from a single soldier specimen. Termites answering *P. barretoi's* description were collected on Madeira in 1973 by the present author, many of them from colonies closely adjacent to those of *P. praecox*. Imagos from both types of colony were identical in appearance. *P. praecox* colonies subsequently cultured in London, produced soldiers which closely resembled those of *P. barretoi* and exhibited a range of sizes intermidiate between those which Grassé measured in his descriptions of the two species. It was therefore suspected that *P. barretoi* was a junior synonym of *P. praecox* (R. M. C. Williams pers. comm.) and it is treated thus in the redescription of *P. praecox*, below.

Grassé *(op. cit.)* mentions in a footnote that the intestinal protozoa inhabiting *P. praecox* and *P. barretoi* were «bien distinctes» from one another but this view has not subsequently been confirmed. Krishna (1961) notes that *P. praecox* and *P. barretoi* have at least one gut symbiont *(Macrotrichomonas hirsuta* Grassé & Hollande) in common.

Postelectrotermes praecox (Hagen)
Calotermes praecox «Wollaston MS» Hagen 1958: 51, Madeira
Neotermes praecox (Hagen) Grassé 1939: 180
Postelectrotermes praecox (Hagen) Krishna 1961: 321
Calotermes barretoi Grassé 1939: **syn. n.**
Kalotermes barretoi Grassé Snyder 1949: 13
Postelectrotermes barretoi (Grassé) Krishna 1961: 321

Imago (Figs. 3-8)

Head capsule chestnut brown to blackish brown (female may be lighter in colour than male), shape a short rectangle with rounded hind and straight fore margin; sparsely setose, with 15-30 slender, pale setae, mainly in positions posterior to eyes; Y-suture not always visible. Frons large, prominent, with shallow, semicircular depression in fore surface. Clypeus cream-coloured; labrum yellow-brown, subrectangular. Antennae yellow-brown, 16-segmented; I > II > [III or IV > others].

TABLE 1: Madeira. Phytogeography and climate. Legend to figs. 1 & 2

ZONE	TYPICAL CULTIVATION	TYPICAL WILD VEGETATION	RAINFALL (mm/yr)	MEAN TEMP. °C WARMEST MONTH	COLDEST MONTH
1. Subtropical coastal	Bananas, sugar cane	Cacti, other xerophytes. Herbs (mainly exotic).	500-750 or less	23	15
2. Temperate coastal	Vines, cereals	Mediterranean broadleaves, cedars, junipers.	750-1000	20.5	13
3. Lower maquais * I	Stone fruits, legumes, brassicas.	Introduced pines; horsetails, «heather ferns».	1000-1250	18	11.5
4. Lower maquais II		«Laurisilva», endemic conifers, woodland ferns, introduced eucalypts.	1250-1500		
5. Transition maquais	Forestry plantations	Tree heaths, club mosses, perennial scrub.	1500-2000	15	5
6. Upper maquais		Sparse perennial scrub, lichens, mosses	2000-3000 +		

Designation of zones mainly follows that of Vahl (1905). Other data and figures mainly from Tavares (1965).

* Macaronesian «maquais» is not the direct equivalent of Mediterranean «maquis», so the spelling distinction is retained here.

Ocelli small, close to eyes, margins sometimes ill-defined. Mandibles very robust, pitch-black at working edge, dark chestnut elsewhere. Molar plate with 20-25 ridges, deeply indented at base.

Pronotum wider and paler than head, hind margin gently emarginate, fore margin with small, neat indentation at centre. Two small, dark, triangular processes arise near the fore margin, one on either side the median line; a dark ridge runs outward from each parallel to the pronotum margin and along one-third of its extent (Fig. 4).

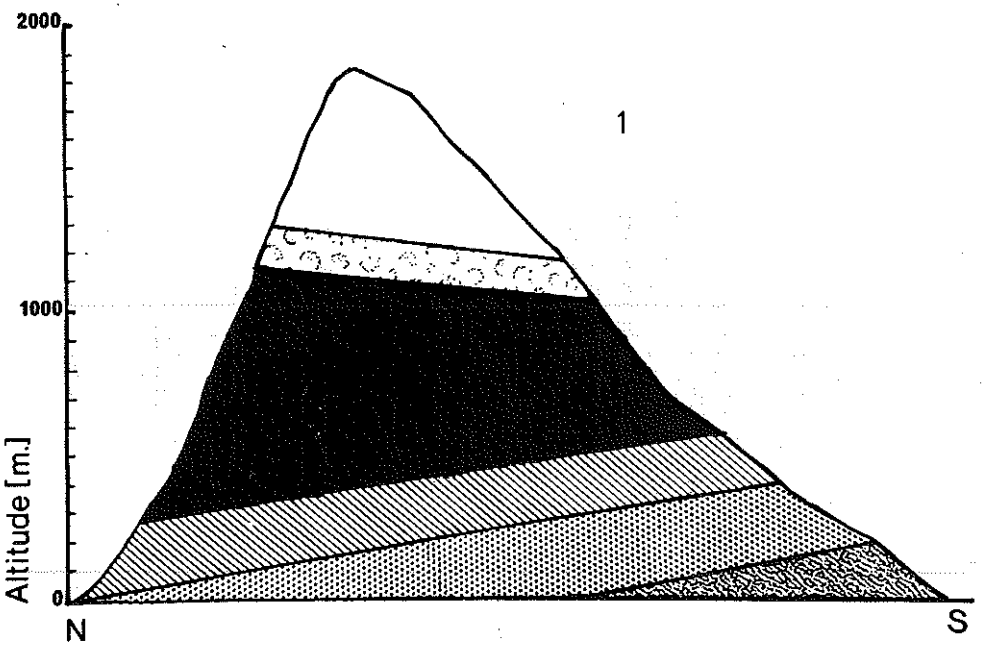


Fig. 1. — Western profile of Madeira showing vegetation and climate zones in relation to altitude; see also Fig. 2 and Table 1. After Tavares (1965) and British Admiralty sources.

Wings smoky brown with characteristic *Postelectrotermes* venation (Fig. 8).

Legs pale yellow, tibiae darker except at distal tip; feet pale. Tibial spurs 3:4:3 (some individuals lack the extra midleg spur); spurs minutely serrated.

Abdominal tergites orange-brown to chestnut brown; sternites pale yellow-brown, darkening and reddening towards rear in some specimens.

Measurements (in mm.) of 10 imagos (6 female, 4 male) from 7 colonies of P. praecox

CHARACTER	RANGE	MEAN	TYPE
Head length to base of mandibles	1.23 - 1.42	1.35	1.33
Head width across eyes	1.18 - 1.33	1.24	1.24
Diameter of eye	0.28 - 0.32	0.30	0.32
Diameter of ocellus	0.11 - 0.13	0.12	0.13
Distance eye-ocellus	0.025-0.035	0.03	0.03
Left mandible (cf. Fig. 5)			
Distance apical — 1st marginal tooth (AB)	0.70 - 0.90	0.80	0.70
1st — 3rd marginal tooth (BC)	0.10 - 0.13	0.11	0.12
3rd marginal tooth — molar prominence (CD)	0.09 - 0.12	0.11	0.09
Right mandible (cf. Fig. 7)			
Apical — 1st marginal tooth (EF)	0.09	0.09	0.09
1st — 2nd marginal tooth (FG)	0.07 - 0.09	0.08	0.09
2nd marginal tooth — molar notch (GH)	0.15 - 0.18	0.16	0.16

Soldier (Figs. 11-19)

Head capsule yellow-brown or pale chestnut brown, darkening to reddish-brown then black towards frons. Some small specimens black or near-black to half length of capsule. Capsule very sparsely setose. Y - suture not always visible. Vestigial eyes, or ocelli, or both may be visible, invisible or absent, pigmented or (more usually) pale.

Mandibles very robust, dentition somewhat variable: the smaller the specimen, the larger the left first marginal tooth appears in relation to its apical tooth.

Frons furrowed transversely, depressed, sometimes quite deeply concave, scattered with minute setae and in some specimens pitted at mandibular muscle attachment sites.

Antennae yellow, 14 — 16 — segmented; IV usually shortest, I > II + III.

Pronotum yellow-brown (in common with other sclerotised body parts), as wide as, or wider than head capsule. Fore margin very

slightly emarginate, with small, neat indentation at centre. Hind margin incurved slightly towards centre.

Legs robust, femur inflated; tibial spurs 3: 4:3 — some individuals lack the extra midleg spur. Sub-anal styles present in all specimens

Measurements (in mm) of 11 soldiers from 8 colonies of P. praecox

CHARACTER	RANGE	MEAN
Head length to base of mandibles	1.67 - 2.86	2.21
Maximum head width	1.33 - 1.81	1.60
Length of left mandible, tip-external attachment, viewed dorsally	1.24 - 1.51	1.39
Length of postmentum (gula)	1.18 - 2.40	1.60
Maximum width of postmentum	0.58 - 0.80	0.69
Length of pronotum at median line	0.35 - 0.89	0.69
Length of hind tibia	0.91 - 1.48	1.21

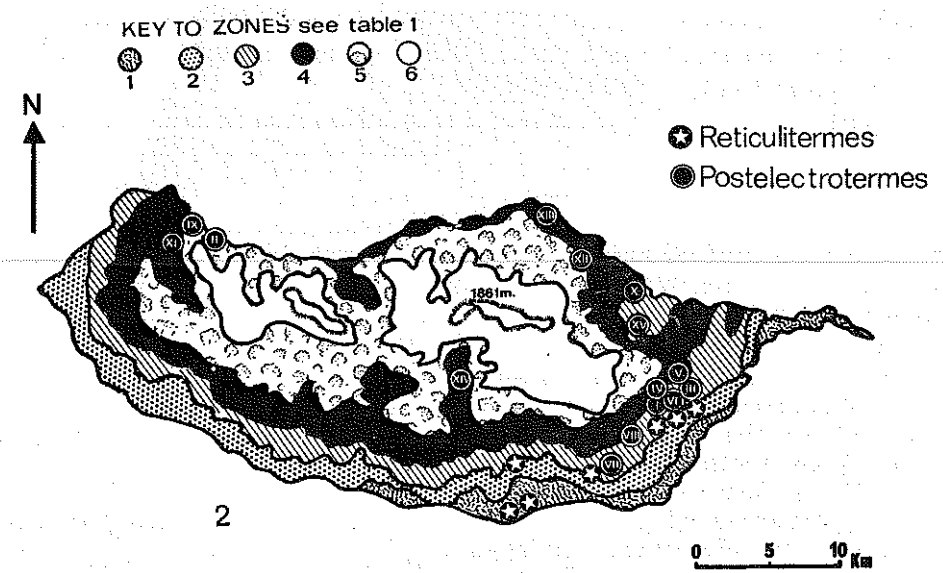
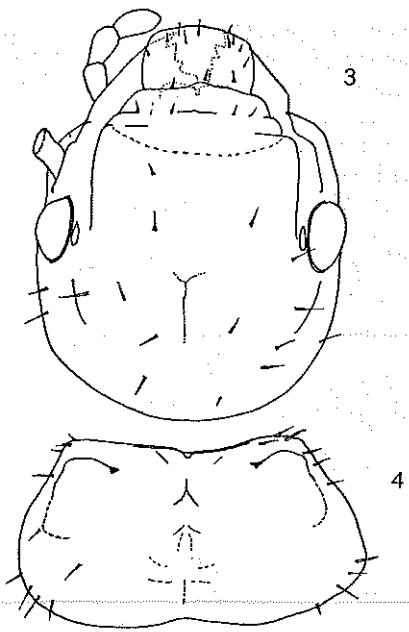


Fig. 2. — Sketch-map of Madeira showing vegetation and climate zones (see also Fig. 1 and Table 1) with Postelectrotermes and Reticulitermes collecting localities. Map after Tavares (1965) and British Admiralty sources

Pseudergates, Neotenics

Head shape, mandibles, tibial spurs as imago. Ocelli absent. Eyes pigmented, up to 0.25 mm in diameter, smaller and less distinct in larval pseudergates (without wingpads) than in nymphs or neotenics. Antennal segments 13 - 15. Larvae yellow or yellowish-white except for mandibles. Nymphs yellow, sometimes darker at tips of abdomen and tibiae and at bases of antennae. Neotenics darker overall. Subanal styles present in all specimens.



Figs. 3 and 4. — Head and pronotum of Postelectrotermes praecox (Hagen) female X 12.

Types

LECTOTYPE female, PARALECTOTYPE male (designated from syntype imago pair) MADEIRA det. Wollaston, coll. Heineken. In British Museum (Natural History).

Other material examined

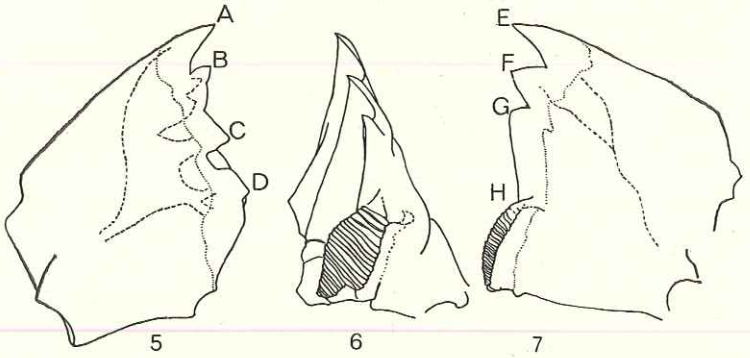
(Roman numerals refer to positions on map, Fig. 2)
I. Santo da Serra. In rotten pine stump at 650 m, Lamb coll. 4: 1973; II. Ribeira da Janela. In dogwood stump at 500 m on hillside below Fanal — R. da Janela road, Lamb coll. 1:8:1973; III, IV as I; V. Santo da

Serra. In loose wood on ground in eucalyptus grove. Blandy & Lamb coll. 28:7:1973; VI. Santo da Serra. In rotting pine log, Lamb coll. 28:7:1973; VII. Palheiro Ferreiro. Quinta do Palheiro botanical gardens. In dry spur on fallen oak, Lamb coll. 31:7:1973; VIII. Camacha (700 m) in woodwork of house, Rui Vieira coll. 11:1954.

Samples II, III, VI and VII are placed in the collections of the Museu Municipal do Funchal, others in the British Museum (Natural History).

Other records

(Roman numerals refer to positions on map, Fig. 2.
IX. Ribeira Funda, Seixal. In *Myrica faya,* Barreto coll., date unknown; X. Pau, Bastias, S. Roque do Faial, in heath *(Erica scoparia),* Barreto coll., date unknown; XI. Chão da Toca, Ribeira da Janela. In laurel, Barreto coll., date unknown; XII. Barreiro, Santana in *Pinus pinaster,* Barreto coll., date unknown; XIII. S. Jorge, in *Myrica faya,* Barreto coll., date unknown; XIV. Serra d'Água, in dead branch of chestnut,



Figs. 5-7. — Left and right mandibles of P. praecox female, with view of working edge of right mandible X 50.

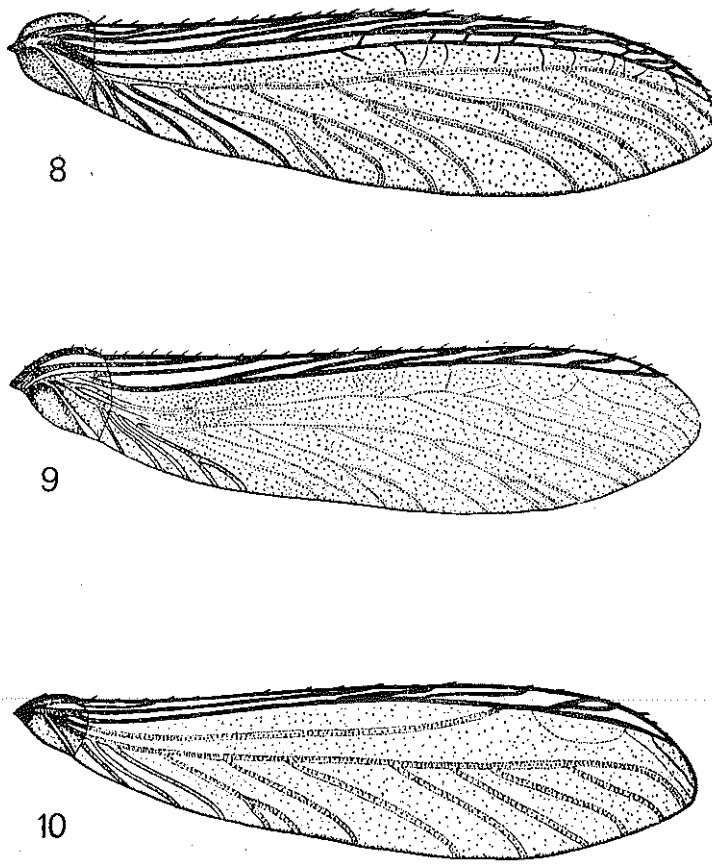
Hollande coll., date unknown; XV. S. Roque do Faial. Barreto coll., habitat and date unknown.

These records were listed by Grassé (1939). Apart from sample XIV — designated by Krishna as the paralectotype soldier of *P. barretoi* and belonging to the American Museum of Natural History — the specimens have not been seen by the present author.

Distribution and Biology

It can be seen from Figs. 1 and 2 that *P. praecox* is distributed in the *maquais* vegetation zones of Madeira between 500 and 1000 m of altitude, or roughly in the lower part of the areas affected by the

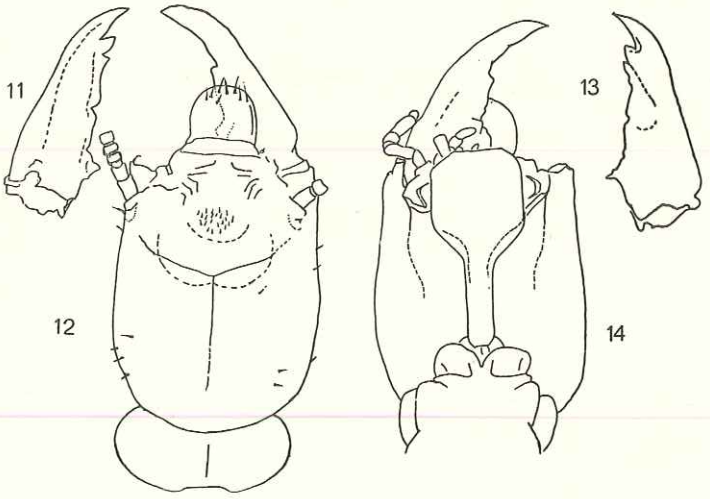
island's cloud belt. It does not appear to be obviously linked to any particular plant community but is often found below the disturbed edges of the laurisilva, a so-called palaeoflora (Ciferri 1962) found throughout Macaronesia and consisting of dense thickets of laurels



Figs. 8-10. — Forewings of (top to bottom) Postelectrotermes praecox, Kalotermes flavicollis and Cryptotermes cavifrons, showing differences in venation between these genera. N. B. the median vein is more pronounced in the distal part of the wing of Cryptotermes brevis than in that of C. cavifrons shown here. Reproduced from Krishna (1961).

which closely resemble fossil species of the late Tertiary of most of the present-day arid regions of the Old World. *Postelectrotermes* is rarely recorded within the laurisilva but presumably used to be a member of the typical *maquais* ecosystem before man-modification and in-

troduction of exotics (including Mediterranean *maquais* plants) after the discovery of Madeira by Zargo in 1419, limited the indigenous vegetation to high altitudes in most parts of the island. *Postelectrotermes* is not a «dry-wood» termite but inhabits the damp root collars or dead stumps of a wide range of trees, including several cultivars. By nesting and feeding in or near the ground, *Postelectrotermes* can probably enjoy a relatively stable micro-climate under conditions which would eliminate most other Kalotermitids — cold night and winter temperatures, desiccation and so on. Further evidence for such an adaptive regime may be found in the large numbers of neotenics found in *P. praecox* colonies on Madeira, a feature which Pinto (1941) and Sands (1975) also observed in *P. militaris* colonies on Sri Lanka. Flightlessness is, besides, common amongst insects of highland or island regions; the numerous neotenics of *Postelectrotermes* may be its social equivalent.



Figs. 11-14. — Postelectrotermes praecox soldiers, dorsal and ventral views of head and left mandible of soldier from wild colony with small soldier size norm X 12.

The overall distribution of *Postelectrotermes* on Madeira resembles that of many of the 34 beetle genera described by Wollaston (1854) as indisputably endemic to the island. These tend to occur mainly on sheltered parts of America-facing slopes or at fairly high altitudes (600 - 1500 m) on Africa-facing slopes. Those insects which, like *Postelectrotermes,* conform to this pattern of distribution and, moreover, occur on both sides of the island's central peaks but not in the coastal area to the South, are unlikely to be historic introductions.

2. Genus *Kalotermes*

Kalotermes dispar Grassé 1938 (Figs. 20-22)

Grassé described dimorphic (i.e. «major» and «minor») soldiers in this Canarian species but it is likely that in this — as in all — kalotermitid species, several different soldier morphs occur, depending on the stage of development (out of six or seven stages) at which the soldier moult occurred and on various other environmental factors.

Nearly all the *K. dispar* syntypes are in Professor Grassé's private collection and have not been made available for study, so it is not possible to illustrate here the extremes of soldier variation, or to depict the imago. Figs. 20-22 show a single large soldier belonging to the American Museum of Natural History and designated by Emerson in 1957 as «co-type from type colony». Below are measurements (in mm) of this soldier where these differ from those given in Grassé (1938), followed in brackets by Grassé's measurements of his small soldier, quoted from the literature.

Head length to base of mandibles	2.40	(1.61)
Maximum head width	1.72	(1.36)
Left mandible length	1.79	(1.19)
Number of antennal segments	14-16	(10-12)
Imago dimensions (from literature)		
Head length to base of clypeus	1.40	
Head width across eyes	1.40	
Pronotum length at median line	1.10	
Pronotum maximum width	1.90 mm	

Distribution

In orchard trees on the E coast of La Palma, cf. Grassé (1938).

3. Genus *Cryptotermes*

Cryptotermes brevis (Walker 1853) (Fig. 23)

This «tramp» species is a pest of buildings in coastal areas throughout the tropics. The soldier can easily be recognised by its phragmotic head (Fig. 23), which may be employed as a temporary plug against predators or desiccating air-currents arriving through exit-holes or accidental breaches in the well-hidden nest-galleries. The imago can be identified by reference to wing-venation features (Fig. 10).

Distribution

Cryptotermes brevis is apparently restricted to Funchal (where it was first noticed damaging buildings shortly before the last World

War) on Madeira and to the area of Las Palmas airport on Gran Canaria (R. L. Araujo pers. comm.). It has been recorded from São Vincente and elsewhere in the Cape Verde Islands since 1936. Williams (1976) has defined some of the natural parameters of the distribution of this species.

FAMILY RHINOTERMITIDAE

Members of this family can be distinguished from the kalotermitids described above by the presence of a fontanelle in the soldier and imago head-capsule.

Subfamily Heterotermitinae

Genus *Reticulitermes*

Reticultitermes lucifugus (Rossi 1792): 107

Termes lucifugus Rossi Hagen 1858: 175 = Termes Madeirensis Heer MS
Reticulitermes lucifugus (Rossi)? Grassé 1939: 179 Madeira

Imago (Figs. 24-29)

Head-capsule and body light to mid-brown, wings pale smoky grey. Antennal segments 17. Mandibles (Figs. 27-29) with normal *Reticulitermes* dentition. Head densely pilose, pronotum slightly more so, posterior border gently emarginate.

Measurements (in mm) of two imagos (one male, one female) from Heer's MS type material.

	MALE	FEMALE (where different)
Head length to base of mandibles	0.97	
Head width across eyes	1.04	
Maximum width of pronotum	0.80	0.85
Length of pronotum at median line	0.48	0.51
Maximum width of postclypeus	0.16	
Length of hind tibia	1.05	1.01
Greatest diameter of eye	0.21	0.23
Maximum diameter of ocellus	0.08	
Distance eye-ocellus	0.03	
Left mandible:		
Apical to 1st marginal tooth	0.04	0.06
1st to 2nd marginal tooth	0.05	0.06
2nd to 3rd marginal tooth	0.07	0.09
3rd marginal tooth to molar prominence	0.08	0.09
Right mandible:		
Apical to 1st marginal tooth	0.06	0.07
1st to 2nd marginal tooth	0.05	
2nd marginal tooth to molar notch	0.19	0.22

Certain measurements and ratios used by Clement (1976) in the course of his morphometric studies on French *Reticulitermes* have also been taken for the Madeiran *R. lucifugus* for comparative purposes, as follows: CH/HC 0.05; OC/CO 0.07; EC/CE 0.088; nb. omm. 121; long. femur 0.913.

Soldier (Figs. 30 - 33)

Head capsule rectangular, widening towards front or rear in larger specimens, very pale yellow (or rarely, dull orange), with up to 25 prominent, irregularly scattered long setae on dorsal surface. Labrum slightly hyaline at tip, sparsely setose. Antennal segments 13 - 17. Frons bulging, deeply embossed, cleavage between bosses in frontal view sharply V-shaped. Fontanelle conspicuous, border somewhat darker than capsule. Pale eyespots (vestigial ocelli) slightly larger than fontanelle and eyepatches (vestigial eyes) clearly visible behind antennal sockets in some larger individuals. Postmentum with 1 - 7 (mean 4) relatively long, dark setae and 4 - 25 (mean 11.5) minute, colourless setae on narrower rear section. Pronotum with no setae or very few (1-4) on central surface, many at margin. Legs pale yellowish-white, femur and tibia often quite strongly inflated.

Measurements (in mm) of 23 soldiers from 5 Madeiran colonies of *R. lucifugus*

	RANGE	MEANS
Head length to hind margin postclypeus	1.46 - 2.12	1.79
Fontanelle to hind margin head capsule	1.02 - 1.44	1.26
Maximum head width	0.98 - 1.27	1.10
Maximum length of pronotum	0.45 - 0.60	0.54
Maximum width of pronotum	0.74 - 0.93	0.84
Length of left mandible, tip-external attachment, viewed dorsally.	0.85 - 1.15	0.99
Length of postmentum	0.97 - 1.29	1.18
Maximum width of postmentum	0.39 - 0.52	0.46
Minimum width of postmentum	0.15 - 0.23	0.19
Length of hind tibia	0.83 - 1.05	0.93

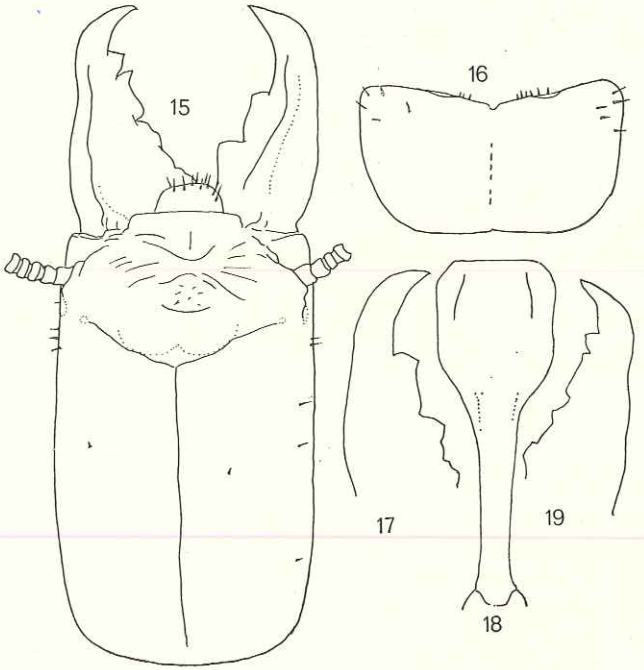
Material Examined

1. Soldiers. Madeira, Santo da Serra, Quinta da Madre d'Água. In pine stump. Lamb coll. 4:8:1973, No. XVI.
2. Soldier with workers. Locality as above. E.M. Blandy coll. 28:7:1973, No. XIX.

3. Male and female imagos. «Termes Madeirensis» Heer MS.
Item 2, above, is deposited in the Museu Municipal do Funchal, others in the British Museum (Natural History).

Other material examined

Ribeira das Cales, A. E. Gardner coll. 14:12:1975; Palheiro Ferreiro, Quinta do Palheiro botanical gardens, in big stump of deodar. E. M. Blandy coll. 31:7:1973, No. XVII; Funchal, Quinta da Achada, in underside of rotten palm trunk on ground. Lamb coll. 6:8:1973, No XX; Santo da Serra, in rotting pine stump. E. M. Blandy coll. 4:8:1973, No. XVIII.



Figs. 15-19. — Postelectrotermes praecox soldiers, dorsal views of head and pronotum, ventral views of mandibles and postmentum of soldier from wild colony with large soldier-sixe norm X 12.

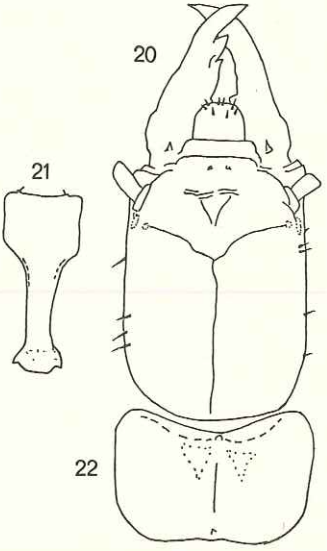
Other Records

Hartung (cf. Hagen 1858) collected *Reticulitermes* at Arrebentão and «in various places to the north of the island». These latter records are not specific but are of great potential interest if they deal with sites remote from ports. Otherwise, the distribution of *R. lucifugus* mainly

in cultivated zones S of Madeira's central peaks and near harbour settlements suggests that this termite was introduced by Man during the past five hundred years, probably from Portugal or Spain. Its origins are further discussed on p. 64.

Comparisons

R. lucifugus soldiers from Madeira were compared with those of *R. lucifugus* from 65 localities in Algeria, Corsica, Cyprus, France, Gibraltar, Italy, Malta, Morocco, Portugal, Spain and Turkey — a total of 200 individual soldiers. Thirty *R. santonensis* soldiers from nine localities in



Figs. 20-22. — Kalotermes dispar soldier; dorsal views of head and pronotum, ventral view of postmentum N. B. X 5.8.

France and seven *R. clypeatus* soldiers from seven localities in Jordan and Palestine were also studied. Imagos from the regions mentioned above were also seen.

Making due allowance for their poor state of preservation, the Madeiran imagos of *R. lucifugus* have distinctly smaller pronota and shorter hind tibiae than those of any of the *R. lucifugus s. str., R. lucifugus banyulensis, R. lucifugus corsicus, R. lucifugus grassei* and *R. santonensis* specimens measured by Clement (1976, 1977). The imagos are intermediate in size between those of *R. lucifugus sensu* Lash (1952) and of *R. clypeatus* in every respect, save for a postclypeus shorter even than that of *R. clypeatus*. The postclypeus does not protrude in profile as in *R. clypeatus* or extend rearwards in dorsal view as in *R. lucifugus sensu* Clement (1976).

In the shape of the worker postclypeus, the Madeiran *R. lucifugus* appears to be intermediate between *R. lucifugus* and *R. santonensis*. The presence of small but distinct, scattered seta together with a down of minute setae on the narrow rear section of the postmentum was observed in all but two of the Madeiran *Reticulitermes* soldiers, studied, while in 90% of *Reticulitermes lucifugus* soldiers from elsewhere, this feature was lacking, setae in that position being minute and few (fewer than 6) or altogether absent.

Buchli (1958) showed that *Reticulitermes* soldiers from the same colony or from different colonies, can exhibit a very wide range of sizes and forms depending on the timing of their last moult and on their caste or instar before they underwent it. Thus the size and proportions of soldier head-capsule features are not reliable characters in this genus.

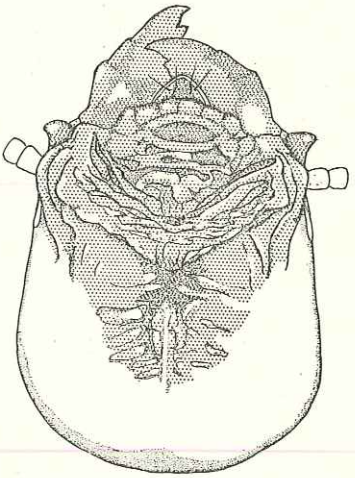


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Fig. 23. — Cryptotermes brevis, dorsal view of soldier head X 12.

Reticulitermes populations in Portugal, Western Spain and Les Landes (NW of the Pyrenées) often display a soldier chaetotaxy quite similar to *R. lucifugus* from Madeira, though none of those examined had the same combination of other characters in all castes as those described above.

FAMILY TERMITIDAE

Subfamily Nasutitermitinae

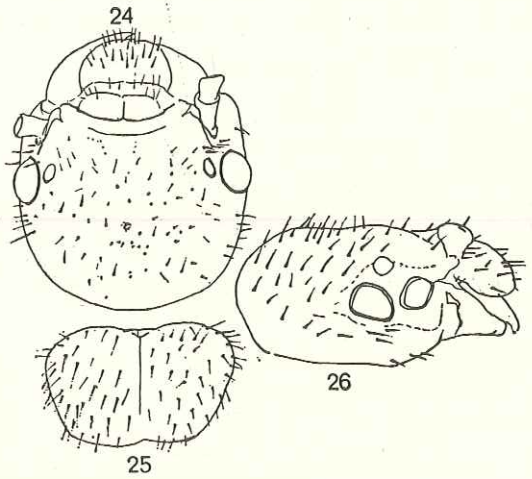
A group of termites noted for the mode of defence in the soldier caste: the mandibles are reduced and the fontanelle conspicuously developed

into a stream-lined frontal tube, or nasus, from which can be squirted a sticky repellent.

Genus ? *Nasutitermes*

? Nasutitermes canariensis (Czerwinsky 1901)

[The types of this species were destroyed during the last war. The monograph in which Czerwinsky's illustrated description appears is not easily available in the West, so a translation of the relevant passage is appended here. Judging by these data and Czerwinsky's photographs, the termites described may have been introduced individuals of an African nasute but in the absence of new material, there is no reason to regard the name as a synonym or (after Snyder 1949) as unavailable].



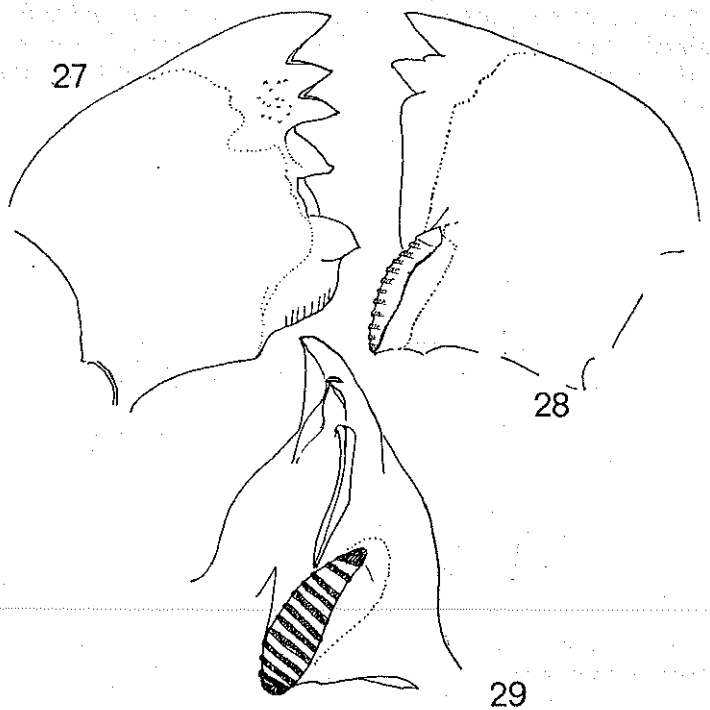
Figs. 24-26. — Reticulitermes lucifugus specimens from Madeira, male imago, dorsal and lateral views of head, with dorsal view of pronotum X 12.

«No. 55 *Eutermes canariensis* n. sp.

One alate male, 4 nasutes and 4 workers from the Canary Isles, given by Mr. Frisch in 1900.

Alate form. Length of body 7 mm, together with wings, 11 mm. Head broad, of a dark brown colour; thorax, abdominal sternites and tergites brown; remaining parts of body light yellow. Antennae with 15 segments, the first longer and thicker than the rest, the second somewhat more slender and shorter, the third segment very short, as long as broad, the remaining segments more elongated. Eyes round, very prominent. In front of eyes, oval simple ocelli, separated from eyes by their own diameter. Width of thorax equal to that of head

including eyes. Anteriorly and at each side the prothorax is narrowed. At its middle, on the brown background is a conspicuous pale yellow cross. The entire body is densely covered with stout setae. Wings narrow, transparent, with scarcely discernible branching median and submedian veins. Nasute. Length 4 mm. Length of head with nose-like rostrum 2 mm; head 1.25 mm, rostrum, 0.75 mm. Head reddish brown, rostrum almost black. Dorsal surface of adbomen brown; antennae, oral



Figs. 27-29. — Reticulitermes lucifugus specimens from Madeira, left and right mandibles of male imago, with view of working edge of right mandible X 50.

appendages and legs, light yellow. Shape of head in dorsal view oval, almost circular; widened posteriorly, somewhat narrowing to base of rostrum. Antennae with 14 segments. The first segment stoutest; the second half as long as the first and those that follow, which are distinctly elongated. Legs long. Thorax narrow. Abdomen stout, oval in shape».

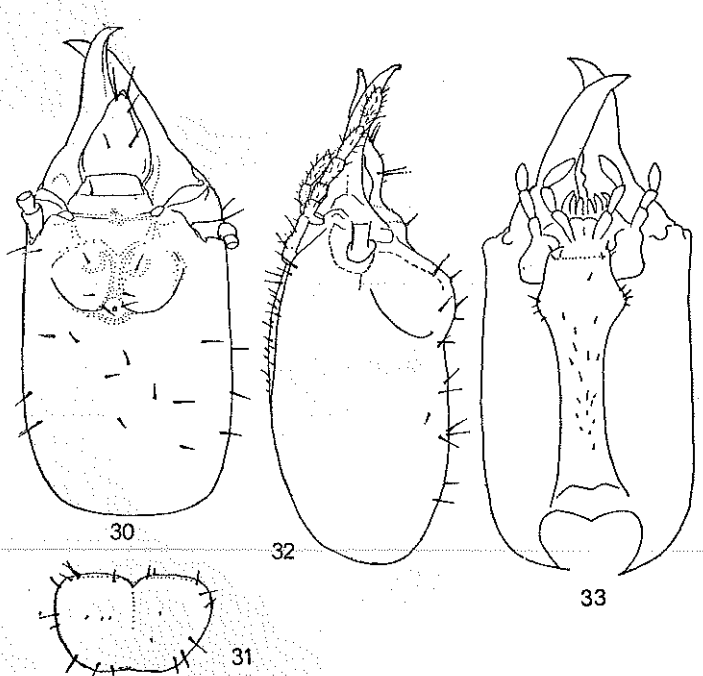
Distribution

Canary Islands; no exact locality known.

DISCUSSION

The ultimate origin of Macaronesia's indigenous termites is of special interest in view of the isolated position of the islands and their relatively recent date of formation.

Postelectrotermes is endemic on Madeira but *P. praecox's* nearest neighbouring congener occurs on Aldabra, while the only known African species is found on the coast of Natal. All but four of the fifteen known species are confined to the Indian subcontinent and the Malagasy re-



Figs. 30-33. — Reticulitermes lucifugus specimens from Madeira, soldier, dorsal, ventral and lateral views of head, with dorsal view pronotum X 12.

gion. Krishna (1961) suspects that the genus originated in the Old World in Mesozoic times. It is possible that the place of origin may have been the area now occupied by the Mediterranean and the Western Sahara regions and that *Postelectrotermes* may have migrated thence relatively recently in response to climate changes and modification of the Sahara towards more uniform conditions during the past few million

years (Moreau 1966): the distribution of several recent xerophilous plants and many fossil (including laurisilva) species, suggests that such movements were commonplace during the late Tertiary (Monod 1961). In view of the unsuitability of termites as long-distance migrants — their poor powers of flight, fragile wings and low tolerance of the conditions likely to obtain in drifting wood (Bowden & Johnson 1976) — a possible means of *P. praecox*'s having reached Madeira could be a process of «island-hopping» *via* seamounts now submerged (Fig. 34).

Though distributed within relatively easy reach of the African

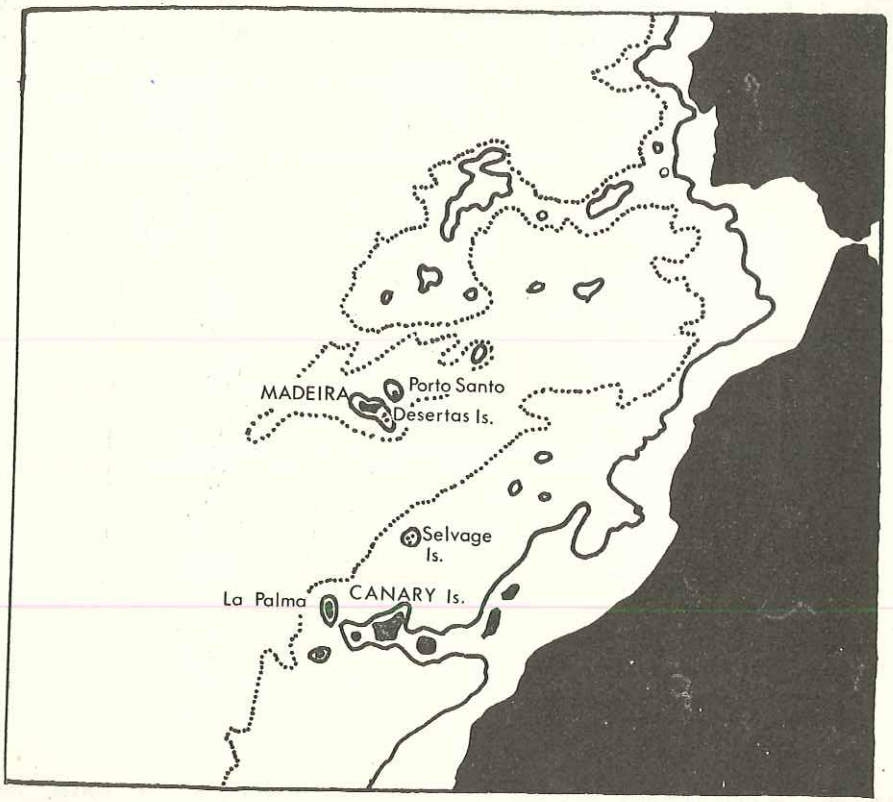


Fig. 34. — Seabed contours off Atlantic coasts of NW Africa and Iberian peninsula, showing land presently above sea level (blocked in), with continental shelf and seamount features at 4000 m (.....) and 2000 m (_____) isobaths.

mainland, *K. dispar* should likewise be seen as a relict endemic species in view of its unusual morphology (especially the great size of larger soldiers) and its considerable isolation from its nearest neighbouring congeners, *K. flavicollis* (Mediterranean region) and various E. African species.

R. lucifugus is categorised above as a recent (since 1419) introduction onto Madeira. The presence of *Reticulitermes* populations similar in soldier chaetotaxy to the Madeiran *R. lucifugus,* in Les Landes, W Spain and Portugal, encourages the view that a *Reticulitermes* genetically isolated from *R. lucifugus* may occur (or may formerly have occurred) on the peninsula and that the Madeiran *Reticulitermes* may owe its peculiarities to an introduction of that isolate, stressed by subsequent geographic isolation and genetic drift. On account, however, of the incompleteness of the record of Iberian forms of *R. lucifugus* and the inadequacy of collections (especially of imago specimens) from Madeira, the Madeiran *Reticulitermes* is not here considered for specific status.

ACKNOWLEDGEMENTS

It is a pleasure to thank Prof. K. Krishna of the American Museum of Natural History, New York, and Dr. G. P. L. Walker of the Dept. of Geology, Imperial College, University of London, for material help and advice. For overall guidance, my sincere thanks also go to Dr. W. A. Sands, R. M. C. Williams and Dr. T. G. Wood of the Centre for Overseas Pest Research (ODM), London. I am indebted to John Blandy and his family for patient help and hospitality during my visit to Madeira.

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