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## The termite genus *Amitermes* in Africa and the Middle East (NRI Bulletin 51)

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# THE TERMITE GENUS *AMITERMES* IN AFRICA AND THE MIDDLE EAST

Bulletin 51



# THE TERMITE GENUS *AMITERMES* IN AFRICA AND THE MIDDLE EAST

W. A. Sands

Bulletin 51



The scientific arm of the  
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*Cover photograph: Mound of Amitermes evuncifer Silvestri*  
*Inset outlines: Imago and soldier heads of Amitermes Mitchellii sp.n.*



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# Summaries

## SUMMARY

The termite genus *Amitermes* is re-examined, with two new species, *A. guineensis* and *A. mitchelli* described here as well as the previously unknown imagos of *A. corpulentus*, *A. gallagheri*, *A. importunus*, *A. sciangallorum* and *A. socotrensis*. The worker castes of all species are keyed and described for the first time. All are fully illustrated, with a total of 535 figures. This is the first work on termites to make use of the DELTA (DEscription Language for TAXonomy) format to record data and the PANKEY set of programmes to manipulate the information automatically to output keys, descriptions and coded matrices for phenetic and cladistic analysis. This entire work is also available in a computerised version on two 1.44 Mb diskettes that provides a fully illustrated on-line menu-driven polyclave identification system for the genus using the CABIKEY software, with a step-by-step manual to facilitate its use.

## RÉSUMÉ

Les termites du genre *Amitermes* font l'objet d'un réexamen, deux nouvelles espèces, à savoir *A. guineensis* et *A. mitchelli* sont décrits ici, ainsi que les imagos auparavant inconnus de *A. corpulentus*, *A. gallagheri*, *A. importunus*, *A. sciangallorum* et *A. socotrensis*. Les castes d'ouvrières de toutes les espèces sont codées et décrites pour la première fois. Elles sont toutes entièrement illustrées et il est fourni un total de 535 figures. Il s'agit de la première étude concernant les termites faisant appel à la structure DELTA (Description Language for Taxonomy – Language descriptif pour la taxonomie) pour l'enregistrement des données ainsi que le jeu de programmes PANKEY de manipulation automatique des informations pour la sortie des touches, descriptions et matrices codées pour l'analyse cladistique et phénétique. L'intégralité de cette étude est également disponible dans une version informatisée, mémorisée sur deux disquettes de 1,44 Mb, assurant un système d'identification polyclave, piloté par menus, en ligne et totalement illustré pour le genre utilisant le logiciel CABIKEY; il est aussi prévu un mode d'emploi point par point afin d'en faciliter l'utilisation.

## الموجز

يعاد فحص نوع *Amitermes* من النمل الأبيض ، مع النوعين *A. guineensis* و *A. mitchelli* الموصوفين هنا بالإضافة إلى الحشرات في دورها الكامل (اليافعة) التي لم تكن معروفة من قبل لكل من الأصناف *A. corpulentus*, *A. gallagheri*, *A. importunus*, *A. sciangallorum* and *A. socotrensis*. كما تم إيضاح فرق الشغالة لكافة الأصناف ووصفها لأول مرة. وكلها مبينة بصورة إيضاحية على أكمل وجه حيث يزود ٥٣٥ شكل. وهذا هو العمل الأول عن النمل الأبيض الذي يتم فيه الإستفادة من لغة دلّتا للوصف الخاصة بعلم تصنيف أجناس وأنواع الحشرات لتسجيل البيانات وكذلك مجموعة بانكي من البرامج لمعالجة المعلومات تلقائيا بإستخدام المفاتيح والأوصاف والمصفوفات الشفرية للتحليل الفنتيكي والكلاديسيكي . ويتوفر هذا المؤلف بأكمله بصورة معدة للكمبيوتر على ثلاثة أقراص سعة ٤٤٤ ميغابايت لتزويد نظام تعريف متعدد الفروع يدار بالفهارس على الخط مع صور إيضاحية على أكمل وجه للأصناف بإستعمال برنامج CABIKEY ، مع كتيب للشرح خطوة بخطوة لتفسير طريقة إستعماله.





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## Section 1

# INTRODUCTION

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Since the first revision of this genus for the African continent (Sands, 1959), several more species have been found, and the undescribed imago castes of others have been collected. A recent major stride in termite taxonomy has been the recognition that it is possible, in many genera, to identify the worker castes separately from the soldiers and imagos, by using a combination of characters of the mandibles and the proportions of the various sections of the alimentary tract (Sands, 1972; Johnson, 1978; Fontes, 1986). The combined need for an update of the species list and to add the worker descriptions and key provides the reason for the present review, at least 40% of which is new information; three species are reduced to synonyms, and two new species described. The list of included species is given under METHODS at the end of the DELTA file.

The almost universal availability of microcomputing facilities and the concomitant development of character-coding and data recording formats such as DELTA (DEscription Language for TAXonomy, Dallwitz and Paine, 1986; Partridge, Dallwitz and Paine, 1986) with automatic taxonomic data-handling programmes like the PANKEY set (Pankhurst, 1986) combined with those for phenetics such as NTSYS (Rohlf, 1990) and cladistics, HENNIG86 (Farris, 1988), have put new tools for communicating their results in the hands of taxonomists.

The occasion to take another look at *Amitermes* has been used as a pilot study to begin to develop automated taxonomy for the Isoptera. DELTA format, developed at CSIRO Canberra, Australia (handbooks available from the Publications Officer of that organization) and mainly employed so far for botanical revisionary studies, has been used to record a set of characters for all castes. Although designed for this genus, the character set could be used with very little modification for almost any group of termites. Thus, this paper is the first on termites to have been generated entirely (apart from this introduction) by computer, and is paralleled by an electronic version.

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## Section 2

# METHODS

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The keys to all castes and the descriptions that follow, as well as the study of relationships among the 20 species that occur in the area delimited by the African continent, the Arabian Peninsula, Iraq and Iran, were all produced automatically once the species characters had been recorded in DELTA format. The keys published here were generated with the PANKEY programmes KCONP and KCONI, the former giving a binary file of the data for which the latter provides the interactive programme that allows modifications by the taxonomist during key construction. These were used in preference to the directly automatic KEY3M3 which tended to employ, early in the keys, characters that are difficult to observe. The alternative of applying character weighting in the DELTA file gave longer keys in which the more variable species appeared several times in different branches. The descriptions were generated from the DELTA file with PANKEY DESCRIP3, which has the advantage that all are directly comparable and totally consistent, no character being omitted. In order to supplement these full descriptions with, for each species, a section of diagnostic COMPARISONS of closely related or sympatric taxa, PANKEY ONLIN5 was used to list character differences between them (with the command DIFF n1 n2).

The DELTA format data have also been used with the CABIKEY software (author, Dr. Ian White, of IIE, who also wrote EPSILON.BAS, to re-format the DELTA data-base) to develop an interactive menu-driven identification system for *Amitermes* that can be run on any PC with a hard disc that uses a version of MS-DOS and graphics allowing the operation of the illustrations. These will run with the majority of colour and monochrome graphics cards, although the quality of colour may vary, and some problems have been reported by users with high resolution (1024x768) non-interlaced monitors associated with 486-chip machines. Some of these can be used at a lower-level graphics emulation. The system is a multiple-entry key, or polyclave, allowing the user to choose either to enter at any convenient character, or to be guided by the automatic character-selection algorithm. A full subject-related HELP glossary is provided, plus the entire text of this review, including the illustrations, which can be called up at any desired point to facilitate character and taxon recognition. It can be operated by anyone who has word-processing experience and requires no other computer skills, being accompanied by a detailed set of instructions.

## CHARACTERS USED AND SPECIES LIST

The characters of all castes have been coded in a layout that allows conventional descriptions to be produced automatically. The alphabetic list of species that forms part of the DELTA file follows the lists of directives, character states and character descriptions. The DELTA list is as follows (Key to character types: TE = text; OM = ordered multistate; UM = unordered multistate; RN = real numbers). After the slash that ends the line of each description of a measured character, a code is given in square brackets in bold-face; this is used to replace the full description in the text to save space and is NOT part of the DELTA file:

\*HEADING AMITERMES- Revision for Africa and Middle East/

\*NUMBER OF CHARACTERS 108

\*MAXIMUM NUMBER OF STATES 7

\*MAXIMUM NUMBER OF ITEMS 20

\*CHARACTER TYPES 1,TE 2,OM 3,OM 4,OM 5,OM 6,OM 7,OM 8,OM 9,OM 10,OM 11,OM 12,OM 13,OM 14,OM 15,OM 16,OM 17,OM 18,OM 19,OM 20,UM 21,OM 22,OM 23,OM 24,OM 25,OM 26,UM 27,OM 28,OM 29,UM 30,UM 31,OM 32,RN 33,OM 34,OM 35,RN 36,RN 37,OM 38,OM 39,OM 40,RN 41,RN 42,RN 43,RN 44,RN 45,RN 46,RN 47,RN 48,RN 49,OM 50,OM 51,OM 52,OM 53,OM 54,OM 55,UM 56,UM 57,OM 58,OM 59,OM 60,UM 61,UM 62,UM 63,UM 64,OM 65,RN 66,RN 67,RN 68,RN 69,RN 70,RN 71,RN 72,RN 73,OM 74,OM 75,OM 76,UM 77,OM 78,OM 79,OM 80,OM 81,OM 82,OM 83,OM 84,OM 85,OM 86,OM 87,UM 88,UM 89,UM 90,OM 91,OM 92,OM 93,UM 94,OM 95,UM 96,UM 97,RN 98,RN 99,RN 100,RN 101,RN 102,RN 103,RN 104,RN 105,TE 106,TE 107,OM 108,RN

\*NUMBERS OF STATES 2,3 3,5 4,5 5,4 6,7 7,4 8,4 9,3 10,5 11,5 12,7 13,7 14,5 15,4 16,3 17,2 18,3 19,5 20,2 21,3 22,3 23,3 24,3 25,3 26,2 27,3 28,3 29,2 30,2 31,3 33,3 34,3 37,3 38,3 39,3 49,6 50,4 51,2 52,2 53,3 54,3 55,2 56,2 57,3 58,3 59,3 60,2 61,2 62,2 63,2 64,3 73,3 74,3 75,3 76,2 77,3 78,3 79,3 80,3 81,3 82,3 83,3 84,3 85,3 86,3 87,2 88,2 89,2 90,3 91,3 92,3 93,2 94,3 95,2 96,2 107,3

\*CHARACTER DESCRIPTIONS

#1. <nomenclatural comments, synonymies>/

#2. imago head capsule <colour>/

#3. imago head capsule genae <colour>/

#4. imago postclypeus <colour>/

#5. imago labrum <colour>/

#6. imago antennal flagellum <colour>/

#7. imago antennal basal segments <colour>/

#8. imago fontanelle <colour>/

#9. imago pronotum <colour>/

#10. imago mesonotum <colour>/

#11. imago metanotum <colour>/

#12. imago legs, coxae <colour>/

#13. imago legs, femora <colour>/

#14. imago legs, tibiae <colour>/

#15. imago legs, tarsi <colour>/

#16. imago wing membrane <colour>/

#17. imago wing, main venation <colour>/

#18. imago abdominal tergites <colour>/

#19. imago abdominal sternites <colour>/

#20. imago posterior margin of head capsule <shape>/

1. semicircular and evenly rounded/

2. arcuate or sinuate/

- #21. imago fontanelle <position>/
1. centred in front of a line joining posterior margins of compound eyes/
  2. centred on a line joining posterior margins of compound eyes/
  3. centred behind a line joining posterior margins of compound eyes/
- #22. imago fontanelle <relative size>/
1. smaller than ocellus/
  2. equal in size to ocellus/
  3. larger than ocellus/
- #23. imago fontanelle <shape>/
1. circular/
  2. broad oval/
  3. narrowly oval/
- #24. imago fontanelle <contour>/
1. flat/
  2. slightly or partly depressed/
  3. deeply depressed/
- #25. imago medial spot in front of fontanelle <shape>/
1. circular/
  2. oval/
  3. parallel-sided/
- #26. imago frons <sculpturing of surface>/
1. with two diverging grooves in front of fontanelle/
  2. smooth or at most weakly indented in front of fontanelle/
- #27. imago posterior margin of postclypeus <shape>/
1. semi-circular/
  2. arcuate/
  3. faceted/
- #28. imago anterior margin of pronotum <shape>/
1. concave/
  2. straight/
  3. slightly lobed in middle/
- #29. imago vertex pilosity <density>/
1. sparse/
  2. dense/
- #30. imago fore coxae <presence of large setae>/
1. with one to five prominent spine-like setae in line or group near middle of front surface/
  2. without prominent spine-like setae/
- #31. imago third marginal tooth of left mandible <degree of prominence>/
1. distinctly protrudes from cutting edge of first plus second marginals/
  2. protrudes slightly from cutting edge of first plus second marginals/
  3. continuous in line with cutting edge of first plus second marginals, not protruding/
- #32. imago left mandible index, mean value <apical to first marginal distance divided by first to third marginal distance>/ (code **[LMI]**)
- #33. imago fourth marginal tooth of left mandible in front view <extent of development relative to molar prominence>/
1. with proximal end clear of molar prominence/
  2. just reaching to tip of molar prominence/
  3. with proximal end hidden behind molar prominence/

- #34. imago first marginal tooth of right mandible with posterior edge <length compared to second>/  
 1. shorter than that of second/  
 2. equal in length to that of second/  
 3. longer than that of second/
- #35. imago right mandible index <apical to first marginal distance divided by first to second marginal distance>/ (code **[RMI]**)
- #36. imago right second marginal index <length of posterior margin divided by length of anterior margin>/ (code **[R2I]**)
- #37. imago notch at proximal end of right molar plate <degree of development>/  
 1. strongly developed, nearly a right angle, almost as deep as long/  
 2. moderately developed, obtuse angled but depth over half length/  
 3. weakly developed, shallowly obtuse/
- #38. imago right molar plate ridges <number>/  
 1. in front of notch six in number/  
 2. in front of notch five in number/  
 3. in front of notch four or fewer in number/
- #39. imago right molar plate ridges <state of development or reduction>/  
 1. prominent/  
 2. concave/  
 3. much reduced/
- #40. imago head width across compound eyes <range, mean, S.D.>/ mm/  
 (code, **[HW]**)
- #41. imago compound eye greatest diameter <range, mean, S.D.>/ mm/  
 (code **[E]**)
- #42. imago ocellus width <range, mean, S.D.>/ mm/ (code **[Ow]**)
- #43. imago ocellus length <range, mean, S.D.>/ mm/ (code **[Ol]**)
- #44. imago distance from ocellus to eye <range, mean, S.D.>/ mm/ (code **[O-E]**)
- #45. imago width of pronotum <range, mean, S.D.>/ mm/ (code **[PW]**)
- #46. imago length of pronotum <range, mean, S.D.>/ mm/ (code **[PL]**)
- #47. imago hind tibia length <range, mean, S.D.>/ mm/ (code **[T3]**)
- #48. imago forewing length including scale <range, mean, S.D.>/ mm/  
 (code **[Fw]**)
- #49. soldier head capsule, front and sides <colour>/
- #50. soldier head capsule, back <colour>/
- #51. soldier mandibles, darkest part <colour>/
- #52. soldier antennae <colour>/
- #53. soldier pronotum <colour>/
- #54. soldier legs <colour>/
- #55. soldier mandible <thickness>/  
 1. length more than 4.4 times shank width behind marginal tooth/  
 2. length less than 4.2 times shank width behind marginal tooth/
- #56. soldier mandible <shape>/  
 1. outline regularly rounded/  
 2. outline angularly rounded/

- #57. soldier mandible, apical hook incurved <curvature>/  
 1. by 1.5-2.5 shank widths/  
 2. by 2.6-3.5 shank widths/  
 3. by more than 3.6 shank widths/
- #58. soldier mandible, point of marginal tooth <position>/  
 1. within basal half/  
 2. midway from base to apex/  
 3. within apical half/
- #59. soldier mandible, point of marginal tooth <shape>/  
 1. sharp/  
 2. blunt, rounded/  
 3. truncated/
- #60. soldier mandible, point of marginal tooth <direction>/  
 1. erect from inner curve of blade/  
 2. in line with inner curve of blade/
- #61. soldier head capsule in profile <shape immediately behind fontanelle>/  
 1. flattened behind fontanelle/  
 2. with a small bulge behind fontanelle/
- #62. soldier head capsule in profile <shape of outline>/  
 1. rounded, convexly curved from fontanelle to occiput/  
 2. flattened or sinuate from behind fontanelle to occiput/
- #63. soldier fore coxae <presence or absence of spine-like setae>/  
 1. without prominent spine-like setae on anterior surface/  
 2. with three or more prominent spine-like setae arranged in line or group on anterior surface/
- #64. soldier pronotum <shape>/  
 1. with anterior lobe smaller than posterior/  
 2. with anterior and posterior lobes equal in size/  
 3. with anterior lobe larger than posterior/
- #65. soldier, length of head capsule to lateral insertions of mandibular abductors <range, mean, S.D.>/ mm/ (code **[HL]**)
- #66. soldier, greatest width of head capsule <range, mean, S.D.>/ mm/ (code **[HW]**)
- #67. soldier, head capsule width at lateral insertions of mandibular abductors <range, mean, mean, S.D.>/ mm/ (code **[Hw]**)
- #68. soldier, depth of head capsule including postmentum <range, mean, S.D.>/ mm/ (code **[HD]**)
- #69. soldier, left mandible length <range, mean, S.D.>/ mm./ (code **[ML]**)
- #70. soldier, pronotum length <range, mean, S.D.>/ mm./ (code **[PL]**)
- #71. soldier, pronotum width <range, mean, S.D.>/ mm/ (code **[PW]**)
- #72. soldier, hind tibia length <range, mean, S.D.>/ mm/ (code **[T3]**)
- #73. worker head capsule <colour>/
- #74. worker antennal flagellum <colour of darkest part>/
- #75. worker fore coxae <shape>/  
 1. conical/  
 2. flanged anteriorly/  
 3. flattened, flanged on both sides/

- #76. worker fore coxae <presence or absence of spine-like setae>/
1. without prominent spine-like setae on anterior surface or flange/
  2. with three or more prominent spine-like setae arranged in line or group on anterior flange/
- #77. worker left mandible, third marginal tooth <state of development>/
1. distinctly protrudes from cutting edge of first plus second marginals/
  2. protrudes slightly from cutting edge of first plus second marginals/
  3. continuous in line with cutting edge of first plus second marginals, not protruding/
- #78. worker left mandible, fourth marginal tooth in front view <extent of development>/
1. with proximal end clear of molar prominence/
  2. reaches tip of molar prominence/
  3. with proximal end hidden behind molar prominence/
- #79. worker right first marginal tooth with posterior edge <proportion relative to second>/
1. shorter than that of second marginal/
  2. equal to that of second marginal/
  3. longer than that of second marginal/
- #80. worker, notch at proximal end of right molar plate <degree of development>/
1. strongly developed, nearly a right angle, almost as deep as long/
  2. moderately developed, obtuse angled but depth over half length/
  3. weakly developed, shallowly obtuse/
- #81. worker, right molar plate ridges <number>/
1. fewer than five/
  2. five in number/
  3. six in number/
- #82. worker, right molar plate ridges <state of development or reduction>/
1. prominent/
  2. concave/
  3. much reduced/
- #83. worker, intestine with anterior part of mesenteron <proportions>/
1. longer than mixed segment/
  2. approximately equal to mixed segment/
  3. shorter than mixed segment/
- #84. worker, intestine with mixed segment <start position>/
1. starting well to left of heart in dorsal view of unopened abdomen/
  2. starting slightly to left or beneath heart in dorsal view of unopened abdomen/
  3. starting well to right of heart in dorsal view of unopened abdomen/
- #85. worker, mesenteric part of mixed segment at its narrowest point <width>/
1. approximately equal in width to proctodeal part/
  2. approximately half width of proctodeal part/
  3. less than half width of proctodeal part/
- #86. worker, mesenteric part of mixed segment <degree of inflation>/
1. strongly inflated at posterior end, length of inflation not more than three times thickness/
  2. slightly inflated at posterior end, length of inflation more than three times thickness/
  3. not inflated/

- #87. worker, mesenteric part of mixed segment <length relative to dilation of proctodeum>/
1. terminating short of proctodeal dilation/
  2. reaching to proctodeal dilation/
- #88. worker, posterior termination of mixed segment in ventral view of unopened abdomen <position relative to ventral nerve cord>/
1. to left of or just reaching ventral nerve cord/
  2. well to right of ventral nerve cord/
- #89. worker, attachment of Malpighian tubules at mesenteric-proctodeal interface <point of attachment>/
1. within basal one-third of mixed segment/
  2. beyond basal one third of mixed segment/
- #90. worker, attachment of Malpighian tubules in dorsal view of unopened abdomen <position relative to heart>/
1. at or near line of heart/
  2. distinctly to right of line of heart/
  3. out of sight to right of heart, visible in lateral view only/
- #91. worker, proctodeal first segment <condition>/
1. tubular/
  2. dilated to twice its basal width/
  3. dilated to more than twice its basal width/
- #92. worker, proctodeal first segment termination at enteric valve <condition>/
1. conical, length less than twice width/
  2. short tubular, length two to four times width/
  3. long tubular, length more than four times width/
- #93. worker, enteric valve <attachment to third proctodeal segment>/
1. entering directly into third segment of proctodeum/
  2. entering a short diverticulum from third segment of proctodeum/
- #94. worker, enteric valve in dorsal view of unopened abdomen <position of entry to third segment of proctodeum, lateral displacement>/
1. distinctly to left of heart line/
  2. at or very near heart line/
  3. distinctly to right of heart line/
- #95. worker, enteric valve in dorsal view of unopened abdomen <position of entry to third segment of proctodeum, longitudinal displacement>/
1. behind curve of mesenteron/
  2. hidden beneath curve of mesenteron/
- #96. worker, colon within mesenteric loop in dorsal view of unopened abdomen <degree of convolution>/
1. forming a single simple coil/
  2. thrown into one or more loops additional to the main coil, mainly to left of heart/
- #97. worker head capsule width <range, mean, S.D.>/ mm/ (code **[HW]**)
- #98. worker, left mandible index <range, mean, S.D.>/ (code **[LMI]**)
- #99. worker, right mandible index <range, mean, S.D.>/ (code **[RMI]**)
- #100. worker, right second marginal index <range, mean, S.D.>/ (code **[R2I]**)
- #101. worker, right first to second marginal index <range, mean, S.D.>/ (code **[R1:2I]**)
- #102. worker postclypeus length <range, mean, S.D.>/ mm/ (code **[Pcl]**)
- #103. worker hind tibia length <range, mean, S.D.>/ mm/ (code **[T3]**)



- #104. worker fore tibia length <range, mean, S.D.>/ mm/ (code [T1])
- #105. <material examined>/
- #106. <biology, economic significance>/
- #107. soldier, shape of inner margin of mandible distal to marginal tooth/  
 1. strongly sinuate/  
 2. straight or slightly sinuate/  
 3. entirely concave/
- #108. soldier, ratio of mandible length to head-width at mandible insertions/ (code [ML:Hw])

\*ITEM DESCRIPTIONS

- #1. ***Amitermes acinacifer*** Sands (1959)/
- #2. ***Amitermes braunsi*** Fuller (1922)/
- #3. ***Amitermes corpulentus*** Al Alawy (1990)/
- #4. ***Amitermes desertorum*** (Desneux 1902)/  
*A. santschii* Silvestri (1911) **syn.n.**
- #5. ***Amitermes evuncifer*** Silvestri (1912)/
- #6. ***Amitermes gallagheri*** Chhotani (1988)/
- #7. ***Amitermes guineensis*** sp.n./
- #8. ***Amitermes hastatus*** (Haviland 1898)/
- #9. ***Amitermes importunus*** Sands (1959)/
- #10. ***Amitermes loennbergianus*** (Sjoestedt 1911)/
- #11. ***Amitermes messinae*** Fuller (1922)/
- #12. ***Amitermes mitchelli*** sp.n./
- #13. ***Amitermes sciangallorum*** Ghidini (1941)/
- #14. ***Amitermes socotrensis*** Harris (1954)/
- #15. ***Amitermes somaliensis*** Sjoestedt (1927)/
- #16. ***Amitermes spinifer*** Silvestri (1914)/
- #17. ***Amitermes stephensoni*** Harris (1957)/
- #18. ***Amitermes truncatidens*** Sands (1959)/
- #19. ***Amitermes unidentatus*** (Wasmann 1897)/
- #20. ***Amitermes vilis*** (Hagen 1858)/  
*A. wahrmani* Spaeth (1964) **syn.n.** *A. rhizophagus* Belyaeva (1974) **syn.n.**

\*END

## COMMENTS ON LISTED CHARACTERS

Some of the characters listed above require further explanation to facilitate their use:

**Colour** characters were coded on a system developed earlier (Sands, 1965), giving 12 numerical grades of sclerotisation between white, unsclerotised, and pitch black, through yellows and browns. Parts of the range used for different characters were renumbered as starting from 1 so that the values of different ranges do not correspond in DELTA.

**Imago** characters (20-28) of outline shape, position of fontanelle, etc., and all measurements of all castes, depend for accurate observation on correct alignment of the part exactly transverse (i.e., at right angles) to the optic axis of the microscope.

**Measurements** were taken with an electronic filar eyepiece micrometer that read automatically into a computer programme in BBC Basic which provided statistics and ratios on demand and stored data on disc for conversion to ASCII files, suitable for input to other statistical and phenetic procedures. The third place of decimals would not normally be repeatable with less sophisticated equipment, but it seemed just as artificial to round to two as to accept the accuracy provided by automation, and leave it to the user to make any convenient approximation.

#21 Fontanelle position: reflects variations in the shape and size of the compound eyes and the fontanelle rather than its actual position, and can be profoundly altered by tilting the head capsule fore and aft. It is best used with corroborating characters.

#28 Anterior margin of pronotum, shape: can be similarly altered, especially in species where its concavity is slight.

#29 Vertex pilosity is best viewed from below and in front, looking up over the postclypeus so as to see the vertex in profile. It becomes sparser in all species towards the back of the head and is judged 'sparse' only when the setae are obviously widely spaced.

**Mandible** characters (IMAGO, 31-39, WORKER, 77-82) require simple dissection by slitting the adductor apodemes to free the mandibles to swing open on their articulations. It is again vital to set them transverse to the optic axis for observation and especially for measurement. Hence it is undesirable to detach them from the specimen, since their trapezoid shape makes them impossible to mount on a slide in the required position.

#31,77 Left third marginal tooth: homology of marginal teeth is decided by reference to their most plesiomorphic state, as seen in Termopsidae and some cockroaches. The left second and third marginals are often reduced in Termitidae, the third sometimes being in line with a cutting edge behind the first that includes the second, and sometimes protruding to a greater or lesser extent. Some authors (Roonwal and Chhotani, 1989) adopt the pragmatic approach of numbering the marginal teeth as seen without regard to homology.

#32,98 Left mandible index **[LMI]**: distance from apical to first marginal divided by distance between first and third marginals.

#33,78 Left fourth marginal tooth (Sands, 1972): referred to by some authors as the molar tooth, being out of alignment behind the other marginals and the molar prominence, with which it is usually connected by a short ridge at an acute angle. It nevertheless functions as a marginal, i.e. cutting tooth in most genera, working against the right second marginal. Its inner end in some species clears the molar prominence in surface view, but is more often hidden behind it.

#34,79 Right first and second marginals compared: the lengths of hind edges of these teeth vary in proportion and provide useful specific characters.

#35,99 Right mandible index [**RMI**]: distance from apical to first marginal divided by that between first and second; usually larger than LMI, but closely correlated with it.

#36,100 Right second marginal index [**R2I**]: the development of the second marginal can only be expressed by the extent to which it protrudes, given by the length of its hind edge divided by that of the front edge. The latter measurement is difficult except in newly moulted specimens because it wears heavily, and it is always a short tooth requiring high magnification. There is however considerable interspecific variation, especially in the worker castes.

#37,80 Right molar notch: presumed plesiomorphic since it occurs in cockroaches (Polyphagidae and Panesthiidae), Mastotermitidae and Termopsidae, this notch at the proximal end of the molar plate, seen in surface view, is thought to release ground food into the cibarium. It tends to be reduced in its apomorphic state which occurs convergently in many groups with variations in the mode of reduction. In *Amitermes*, it is less developed in imagos and later worker instars, suggesting that food gathering and processing may be predominantly a function of the earlier instars. While easy to assess when strongly developed, it is less so when moderately or weakly present.

#38,39,81,82 Right molar ridges: only those in front of the molar notch were counted, and may be difficult to see without intense illumination at various angles, especially when 'concave' or 'much reduced' as in species more adapted to soft litter feeding. It is usually worth moving the plate into different positions to highlight the ridges where possible.

**Soldier** characters (55-72) are those best known from past use and are largely self-explanatory. A few need expansion:

#55 Mandible thickness: the mandible length measurement from the outside base diagonally to the tip is standard. The 'shank width' is measured at the narrowest point behind the marginal tooth since this is the best defined location.

#57 Mandible incurvature: two methods have been adopted in the literature; the one used here is to take the extrapolation of the straight part of the outer edge near the base of the mandible as the long side of a rectangle, the opposite side of which just includes the tip of the apical tooth. The short side of the rectangle is then measured in 'shank widths'. Some other authors (Roonwal and Chhotani, 1989) have taken the diagonal overall length and measured for comparison the perpendicular from it to the greatest extent of the curve of the outer margin.

#61,62 Head profile: two aspects are coded, the first referring only to the limited region immediately behind the fontanelle, where in some species there is a small bulge, slightly overhanging the fontanelle; the alternative is to be more or less flat at this point, although there may be a small ripple in the profile slightly further back. The main part of the profile extends from just behind this region right to the occipital foramen, and may be entirely convex although with increasing curvature towards the back; the alternative is to be flattened on the top of the head or even slightly undulating.

#63 Fore coxae (also **Imago**, 30 and **Worker**, 75,76): The presence or absence of spine-like setae is easy to determine; the degree of flattening is less so and, in worker castes at least, it is worth sacrificing a specimen in order to view the fore coxa flat, either by detaching the entire leg or by slicing off the head and one coxa diagonally so that the remaining one can be examined at the correct angle.

#64 Pronotum lobes: when the pronotum is viewed in profile, the point of inflection, i.e. the lowest point of the curve of the 'saddle-shape', divides the sclerite into two lobes which vary in their proportions. Viewed from above, the 'anterior' will always appear shorter and narrower than the 'posterior'.

**Worker** gut characters (#83-96) have been used in the Apicotermitinae (Sands, 1972) and in other genera of Termitinae, but not so far in *Amitermes*. Some require dissection and unravelling to be seen clearly; others can, with

experience, be recognised *in situ* in the abdomen, their locations being fixed by reference to longitudinal anatomical features such as the dorsal heart and ventral nerve cord. All of these characters are subject to some variation and distortion, both as a result of the nutritional state of the individual and of its dying contortions on being put into preservative; the characters chosen for identification are those found to be least affected by such displacements. It is best when learning to recognise these features to select specimens that died with full guts and with the abdomen straight.

#83-88 Mesenteron and mixed segment: #83 and 85 need dissection to display adequately, and extreme care and delicacy is required in preserved specimens to avoid damage. Most difficult is the removal of the outer parts of the malpighian tubules and connective tissue; #84,86-88 can be detected through the body wall once the observer is familiar with the layout of coiling of the gut, and it is well worth the effort of learning this for most of the Termitidae. The start of the mixed segment at the beginning of proctodeal tissue is often obscure in those species that feed mainly on decomposed material because the mesenteric epithelium tends to be thinner and less distinct from the proctodeum.

#89,90 The attachment of the malpighian tubules: may be difficult to find especially in the unopened abdomen, since their outer parts are thicker and more convoluted as well as reflexed several times over the surface of the mixed segment; again it is necessary to learn where to look and to persist in searching for the rather faint and much straighter proximal ends of the tubules close to the mesenteric/proctodeal interface, where they are usually attached (except in the Apicotermitinae).

#91-97 Proctodeum and enteric valve: generally visible through the body wall; the first segment of the proctodeum #91, may be tubular or dilated to a varying extent, and its termination at the enteric valve #92 may be continuous with its main pouch or separated by a tubular section of varying length. The enteric valve, designated the second section of the proctodeum, may enter the third pouch #93,94, directly, or on a diverticulum from it. Where a diverticulum is present in *Amitermes*, it can be found towards the rear in dorsal view, with the first segment on the left and the third on the right. In some species the tubular extension of the first proctodeal segment is long enough to carry the enteric valve forward on the right of the heart line to beneath the transverse coil of the mixed segment #95. The colon is best recognised by following the rectum forward until it loops somewhat to the right before passing under the mixed segment; the continuation within the mixed segment is the coil referred to in #96.

## PHENETIC AND CLADISTIC ASSESSMENT OF SIMILARITIES

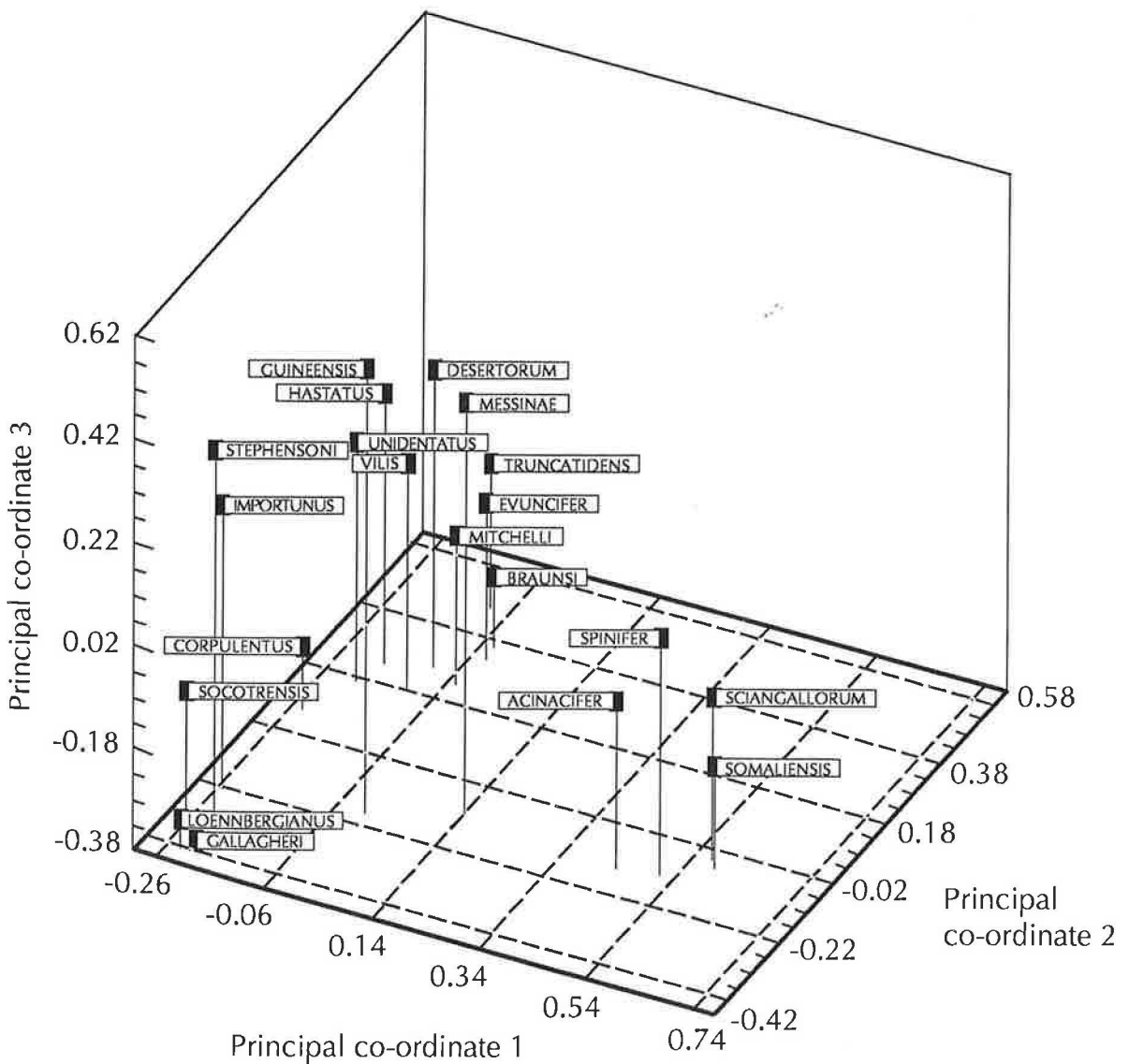
This review is concerned only with a small, geographically defined section of the genus, so that the relationships between the species are only roughly indicative of what may be found when the whole of its tropicopolitan membership is considered. No final conclusions are attempted, but there is evidence that the existing genus incorporates a wider range of forms than do some others more closely defined, and it may in future require subdivision when the groupings within it are more fully understood.

The matrix of similarity coefficients produced from the coded character database by PANKEY programme SC3 was edited by the addition of the unit diagonal and run through the NTSYS-SAHN complete and single linkage, weighted and unweighted pair-group clustering (COMPL, SINGL, UPGMA and WPGMA), for which the consensus trees are shown in Figures 2 and 3 and the Principal Coordinates (DCENTER, EIGEN) routines, in Figure 1. The similarity matrix was also transformed to a distance matrix (TRANSF) in order to run the NTSYS phylogenetic tree programme (NJOIN), compared with the result from HENNIG86 in Figures 4 and 5. The output from PANKEY-DELPAUP1, also slightly edited, was accepted by HENNIG86 and after two cycles (of M\*;BB\*;XS W);

produced a single phylogenetic tree, length 393, Consistency index 68, Retention index 75. The interpretation of the cladistic results was affected by the ease with which a polarity reversal of one or two characters completely re-rooted the tree. This suggested that it would be unwise to speculate too far about the plesiomorphic or apomorphic states of the majority of the characters, and it would be best only to consider those groupings of species that remained robust throughout a range of clustering and ordination methods.

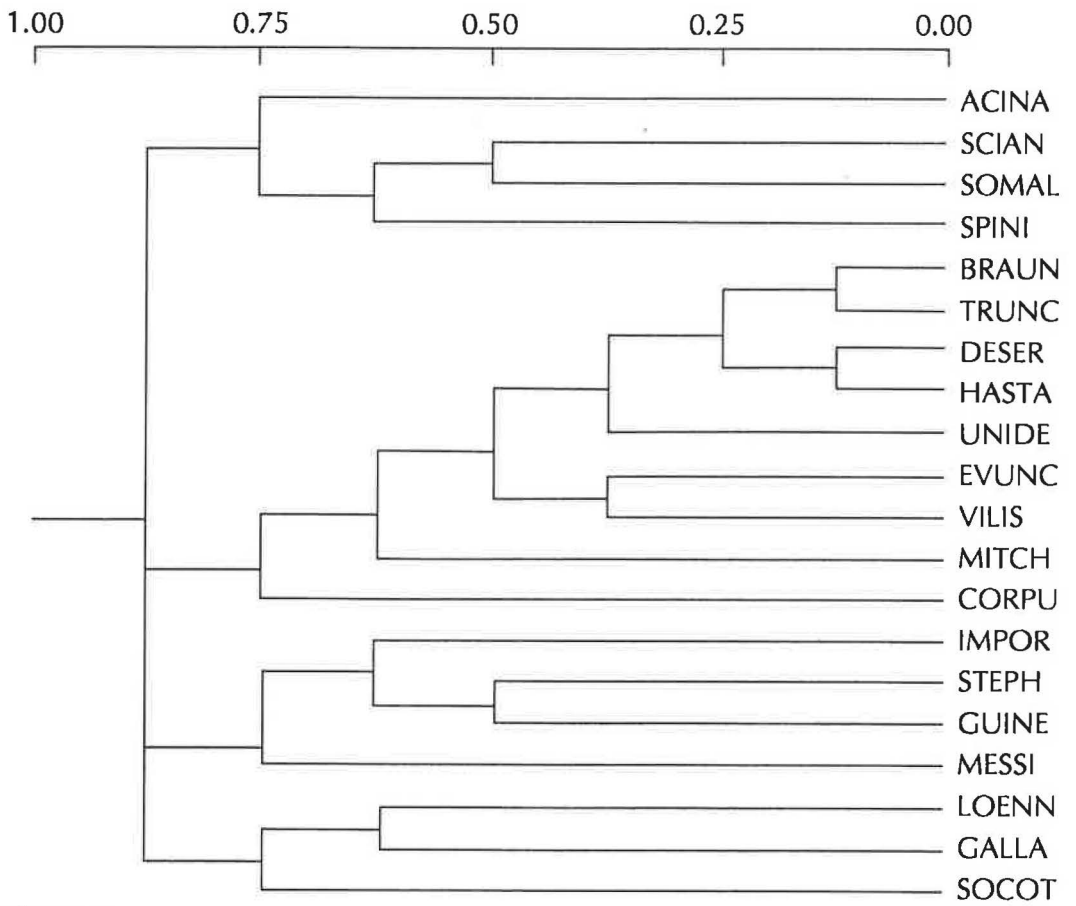
The results of these analyses consistently show that a group of four small species, *A. acinacifer*, *A. sciangallorum*, *A. somaliensis* and *A. spinifer*, is separated from the other species in the region. These species are characterised by apparently having a more developed polymorphism than the rest of the genus in the worker caste, which requires further study to understand it fully. For the moment, the variation is interpreted in terms of instars of development in line with the work of Noirot (1955), but this results in anomalies that need explanation.

Another somewhat divergent grouping that persists through most analyses is that of *A. loennbergianus*, *A. gallagheri* and *A. socotrensis*, all from arid areas of northern East Africa and Arabia, whose nearest relative appears to be the Central African *A. importunus*.



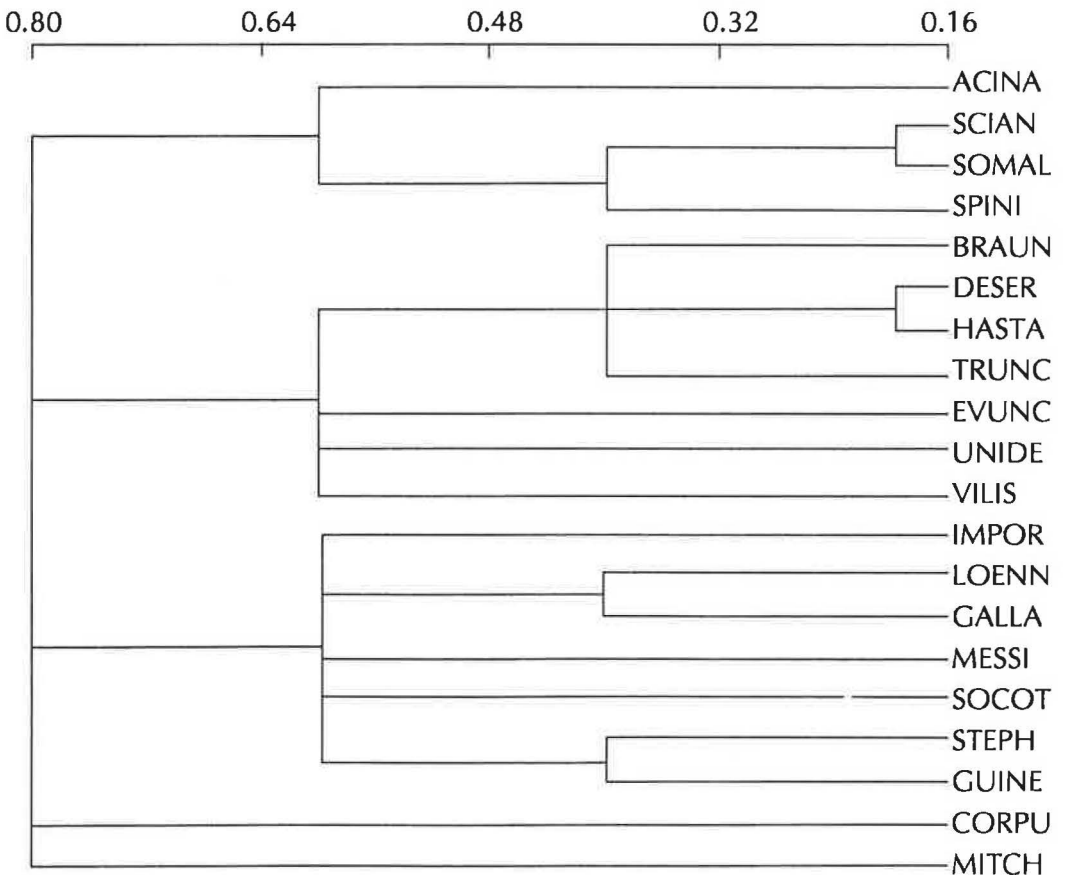
**Figure 1**

Plot of principal co-ordinates of the genus *Amitermes*



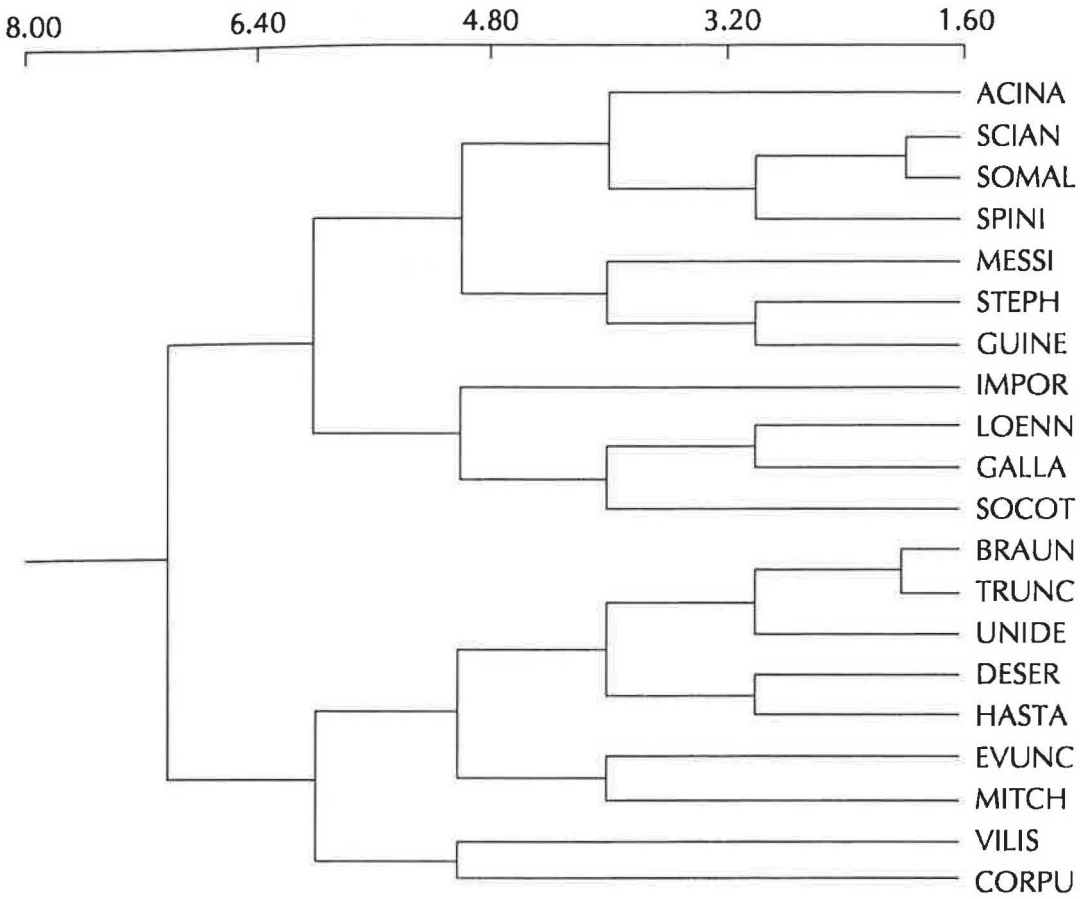
**Figure 2**

Phenogram (consensus tree) of *Amitermes*: Linkage methods of clustering

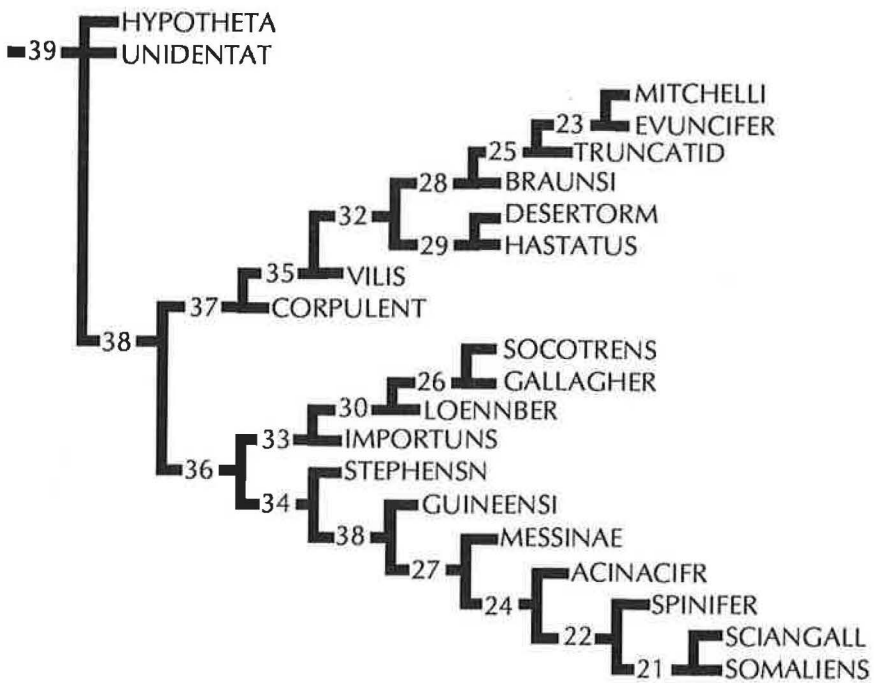


**Figure 3**

Phenogram (consensus tree) of *Amitermes*: Pair-group methods of clustering



**Figure 4**  
Neighbour-joining phylogeny of *Amitermes*



**Figure 5**  
Hennig single cladogram of *Amitermes*

# KEYS TO AND DESCRIPTIONS OF SPECIES

## KEY TO IMAGOS OF AMITERMES

- 1 Third marginal tooth of left mandible continuous in line with cutting edge of first plus second ..... 2
  - Third marginal tooth of left mandible protrudes slightly to distinctly from cutting edge of first plus second marginals ..... 7
- 2 Fore coxae with one to five prominent spine-like setae in line or group near middle of front surface, posterior margin of postclypeus faceted, anterior margin of pronotum slightly lobed in middle, fourth marginal tooth of left mandible in front view just reaching to tip of molar prominence .....  
*Amitermes messinae* Fuller (1922) (page 101 Figures 254-260)
  - Fore coxae without prominent spine-like setae, posterior margin of postclypeus semi-circular, anterior margin of pronotum straight, fourth marginal tooth of left mandible in front view with proximal end hidden behind molar prominence ..... 3
- 3 Left mandible index 1.01 to 1.14, notch at proximal end of right molar plate weakly developed, shallowly obtuse, ridges much reduced .....  
*Amitermes importunus* Sands (1959) (page 93 Figures 200-205)
  - Left mandible index 0.50 to 0.91, notch at proximal end of right molar plate strongly developed, nearly a right angle, almost as deep as long, or moderately developed, obtuse angled but depth over half length, right molar plate ridges prominent, or concave ..... 4
- 4 Right molar plate ridges in front of notch five in number, medial spot in front of fontanelle oval ..... 5
  - Right molar plate ridges in front of notch six in number, medial spot in front of fontanelle circular, or parallel-sided ..... 6
- 5 Left mandible index 0.879 to 0.91, fontanelle centred in front of a line joining posterior margins of compound eyes, smaller than ocellus, vertex pilosity dense, right mandible index 1.044 to 1.336, notch at proximal end of right molar plate strongly developed, nearly a right angle, almost as deep as long, ridges prominent .....  
*Amitermes loennbergianus* (Sjoestedt 1911) (page 97 Figures 229-234)
  - Left mandible index 0.526 to 0.579, fontanelle centred on or behind a line joining posterior margins of compound eyes, size equal to ocellus, vertex pilosity sparse, right mandible index 0.857 to 0.91, notch at proximal end of right molar plate moderately developed, obtuse angled but depth over half length, ridges concave .....  
*Amitermes hastatus* (Haviland 1898) (page 89 Figures 172-178)
- 6 Head width across compound eyes 1.224 to 1.275 mm, compound eye greatest diameter 0.296 to 0.313 mm, length of pronotum 0.663 to 0.714 mm, hind tibia length 1.2 to 1.25 mm, fontanelle centred on a line joining posterior margins of compound eyes, smaller than ocellus, shape circular, flat, medial spot in front of fontanelle circular, notch at proximal



- end of right molar plate strongly developed, nearly a right angle, almost as deep as long, ridges prominent . . . . .
- Amitermes socotrensis*** Harris (1954) (page 112 Figures 334-349)
- Head width across compound eyes 0.97 to 1.07 mm, compound eye greatest diameter 0.23 to 0.27 mm, length of pronotum 0.54 mm, hind tibia length 0.91 to 1.0 mm, fontanelle centred behind a line joining posterior margins of compound eyes, size equal to ocellus, shape broad oval, slightly or partly depressed, medial spot in front of fontanelle parallel-sided, notch at proximal end of right molar plate moderately developed, obtuse angled but depth over half length, ridges concave . . . . .
- Amitermes desertorum*** (Desneux 1902) (page 73 Figures 68-75)
- 7 Fore coxae with one to five prominent spine-like setae in line or group near middle of front surface, fourth marginal tooth of left mandible in front view just reaching to tip of molar prominence . . . . . **8**
- Fore coxae without prominent spine-like setae, fourth marginal tooth of left mandible in front view with proximal end clear of molar prominence, or hidden behind molar prominence, but not just touching it . . . . . **10**
- 8 Right molar plate ridges in front of notch four or fewer in number, vertex pilosity sparse, ocellus width 0.05 to 0.053 mm . . . . .
- Amitermes sciangallorum*** Ghidini (1941) (page 109 Figures 310-315)
- Right molar plate ridges in front of notch five in number, vertex pilosity dense, ocellus width 0.07 to 0.09 mm . . . . . **9**
- 9 Third marginal tooth of left mandible protrudes slightly from cutting edge of first plus second marginals, frons with two diverging grooves in front of fontanelle, posterior margin of postclypeus arcuate . . . . .
- Amitermes spinifer*** Silvestri (1914) (page 120 Figures 398-403)
- Third marginal tooth of left mandible distinctly protrudes from cutting edge of first plus second marginals, frons smooth or at most weakly indented in front of fontanelle, posterior margin of postclypeus semi-circular . . . . .
- Amitermes somaliensis*** Sjøstedt (1927) (page 116 Figures 368-374)
- 10 First marginal tooth of right mandible with posterior edge shorter than that of second . . . . .
- Amitermes truncatidens*** Sands (1959) (page 127 Figures 447-452)
- First marginal tooth of right mandible with posterior edge equal to, or longer than, that of second . . . . . **11**
- 11 Fourth marginal tooth of left mandible in front view with proximal end clear of molar prominence, right molar plate ridges much reduced . . . . .
- Amitermes guineensis*** sp.n. (page 85 Figures 146-151)
- Fourth marginal tooth of left mandible in front view with proximal end hidden behind molar prominence, right molar plate ridges prominent, or concave . . . . . **12**
- 12 Right molar plate ridges in front of notch six in number . . . . .
- Amitermes corpulentus*** Al Alawy (1990) (page 69 Figures 44-49)
- Right molar plate ridges in front of notch five in number . . . . . **13**
- 13 First marginal tooth of right mandible with posterior edge longer than that of second . . . . . **14**
- First marginal tooth of right mandible with posterior edge equal in length to that of second . . . . . **16**
- 14 Left mandible index 0.56 to 0.69, third marginal tooth of left mandible distinctly protrudes from cutting edge of first plus second marginals, notch at proximal end of right molar plate weakly developed, shallowly obtuse,

fontanelle centred behind a line joining posterior margins of compound eyes .....

***Amitermes evuncifer*** Silvestri (1912) (page 77 Figures 95-101)

- Left mandible index 0.716 to 0.91, third marginal tooth of left mandible protrudes slightly from cutting edge of first plus second marginals, notch at proximal end of right molar plate strongly developed, nearly a right angle, almost as deep as long, or moderately developed, obtuse angled but depth over half length, fontanelle centred on a line joining posterior margins of compound eyes ..... **15**

- 15 Head width across compound eyes 1.024 to 1.078 mm, ocellus to eye distance 0.041 to 0.074 mm, fontanelle larger than ocellus, shape narrowly oval, medial spot in front of fontanelle parallel-sided, frons with two diverging grooves in front of fontanelle, posterior margin of postclypeus arcuate, vertex pilosity dense, notch at proximal end of right molar plate moderately developed, obtuse angled but depth over half length, anterior margin of pronotum concave .....

***Amitermes vilis*** (Hagen 1858) (page 135 Figures 500-507)

- Head width across compound eyes 1.16 to 1.171 mm, ocellus to eye distance 0.09 to 0.106 mm, fontanelle smaller than ocellus, shape broad oval, medial spot in front of fontanelle circular, frons smooth or at most weakly indented in front of fontanelle, posterior margin of postclypeus semi-circular, vertex pilosity sparse, notch at proximal end of right molar plate strongly developed, nearly a right angle, almost as deep as long, anterior margin of pronotum straight .....

***Amitermes gallagheri*** Chhotani (1988) (page 81 Figures 123-127)

- 16 Posterior margin of head capsule arcuate or sinuate, posterior margin of postclypeus arcuate, size smaller than ocellus, notch at proximal end of right molar plate strongly developed, nearly a right angle, almost as deep as long, ridges prominent .....

***Amitermes mitchelli*** sp.n. (page 105 Figures 281-286)

- Posterior margin of head capsule semicircular and evenly rounded, posterior margin of postclypeus semi-circular, size equal to ocellus, or larger than ocellus, notch at proximal end of right molar plate moderately developed, obtuse angled but depth over half length, or weakly developed, shallowly obtuse, ridges concave ..... **17**

- 17 Fontanelle larger than ocellus, anterior margin of pronotum straight, notch at proximal end of right molar plate weakly developed, shallowly obtuse

***Amitermes unidentatus*** (Wasmann 1897) (page 131 Figures 473-481)

- Fontanelle equal in size to ocellus, anterior margin of pronotum concave, notch at proximal end of right molar plate moderately developed, obtuse angled but depth over half length .....

***Amitermes braunsi*** Fuller (1922) (page 67 Figures 28-32)

## KEY TO SOLDIER CASTES OF AMITERMES

- 1 Fore coxae with three or more prominent spine-like setae arranged in line or group on anterior surface ..... **2**

- Fore coxae without prominent spine-like setae on anterior surface ..... **8**

- 2 Point of marginal tooth of mandible within apical half, apical hook incurved by 1.5-2.5 shank widths, ratio of mandible length to head-width at mandible insertions 0.79 to 0.89 .....

***Amitermes somaliensis*** Sjoestedt (1927) (page 117 Figures 375-379)

- Point of marginal tooth of mandible within basal half, or midway from base to apex, apical hook incurved by more than 2.6 shank widths, ratio of mandible length to head-width at mandible insertions 0.91 to 1.34 .... **3**

- 3 Shape of inner margin of mandible strongly sinuate distal to marginal tooth, ratio of mandible length to head-width at mandible insertions 1.30 to 1.34  
*Amitermes acinacifer* Sands (1959) (page 64 Figures 6-11)
- Shape of inner margin of mandible straight or slightly sinuate, or entirely concave distal to marginal tooth, ratio of mandible length to head-width at mandible insertions 0.91 to 1.15 ..... 4
- 4 Head capsule in profile flattened or sinuate from behind fontanelle to occiput ..... 5
- Head capsule in profile rounded, convexly curved from fontanelle to occiput ..... 6
- 5 Hind tibia length 0.72 to 0.88 mm, head capsule in profile with a small bulge behind fontanelle, pronotum with anterior lobe larger than posterior  
*Amitermes guineensis* sp.n.(page 86 Figures 153-157)
- Hind tibia length 1.09 to 1.22 mm, head capsule in profile flattened behind fontanelle, pronotum with anterior and posterior lobes equal in size .....  
*Amitermes stephensoni* Harris (1957) (page 124 Figures 430-433)
- 6 Point of marginal tooth of mandible in line with inner curve of blade, apical hook incurved by more than 3.6 shank widths, soldier head capsule in profile flattened behind fontanelle .....  
*Amitermes messinae* Fuller (1922) (page 102 Figures 261-265)
- Point of marginal tooth of mandible erect from inner curve of blade, apical hook incurved by 2.6-3.5 shank widths, soldier head capsule in profile with a small bulge behind fontanelle .....7
- 7 Shape of inner margin of mandible entirely concave distal to marginal tooth, point of marginal tooth midway from base to apex .....  
*Amitermes spinifer* Silvestri (1914) (page 121 Figures 404-410)
- Shape of inner margin of mandible straight or slightly sinuate distal to marginal tooth, point of marginal tooth within basal half .....  
*Amitermes sciangallorum* Ghidini (1941) (page 109 Figures 316-323)
- 8 Apical hook of mandible incurved by more than 3.6 shank widths .... 9
- Apical hook of mandible incurved by less than 3.5 shank widths .... 10
- 9 Point of marginal tooth of mandible erect from inner curve of blade, midway from base to apex, shape of inner margin of mandible straight or slightly sinuate distal to marginal tooth, head capsule in profile with a small bulge behind fontanelle, rounded, convexly curved from fontanelle to occiput, length to lateral insertions of mandibular abductors 1.09 to 1.22 mm, greatest width 0.90 to 0.99 mm, width at lateral insertions of mandibular abductors 0.70 to 0.84 mm, depth including postmentum 0.78 to 0.86 mm, left mandible length 0.79 to 0.88 mm, pronotum width 0.55 to 0.64 mm, hind tibia length 0.80 to 0.87 mm .....  
*Amitermes mitchelli* sp.n. (page 106 Figures 287-294)
- Point of marginal tooth of mandible in line with inner curve of blade, within apical half, shape of inner margin of mandible entirely concave distal to marginal tooth, head capsule in profile flattened behind fontanelle, flattened or sinuate from behind fontanelle to occiput, length to lateral insertions of mandibular abductors 1.61 to 1.88 mm, greatest width 1.37 to 1.51 mm, width at lateral insertions of mandibular abductors 0.97 to 1.06 mm, depth including postmentum 1.11 to 1.27 mm, left mandible length 1.03 to 1.12 mm, pronotum width 0.80 to 0.91 mm, hind tibia length 1.31 to 1.44 mm, .....  
*Amitermes corpulentus* Al Alawy (1990) (page 70 Figures 50-53)
- 10 Point of marginal tooth of mandible in line with inner curve of blade 11
- Point of marginal tooth of mandible erect from inner curve of blade .. 12

- 11 Point of marginal tooth of mandible within apical half, pronotum with anterior and posterior lobes equal in size .....  
*Amitermes hastatus* (Haviland 1898) (page 90 Figures 179-184)
- Point of marginal tooth of mandible midway from base to apex, pronotum with anterior lobe larger than posterior .....  
*Amitermes desertorum* (Desneux 1902) (page 74 Figures 76-81)
- 12 Ratio of mandible length to head-width at mandible insertions 1.14 to 1.27, shape of inner margin of mandible straight or slightly sinuate distal to marginal tooth .....  
*Amitermes socotrensis* Harris (1954) (page 113 Figures 350-354)
- Ratio of mandible length to head-width at mandible insertions 0.78 to 1.09, shape of inner margin of mandible entirely concave distal to marginal tooth ..... **13**
- 13 Point of marginal tooth of mandible sharp .....  
*Amitermes gallagheri* Chhotani (1988) (page 82 Figures 128-132)
- Point of marginal tooth of mandible blunt, rounded, or truncated .... **14**
- 14 Head capsule in profile flattened or sinuate from behind fontanelle to occiput, pronotum with anterior and posterior lobes equal in size .... **15**
- Head capsule in profile rounded, convexly curved from fontanelle to occiput, pronotum with anterior lobe smaller or larger than posterior **16**
- 15 Point of marginal tooth of mandible, blunt, rounded .....  
*Amitermes unidentatus* (Wasmann 1897) (page 132 Figures 482-486)
- Point of marginal tooth of mandible, truncated .....  
*Amitermes importunus* Sands (1959) (page 94 Figures 206-211)
- 16 Pronotum width 0.78 to 0.88 mm, apical hook of mandible incurved by 1.5-2.5 shank widths, pronotum with anterior lobe smaller than posterior, head capsule width at lateral insertions of mandibular abductors 0.97 to 1.09 mm .....  
*Amitermes loennbergianus* (Sjoestedt 1911) (page 98 Figures 235-239)
- Pronotum width 0.54 to 0.75 mm, apical hook of mandible incurved by 2.6-3.5 shank widths, pronotum with anterior lobe larger than posterior, head capsule width at lateral insertions of mandibular abductors 0.632 to 0.9 mm ..... **17**
- 17 Head capsule in profile flattened behind fontanelle .....  
*Amitermes evuncifer* Silvestri (1912) (page 78 Figures 102-105)
- Head capsule in profile with a small bulge behind fontanelle ..... **18**
- 18 Point of marginal tooth of mandible midway from base to apex, or within apical half, head capsule width at lateral insertions of mandibular abductors 0.63 to 0.74 mm .....  
*Amitermes vilis* (Hagen 1858) (page 136 Figures 508-521)
- Point of marginal tooth of mandible within basal half, head capsule width at lateral insertions of mandibular abductors 0.78 to 0.9 mm .....  
*Amitermes truncatidens* Sands (1959) (page 128 Figures 453-456)

## KEY TO WORKER CASTES OF AMITERMES

- 1 Fore coxae with three or more prominent spine-like setae arranged in line or group on anterior flange ..... **2**
- Fore coxae without prominent spine-like setae on anterior surface or flange ..... **8**
- 2 Fourth marginal tooth of left mandible in front view with proximal end clear of molar prominence ..... **3**

- Fourth marginal tooth of left mandible in front view with proximal end hidden behind or just reaching tip of molar prominence . . . . . 4
  
- 3 Molar plate ridges of right mandible in front of notch six in number, left mandible with third marginal tooth protruding slightly from cutting edge of first plus second marginals; intestine with anterior part of mesenteron longer than mixed segment, which starts well to right of heart in dorsal view of unopened abdomen; posterior termination of mixed segment in ventral view of unopened abdomen well to right of ventral nerve cord; enteric valve enters a short diverticulum from third segment of proctodeum, behind curve of mesenteron in dorsal view of unopened abdomen, colon within mesenteric loop forming a single simple coil . . . . .  
***Amitermes guineensis* sp.n.** (pages 87, 88 Figures 158-171)
  
- Molar plate ridges of right mandible in front of notch fewer than five, left mandible with third marginal tooth continuous in line with cutting edge of first plus second marginals not protruding; intestine with anterior part of mesenteron shorter than mixed segment, which starts slightly to left of or beneath heart in dorsal view of unopened abdomen; posterior termination of mixed segment in ventral view of unopened abdomen to left of or just reaching ventral nerve cord; enteric valve enters directly into third segment of proctodeum, worker, in dorsal view of unopened abdomen hidden beneath curve of mesenteron, colon within mesenteric loop thrown into one or more loops additional to the main coil, mainly to left of heart . . . .  
***Amitermes spinifer*** Silvestri (1914) (pages 122, 123 Figures 411-429)
  
- 4 First marginal tooth of right mandible with posterior edge equal to that of second marginal; intestine with anterior part of mesenteron longer than mixed segment, termination of first segment of proctodeum at enteric valve short tubular, length two to four times width, enteric valve entering a short diverticulum from third segment of proctodeum . . . . .  
***Amitermes stephensoni*** Harris (1957) (pages 125, 126 Figures 434-446)
  
- First marginal tooth of right mandible with posterior edge longer than that of second marginal; intestine with anterior part of mesenteron approximately equal to or shorter than mixed segment, termination of first segment of proctodeum at enteric valve long tubular, length more than four times width, enteric valve entering directly into third segment of proctodeum 5
  
- 5 Left mandible, third marginal tooth continuous in line with cutting edge of first plus second marginals, not protruding; intestine with anterior part of mesenteron approximately equal to mixed segment, mesenteric part of mixed segment at its narrowest point approximately half width of proctodeal part, posterior termination of mixed segment not inflated, in ventral view of unopened abdomen well to right of ventral nerve cord; proctodeal first segment dilated to twice its basal width; colon within mesenteric loop in dorsal view of unopened abdomen forming a single simple coil . . . . .  
***Amitermes messinae*** Fuller (1922) (pages 103, 104 Figures 266-280)
  
- Left mandible, third marginal tooth protrudes slightly or distinctly from cutting edge of first plus second marginals; intestine with anterior part of mesenteron shorter than mixed segment, mesenteric part of mixed segment at its narrowest point less than half width of proctodeal part, strongly inflated at its posterior end, length of inflation not more than three times thickness, in ventral view of unopened abdomen to left of or just reaching ventral nerve cord; proctodeal first segment dilated to more than twice its basal width, colon within mesenteric loop in dorsal view of unopened abdomen thrown into one or more loops additional to the main coil, mainly to left of heart . . . . . 6
  
- 6 Mixed segment start and attachment of malpighian tubules in dorsal view of unopened abdomen both distinctly to right of line of heart, enteric valve behind curve of mesenteron, fourth marginal tooth of left mandible in front

- view with proximal end hidden behind molar prominence, ridges of right molar plate much reduced ..... 7
- Amitermes acinacifer*** Sands (1959) (pages 65, 66 Figures 12-27)
- Mixed segment starting well to left of heart in dorsal view of unopened abdomen, attachment of Malpighian tubules at or near line of heart, enteric valve hidden beneath curve of mesenteron; fourth marginal tooth of left mandible in front view reaches tip of molar prominence, ridges of right molar plate prominent ..... 7
- 7 Left mandible, third marginal tooth protrudes slightly from cutting edge of first plus second marginals ..... 7
- Amitermes somaliensis*** Sjoestedt (1927) (pages 118, 119 Figures 380-397)
- Left mandible, third marginal tooth distinctly protrudes from cutting edge of first plus second marginals ..... 7
- Amitermes sciangallorum*** Ghidini (1941) (pages 110, 111 Figures 324-343)
- 8 Right first marginal tooth with posterior edge longer than that of second marginal ..... 9
- Right first marginal tooth with posterior edge shorter than or equal to that of second marginal ..... 14
- 9 Enteric valve entering directly into third segment of proctodeum, termination of first proctodeal segment at enteric valve conical, length less than twice width; mixed segment starting slightly to left or beneath heart in dorsal view of unopened abdomen; left mandible, third marginal tooth distinctly protrudes from cutting edge of first plus second marginals ..... 9
- Amitermes evuncifer*** Silvestri (1912) (pages 79, 80 Figures 106-122)
- Enteric valve entering a short diverticulum from third segment of proctodeum, termination of first segment of proctodeum at enteric valve tubular, length two or more times width; mixed segment starting well to right of heart in dorsal view of unopened abdomen; left mandible, third marginal tooth continuous in line with cutting edge of first plus second marginals, or protruding slightly ..... 10
- 10 Worker, mesenteric part of mixed segment strongly inflated at posterior end, length of inflation not more than three times thickness, in ventral view of unopened abdomen to left of or just reaching ventral nerve cord ..... 11
- Worker, mesenteric part of mixed segment slightly inflated at posterior end, length of inflation more than three times thickness, or not inflated, in ventral view of unopened abdomen well to right of ventral nerve cord ..... 12
- 11 Fore coxae conical; intestine with anterior part of mesenteron shorter than mixed segment, mesenteric part of mixed segment at its narrowest point approximately half width of proctodeal part, attachment of Malpighian tubules at mesenteric-proctodeal interface beyond basal one third of mixed segment ..... 11
- Amitermes hastatus*** (Haviland 1898) (pages 91, 92 Figures 185-199)
- Fore coxae flattened, flanged on both sides; intestine with anterior part of mesenteron approximately equal to mixed segment, mesenteric part of mixed segment at its narrowest point approximately equal in width to proctodeal part, attachment of Malpighian tubules at mesenteric-proctodeal interface within basal one-third of mixed segment ..... 11
- Amitermes desertorum*** (Desneux 1902) (pages 75, 76 Figures 82-94)
- 12 Fore coxae conical; left mandible, third marginal tooth continuous in line with cutting edge of first plus second marginals, not protruding; intestine with anterior part of mesenteron longer than mixed segment, mesenteric part of mixed segment at its narrowest point approximately half width of proctodeal part ..... 12
- Amitermes socotrensis*** Harris (1954) (pages 114, 115 Figures 355-367)

- Fore coxae flanged anteriorly; left mandible, third marginal tooth protrudes slightly from cutting edge of first plus second marginals; intestine with anterior part of mesenteron approximately equal to, or shorter than mixed segment, mesenteric part of mixed segment at its narrowest point approximately equal in width to, or less than half width of proctodeal part . . . **13**
- 13 Right molar ridges prominent, notch at proximal end of right molar plate strongly developed, nearly a right angle, almost as deep as long; intestine with anterior part of mesenteron shorter than mixed segment, mesenteric part of mixed segment at its narrowest point approximately equal in width to proctodeal part, slightly inflated at posterior end, length of inflation more than three times thickness, reaching to proctodeal dilation; attachment of malpighian tubules at mesenteric-proctodeal interface beyond basal one third of mixed segment; proctodeal first segment dilated to more than twice its basal width, termination at enteric valve long tubular, length more than four times width, enteric valve in dorsal view of unopened abdomen distinctly to right of heart line; colon within mesenteric loop in dorsal view of unopened abdomen forming a single simple coil . . . . .  
***Amitermes vilis*** (Hagen 1858) (pages 137, 138 Figures 522-535)
- Right molar ridges much reduced, notch at proximal end of right molar plate weakly developed, shallowly obtuse, to moderately developed, obtuse angled but depth over half length; intestine with anterior part of mesenteron approximately equal to mixed segment, mesenteric part of mixed segment at its narrowest point less than half width of proctodeal part, not inflated, terminating short of proctodeal dilation; attachment of Malpighian tubules at mesenteric-proctodeal interface within basal one-third of mixed segment; proctodeal first segment dilated to twice its basal width, termination at enteric valve short tubular, length two to four times width, enteric valve in dorsal view of unopened abdomen at or very near heart line, colon within mesenteric loop in dorsal view of unopened abdomen thrown into one or more loops additional to the main coil, mainly to left of heart . . . . .  
***Amitermes importunus*** Sands (1959) (pages 95, 96 Figures 212-228)
- 14 Proctodeal first segment tubular, intestine with anterior part of mesenteron longer than mixed segment, termination at enteric valve long tubular, length more than four times width . . . . .  
***Amitermes unidentatus*** (Wasmann 1897) (pages 133, 134 Figures 487-499)
- Proctodeal first segment dilated to twice its basal width, or more, termination at enteric valve conical or short tubular, length up to four times width, anterior part of mesenteron shorter than mixed segment . . . . . **15**
- 15 Right molar plate ridges in front of notch six in number . . . . .  
***Amitermes gallagheri*** Chhotani (1988) (pages 83, 84 Figures 133-145)
- Right molar plate ridges in front of notch five in number . . . . . **16**
- 16 Left mandible, third marginal tooth continuous in line with cutting edge of first plus second marginals, not protruding; mesenteric part of mixed segment at its narrowest point less than half width of proctodeal part, not inflated, posterior termination of mixed segment in ventral view of unopened abdomen well to right of ventral nerve cord; proctodeal first segment dilated to twice its basal width, colon within mesenteric loop in dorsal view of unopened abdomen thrown into one or more loops additional to the main coil, mainly to left of heart . . . . .  
***Amitermes loennbergianus*** (Sjostedt 1911) (pages 99, 100 Figures 240-253)
- Left mandible, third marginal tooth protrudes slightly to distinctly from cutting edge of first plus second marginals; mesenteric part of mixed segment at its narrowest point at least half width of proctodeal part, slightly to strongly inflated at posterior end, posterior termination in ventral view of unopened abdomen to left of or just reaching ventral nerve cord; proctodeal first segment dilated to more than twice its basal width, colon within

- mesenteric loop in dorsal view of unopened abdomen forming a single simple coil ..... 17
- 17 Left mandible, third marginal tooth protrudes slightly from cutting edge of first plus second marginals, mesenteric part of mixed segment slightly inflated at posterior end, length of inflation more than three times thickness, terminating short of proctodeal dilation; enteric valve entering a short diverticulum from third segment of proctodeum .....  
*Amitermes corpulentus* Al Alawy (1990) (pages 71, 72 Figures 54-67)
- Left mandible, third marginal tooth distinctly protrudes from cutting edge of first plus second marginals, mesenteric part of mixed segment strongly inflated at posterior end, length of inflation not more than three times thickness, reaching to proctodeal dilation; enteric valve entering directly into third segment of proctodeum ..... 18
- 18 Right first marginal tooth with posterior edge equal to that of second marginal; mixed segment starting well to right of heart in dorsal view of unopened abdomen, attachment of Malpighian tubules at mesenteric-proctodeal interface within basal one-third of mixed segment; termination of first segment of proctodeum at enteric valve conical, length less than twice width, enteric valve in dorsal view of unopened abdomen distinctly to right of heart line .....  
*Amitermes braunsi* Fuller (1922) (pages 68 Figures 33-43)
- Right first marginal tooth with posterior edge shorter than that of second marginal; mixed segment starting slightly to left or beneath heart in dorsal view of unopened abdomen, attachment of Malpighian tubules at mesenteric-proctodeal interface beyond basal one third of mixed segment, termination of proctodeal first segment at enteric valve short tubular, length two to four times width, enteric valve in dorsal view of unopened abdomen distinctly to left of heart line, or at or very near heart line ..... 19
- 19 Mesenteric part of mixed segment at its narrowest point approximately half width of proctodeal part, enteric valve in dorsal view of unopened abdomen at or very near heart line; right molar ridges concave .....  
*Amitermes mitchelli* sp.n. (pages 107, 108 Figures 295-309)
- Mesenteric part of mixed segment at its narrowest point approximately equal in width to proctodeal part, enteric valve in dorsal view of unopened abdomen distinctly to left of heart line; right molar ridges prominent ....  
*Amitermes truncatidens* Sands (1959) (pages 129, 130 Figures 457-472)

## DESCRIPTIONS OF SPECIES

*Amitermes acinacifer* Sands (1959)  
 (Figures 6-11: Soldier, 12-19: Worker, &  
 20-27: Worker, configuration of intestines)

*Amitermes acinacifer* Sands, 1959: 133. Holotype soldier, KENYA: Marsabet district (British Museum (Natural History), (examined)).

**Soldier:** Head capsule, front and sides yellow-brown, back yellow; mandibles, darkest part sepia brown; antennae pale yellow; pronotum yellow-white, legs pale yellow.

Head capsule in profile flattened behind fontanelle, rounded, convexly curved from fontanelle to occiput. Mandible length more than 4.4 times shank width behind marginal tooth, outline angularly rounded, apical hook incurved by 2.5–3.5 shank widths; point of marginal tooth within basal half, truncated, erect from inner curve of blade; shape of inner margin strongly sinuate distal to marginal tooth. Pronotum with anterior and posterior lobes equal in size; fore coxae with three or more prominent spine-like setae arranged in line or group on anterior surface.



Measurements and indices (seven individuals from five localities): [HL] 0.93 to 0.979 mm <mean, 0.963 S.D., 0.015>; [HW] 0.76 to 0.82 mm <mean, 0.784 S.D., 0.018>; [Hw] 0.606 to 0.63 mm <mean, 0.614 S.D., 0.008>; [HD] 0.61 to 0.64 mm <mean, 0.626 S.D., 0.011>; [ML] 0.798 to 0.82 mm <mean, 0.809 S.D., 0.011>; [ML:Hw] 1.302 to 1.344 <mean, 1.316 S.D., 0.014>; [PL] 0.32 mm; [PW] 0.465 to 0.49 mm <mean, 0.473 S.D., 0.008>; [T3] 0.699 to 0.78 mm <mean, 0.726 S.D., 0.027>.

**Worker (first full description):** Head capsule yellow, antennal flagellum yellow-white.

Fore coxae flattened, flanged on both sides, with three or more prominent spine-like setae arranged in line or group on anterior flange. Left mandible, third marginal tooth protrudes slightly from cutting edge of first plus second marginals, fourth marginal tooth in front view with proximal end hidden behind molar prominence. Right first marginal tooth with posterior edge longer than that of second marginal; notch at proximal end of right molar plate strongly developed, nearly a right angle, almost as deep as long, molar plate ridges fewer than five, much reduced.

Intestine with anterior part of mesenteron shorter than mixed segment, mixed segment starting well to right of heart in dorsal view of unopened abdomen; mesenteric part of mixed segment at its narrowest point less than half width of proctodeal part, strongly inflated at posterior end, length of inflation not more than three times thickness, terminating short of proctodeal dilation; posterior termination of mixed segment in ventral view of unopened abdomen to left of or just reaching ventral nerve cord; attachment of malpighian tubules at mesenteric-proctodeal interface within basal one-third of mixed segment, in dorsal view of unopened abdomen distinctly to right of line of heart; proctodeal first segment dilated to more than twice its basal width, termination at enteric valve long tubular, length more than four times width; enteric valve entering directly into third segment of proctodeum, in dorsal view of unopened abdomen distinctly to right of heart line, behind curve of mesenteron; colon within mesenteric loop in dorsal view of unopened abdomen thrown into one or more loops additional to the main coil, mainly to left of heart.

Measurements and indices (20 individuals from six localities): [HW] 0.713 to 0.904 mm <mean, 0.852 S.D., 0.026>; [LMI] 0.715 to 1.06 <mean, 0.842 S.D., 0.081>; [RMI] 1.012 to 1.267 <mean, 1.089 S.D., 0.068>; [R2I] 2.701 to 5.197 <mean, 3.860 S.D., 0.709>; [R1:2I] 1.103 to 1.485 <mean, 1.233 S.D., 0.123>; [Pcl] 0.198 to 0.248 mm <mean, 0.221 S.D., 0.010>; [T3] 0.569 to 0.672 mm <mean, 0.620 S.D., 0.027>; [T1] 0.429 to 0.518 mm <mean, 0.480 S.D., 0.022>.

**Comparisons:** A member of the group of smaller species that includes its apparent closest relative, *A. sciangallorum*, as well as *A. somaliensis* and *A. spinifer*, *A. acinacifer* differs from them in the soldier caste by the distinctive shape and greater relative length of the mandibles; the profile of the head capsule immediately behind the fontanelle is flatter in *A. acinacifer* than in *A. spinifer* and *A. sciangallorum*. All members share with *A. guineensis*, *A. messinae* and *A. stephensoni* the presence of spine-like setae on the fore coxae of soldier and worker castes, but differ from them in the smaller average size and the configuration of the coiled gut. The group appears also to differ from other *Amitermes* in the area in having a trend towards a dimorphic worker caste. In fresh, unworn worker mandibles, the left fourth marginal of *A. acinacifer* is partly hidden behind the molar prominence rather than fully exposed as in the other three species of the group and in *A. messinae*. In the unopened worker abdomen in dorsal view, the starting point of the mixed segment in *A. acinacifer* distinguishes it from the other three small species. The imago of *A. acinacifer* has yet to be found.

**Material examined:** soldiers and workers only, KENYA: 27 miles S of Marsabet (type series), Marsabet on Mega and Moyale roads, 35 miles N of Uaso Nyero,

1953, Turkana, Loferi, 1969 (W.A.Sands). ETHIOPIA: W of Dire Dawa, 1963 (R.G.Hill).

**Biology, economic significance:** All the records are from dead plant material, such as tree stumps, *Sansevieria* clumps, etc; the nest proper has not been found. The species is of no economic importance.

***Amitermes braunsi* Fuller (1922)**

(Figures 28-32: Imago, 33-43: Worker, including configuration of intestines)

*Hamitermes braunsi* Fuller, 1922: 125,128. Type series, imagos and workers, REPUBLIC OF SOUTH AFRICA: Cape Province, Willowmore (examined) (National Collection of Isoptera, Pretoria, and American Museum of Natural History).

**Imago** (colour not described because of fading in old specimens): Posterior margin of head capsule semicircular and evenly rounded. Fontanelle centred behind a line joining posterior margins of compound eyes, equal in size to ocellus, broad oval, flat or slightly or partly depressed; medial spot in front of fontanelle parallel-sided. Frons smooth or at most weakly indented in front of fontanelle, posterior margin of postclypeus semi-circular. Anterior margin of pronotum concave. Vertex pilosity sparse. Fore coxae without prominent spine-like setae.

Third marginal tooth of left mandible distinctly protrudes from cutting edge of first plus second marginals, fourth marginal tooth of left mandible in front view with proximal end hidden behind molar prominence. First marginal tooth of right mandible with posterior edge equal in length to that of second; notch at proximal end of right molar plate moderately developed, obtuse angled but depth over half length, right molar plate ridges in front of notch five in number, concave.

Measurements and indices (12 individuals from one locality): **[HW]** 0.954 to 1.03 mm <mean, 0.987 S.D., 0.021>; **[E]** 0.223 to 0.253 mm <mean, 0.239 S.D., 0.008>; **[Ow]** 0.06 to 0.09 mm <mean, 0.080 S.D., 0.007>; **[Ol]** 0.108 to 0.132 mm <mean, 0.121 S.D., 0.009>; **[O-E]** 0.037 to 0.08 mm <mean, 0.059 S.D., 0.011>; **[LMI]** 0.500-0.684 <mean, 0.592>; **[RMI]** 0.840-1.132 <mean, 0.986>; **[R2I]** 3.052-4.676 <mean, 3.864>; **[PW]** 0.713 to 0.785 mm <mean, 0.765 S.D., 0.022>; **[PL]** 0.433 to 0.501 mm <mean, 0.475 S.D., 0.018>; **[T3]** 0.955 to 1.005 mm <mean, 0.977 S.D., 0.017>; **[Fw]** 9.174 to 10.138 mm <mean, 9.556 S.D., 0.234>.

**Soldier:** Missing from type series, despite a brief and inadequate description in his key by Fuller, 1922. It is not possible to assess its relationships on the basis of the scanty recorded information.

**Worker (first full description):** Head capsule pale yellow, antennal flagellum yellow-white.

Fore coxae conical, without prominent spine-like setae on anterior surface or flange. Left mandible, third marginal tooth distinctly protrudes from cutting edge of first plus second marginals, fourth marginal tooth in front view with proximal end hidden behind molar prominence. Right first marginal tooth with posterior edge equal to that of second marginal; notch at proximal end of right molar plate strongly developed, nearly a right angle, almost as deep as long, molar plate ridges five in number, prominent.

Intestine with anterior part of mesenteron shorter than mixed segment, mixed segment starting well to right of heart in dorsal view of unopened abdomen; mesenteric part of mixed segment at its narrowest point approximately equal in width to proctodeal part, strongly inflated at posterior end, length of inflation not more than three times thickness, reaching to proctodeal dilation; posterior termination of mixed segment in ventral view of unopened abdomen to left of or just reaching ventral nerve cord; attachment of Malpighian tubules at mesenteric-proctodeal interface within basal one-third of mixed segment, in dorsal view of unopened abdomen out of sight to right of heart, visible in lateral

view only; proctodeal first segment dilated to more than twice its basal width, termination at enteric valve conical, length less than twice width, enteric valve entering directly into third segment of proctodeum, in dorsal view of unopened abdomen distinctly to right of heart line, behind curve of mesenteron; colon within mesenteric loop in dorsal view of unopened abdomen forming a single simple coil.

Measurements and indices (nine individuals from one locality): [HW] 0.941 to 1.031 mm <mean, 0.984 S.D., 0.026>; [LMI] 0.635 to 0.762 <mean, 0.675 S.D., 0.039>; [RMI] 0.979 to 1.136 <mean, 1.048 S.D., 0.062>; [R2I] 3.35 to 5.101 <mean, 4.219 S.D., 0.533>; [R1:2I] 0.946 to 1.241 <mean, 1.096 S.D., 0.095>; [Pcl] 0.243 to 0.278 mm <mean, 0.267 S.D., 0.012>; [T3] 0.886 to 0.958 mm <mean, 0.923 S.D., 0.026>; [T1] 0.719 to 0.775 mm <mean, 0.751 S.D., 0.020>.

**Comparisons:** *A. braunsi* differs in the imago mandibles from sympatric *A. hastatus*, and from *A. importunus* and *A. messinae*, in having the left third marginal tooth distinct, from the former species by the proportionately shorter right first marginal, and from the latter two, by lower principle mandibular indices. *A. messinae* also has fore coxal spine-like setae; *A. truncatidens* and *A. unidentatus* are larger, the former having small diverging grooves on the frons. The protruding left third marginal of the worker mandible again distinguishes *A. braunsi* from *A. hastatus* and *A. messinae*. *A. importunus* has higher mandibular indices, reduced molar ridges, and a different gut configuration, notably lacking the posterior terminal inflation of the mesenteron. *A. truncatidens* has the Malpighian tubules attached beyond the basal third of the mixed segment, and the enteric valve in dorsal view of the unopened abdomen well to the left of the heart line. In *A. unidentatus*, the front part of the mesenteron is markedly longer than the mixed segment, and the first section of the proctodeum is tubular. One further species may be partly sympatric with *A. braunsi*, namely *A. mitchelli* sp.n. in which the imago has a lower right mandible index, a fontanelle smaller than the ocellus, and an arcuate rather than a semi-circular margin to the head behind the eyes; the worker right first marginal tooth is shorter than the second and the Malpighian tubules are attached well beyond the basal third of the mixed segment, where the mesenteron narrows to half the width of the proctodeum.

**Material examined:** Imagos and workers only (type-series, unique soldier keyed by Fuller not included in vial and not recorded on label), REPUBLIC OF SOUTH AFRICA: Cape Province, Willowmore, 1920 (H. Brauns)(Fuller coll. no. F1131) in National Collection of Isoptera, Pretoria, and American Museum of Natural History.

**Biology, economic significance:** The type-series was collected 'emerging from flight hole at sandy spot'. Nothing else is known of the biology.

***Amitermes corpulentus*** Al Alawy (1990)

(Figures 44-49: Imago, 50-53: Soldier, 54-60: Worker, 61-67: Worker, configuration of intestines)

*Amitermes corpulentus* Al Alawy, 1990. Type series, soldiers and workers only, IRAQ: Erbil (paratypes examined) (Iraq Natural History Museum, Baghdad, Zoological Survey of India, Calcutta, and British Museum (Natural History), London).

**Imago (described here):** Head capsule brown, genae and postclypeus yellow-brown, labrum yellow; antennal flagellum yellow-brown, basal segments pale yellow-brown; fontanelle pale yellow-brown. Pronotum brown, mesonotum and metanotum yellow-brown; legs, pale yellow-brown apart from yellow tarsi. Wing membrane yellow-brown, main venation brown. Abdominal tergites brown, sternites pale yellow-brown.

Posterior margin of head capsule semicircular and evenly rounded. Fontanelle centred on a line joining posterior margins of compound eyes, smaller than ocellus, broad oval, slightly or partly depressed; medial spot in front of fontanelle parallel-sided, frons smooth or at most weakly indented in front of fontanelle,

posterior margin of postclypeus arcuate. Anterior margin of pronotum concave. Vertex pilosity dense. Fore coxae without prominent spine-like setae.

Third marginal tooth of left mandible protrudes slightly from cutting edge of first plus second marginals, fourth marginal tooth of left mandible in front view with proximal end hidden behind molar prominence. First marginal tooth of right mandible with posterior edge longer than that of second; notch at proximal end of right molar plate moderately developed, obtuse angled but depth over half length, right molar plate ridges in front of notch six in number, concave.

Measurements and indices (three individuals from one locality): [**HW**] 1.15 to 1.185 mm <mean, 1.167 S.D., 0.017>; [**E**] 0.316 to 0.33 mm <mean, 0.323 S.D., 0.008>; [**Ow**] 0.083 to 0.096 mm <mean, 0.091 S.D., 0.007>; [**Ol**] 0.141 to 0.152 mm <mean, 0.146 S.D., 0.006>; [**O-E**] 0.024 to 0.038 mm <mean, 0.032 S.D., 0.007>; [**LMI**] 0.596 to 0.659 <mean, 0.620>; [**RMI**] 0.907 to 0.95 <mean, 0.933>; [**R2I**] 2.435 to 2.691 <mean, 2.550>; [**PW**] 1.005 to 1.044 mm <mean, 1.019 S.D., 0.021>; [**PL**] 0.629 to 0.66 mm <mean, 0.649 S.D., 0.018>; [**T3**] 1.22 to 1.258 mm <mean, 1.243 S.D., 0.020>; [**Fw**] 9.1 to 9.317 mm <mean, 9.201 S.D., 0.109>.

**Soldier:** First described by Al Alawy (1990), redescribed more fully here:

Head capsule, front and sides pale yellow-brown, back pale yellow, mandibles, darkest part brown, antennae pale yellow-brown, pronotum and legs pale yellow.

Head capsule in profile flattened behind fontanelle, flattened or sinuate from behind fontanelle to occiput. Mandible length less than 4.2 times shank width behind marginal tooth, outline regularly rounded, apical hook incurved by more than 3.6 shank widths; point of marginal tooth within apical half, sharp, in line with entirely concave inner curve of blade distal to marginal tooth. Pronotum with anterior and posterior lobes equal in size or anterior larger than posterior. Fore coxae without prominent spine-like setae on anterior surface.

Measurements and indices (13 individuals from three localities): [**HL**] 1.605 to 1.876 mm <mean, 1.706 S.D., 0.075>; [**HW**] 1.371 to 1.514 mm <mean, 1.429 S.D., 0.047>; [**Hw**] 0.97 to 1.059 mm <mean, 0.994 S.D., 0.025>; [**HD**] 1.06 to 1.273 mm <mean, 1.152 S.D., 0.058>; [**ML**] 1.0 to 1.123 mm <mean, 1.056 S.D., 0.034>; [**ML:Hw**] 1.031 to 1.097 <mean, 1.063 S.D., 0.017>; [**PL**] 0.351 to 0.436 mm <mean, 0.411 S.D., 0.024>; [**PW**] 0.774 to 0.905 mm <mean, 0.839 S.D., 0.037>; [**T3**] 1.245 to 1.442 mm <mean, 1.367 S.D., 0.057>.

**Worker (first full description):** Head capsule pale yellow, antennal flagellum yellow.

Fore coxae flanged anteriorly, without prominent spine-like setae on anterior surface or flange.

Left mandible, third marginal tooth protrudes slightly from cutting edge of first plus second marginals, fourth marginal tooth in front view with proximal end hidden behind molar prominence. Right first marginal tooth with posterior edge shorter than or equal to that of second marginal; notch at proximal end of right molar plate strongly developed, nearly a right angle, almost as deep as long or moderately developed, obtuse angled but depth over half length, molar plate ridges five in number, prominent or concave.

Intestine with anterior part of mesenteron shorter than mixed segment, mixed segment starting well to right of heart in dorsal view of unopened abdomen; mesenteric part of mixed segment at its narrowest point approximately equal in width to proctodeal part, slightly inflated at posterior end, length of inflation more than three times thickness, terminating short of proctodeal dilation; posterior termination of mixed segment in ventral view of unopened abdomen to left of or just reaching ventral nerve cord; attachment of Malpighian tubules at mesenteric-proctodeal interface beyond basal one third of mixed segment, in dorsal view of unopened abdomen distinctly to right of line of heart; proctodeal first segment dilated to more than twice its basal width, termination at enteric

valve short tubular, length two to four times width; enteric valve entering a short diverticulum from third segment of proctodeum, in dorsal view of unopened abdomen at or very near heart line, behind curve of mesenteron; colon within mesenteric loop in dorsal view of unopened abdomen forming a single simple coil.

Measurements and indices (six individuals from three localities): [HW] 1.119 to 1.278 mm <mean, 1.203 S.D., 0.063>; [LMI] 0.583 to 0.706 <mean, 0.636 S.D., 0.055>; [RMI] 0.929 to 1.025 <mean, 0.978 S.D., 0.036> [R2I] 2.434 to 3.462 <mean, 3.045 S.D., 0.340>; [R1:2I] 0.992 to 1.166 <mean, 1.099 S.D., 0.062>; [Pcl] 0.268 to 0.319 mm <mean, 0.292 S.D., 0.021>; [T3] 0.961 to 1.133 mm <mean, 1.042 S.D., 0.078>; [T1] 0.69 to 0.853 mm <mean, 0.762 S.D., 0.072>.

**Comparisons:** *A. corpulentus* is generally larger in all castes than *A. desertorum*, *A. messinae* and *A. vilis* with which it may overlap in parts of their geographical ranges, and has in the imago a proportionately larger pronotum, as well as ocelli closer to the compound eyes than in *A. gallagheri*. The soldier of *A. corpulentus* also has more incurved mandibles than *A. desertorum*, *A. gallagheri*, *A. hastatus* and *A. vilis*, the marginal tooth being within the apical half. In the worker, the lack of coxal spine-like setae separates *A. corpulentus* from *A. messinae*, and the uninflated end of the mesenteron, from *A. desertorum* and *A. vilis*; the protruding left third marginal tooth and less convoluted colon distinguish it from *A. gallagheri*. Al Alawy (personal communication, 1990) gave an inadequate description of the worker and lacked material of the imago, both castes being described here in full for the first time. His new species has not as yet appeared in print in libraries in UK, probably due to the hostilities in the Arabian Gulf. However, that appears a poor reason to delay this publication, providing his priority is given full recognition, and his original authorship of the species is acknowledged.

**Material examined:** Soldiers and workers only IRAQ: Erbil, 1981 (Al Alawy) (paratypes), IRAN: Kermanshah, Shahaba, 1958 (Brown); Ray, near Teheran, 1989 (Wright), all in British Museum (Natural History); the holotype and other paratypes were stated by Al Alawy to be deposited in the Iraq Natural History Museum, in Baghdad.

**Biology, economic significance:** There is no information.

***Amitermes desertorum*** (Desneux 1902)

(Figures 68-75: Imago, 76-81: Soldier, 82-87: Worker, 88-94: Worker, configuration of intestines)

*Eutermes desertorum* Desneux, 1902:439. Type series, imagos and workers, ALGERIA: dans le Souf (examined) (Desneux coll., Institut Royal des Sciences Naturelles, Bruxelles).

*Hamitermes santschi* Silvestri, 1911:105. Type series, soldier and workers, TUNISIA: Kairouan, Cheri-Chera (Silvestri coll. Istituto di Entomologia Agraria, Napoli). **syn.n.**

**Imago:** Head capsule, genae and postclypeus sepia brown, labrum yellow-brown; antennal flagellum pale brown, basal segments yellow-brown; fontanelle pale brown. Pronotum, mesonotum and metanotum sepia brown; legs, coxae yellow-brown, femora and tibiae sepia brown, tarsi pale yellow-brown. Wing membrane yellow-brown, main venation sepia brown. Abdominal tergites dark sepia brown, sternites sepia brown.

Posterior margin of head capsule semi-circular and evenly rounded. Fontanelle centred behind a line joining posterior margins of compound eyes, equal to ocellus, broad oval, slightly or partly depressed; medial spot in front of fontanelle parallel-sided, frons smooth or at most weakly indented in front of fontanelle. Posterior margin of postclypeus semi-circular. Anterior margin of pronotum straight. Vertex pilosity sparse. Fore coxae without prominent spine-like setae.

Third marginal tooth of left mandible continuous in line with cutting edge of first plus second marginals, fourth marginal tooth of left mandible in front view with

proximal end hidden behind molar prominence. First marginal tooth of right mandible with posterior edge longer than that of second, notch at proximal end of right molar plate moderately developed, obtuse angled but depth over half length, right molar plate ridges in front of notch six in number, concave.

Measurements and indices (11 individuals from two localities): **[HW]** 0.97 to 1.07 mm <mean, 1.029 S.D., 0.038>; **[E]** 0.23 to 0.27 mm <mean, 0.249 S.D., 0.014>; **[Ow]** 0.06 to 0.09 mm <mean, 0.076 S.D., 0.008>; **[OI]** 0.09 to 0.12 mm <mean, 0.109 S.D., 0.01>; **[O-E]** 0.03 to 0.05 mm <mean, 0.044 S.D., 0.007>; **[LMI]** 0.622 to 0.806 <mean, 0.714>; **[RMI]** 0.919 to 1.211 <mean, 1.065>; **[R2I]** 2.017 to 3.641 <mean, 2.829>; **[PW]** 0.86 to 1.0 mm <mean, 0.916 S.D., 0.045>; **[PL]** 0.54 mm; **[T3]** 0.91 to 1.0 mm <mean, 0.972 S.D., 0.042>; **[Fw]** 8.0 to 9.0 mm <mean, 8.55 S.D., 0.385>.

**Soldier:** Head capsule, front and sides pale yellow-brown, back pale yellow, mandibles, darkest part sepia brown, antennae pale yellow, pronotum and legs yellow-white.

Head capsule in profile with a small bulge behind fontanelle, flattened or sinuate from behind fontanelle to occiput. Mandible length more than 4.4 times shank width behind marginal tooth, outline regularly rounded, apical hook incurved by 2.6-3.5 shank widths; point of marginal tooth midway from base to apex, sharp, in line with entirely concave inner curve of blade, distal to marginal tooth. Pronotum with anterior lobe larger than posterior. Fore coxae without prominent spine-like setae on anterior surface.

Measurements and indices (six individuals from three localities): **[HL]** 1.3 to 1.43 mm <mean, 1.348 S.D., 0.048>; **[HW]** 1.05 to 1.17 mm <mean, 1.11 S.D., 0.043>; **[Hw]** 0.685 to 0.714 mm <mean, 0.70 S.D., 0.015> **[HD]** 0.893 to 0.969 mm <mean, 0.931 S.D., 0.033>; **[ML]** 0.65 to 0.7 mm <mean, 0.676 S.D., 0.022>; **[ML:Hw]** 0.924 to 1.019 <mean, 0.967 S.D., 0.039>; **[PI]** 0.325 to 0.357 mm <mean, 0.342 S.D., 0.014>; **[Pw]** 0.6 to 0.66 mm <mean, 0.629 S.D., 0.021>; **[T3]** 0.893 to 1.02 mm <mean, 0.96 S.D., 0.041>.

**Worker (first full description):** Head capsule pale yellow, antennal flagellum yellow-white.

Fore coxae flattened, flanged on both sides, without prominent spine-like setae on anterior surface or flange.

Left mandible, third marginal tooth continuous in line with cutting edge of first plus second marginals, not protruding, fourth marginal tooth in front view with proximal end hidden behind molar prominence. Right first marginal tooth with posterior edge longer than that of second marginal; notch at proximal end of right molar plate moderately developed, obtuse angled but depth over half length, molar plate ridges five in number, concave.

Intestine with anterior part of mesenteron approximately equal in length to mixed segment, mixed segment starting well to right of heart in dorsal view of unopened abdomen; mesenteric part of mixed segment at its narrowest point approximately equal in width to proctodeal part, strongly inflated at posterior end, length of inflation not more than three times thickness, reaching to proctodeal dilation; posterior termination of mixed segment in ventral view of unopened abdomen to left of or just reaching ventral nerve cord; attachment of malpighian tubules at mesenteric-proctodeal interface within basal one-third of mixed segment, in dorsal view of unopened abdomen distinctly to right of line of heart. Proctodeal first segment dilated to more than twice its basal width, termination at enteric valve long tubular, length more than four times width; enteric valve entering a short diverticulum from third segment of proctodeum, in dorsal view of unopened abdomen distinctly to right of heart line, behind curve of mesenteron; colon within mesenteric loop in dorsal view of unopened abdomen forming a single simple coil.

Measurements and indices (15 individuals from three localities): **[HW]** 0.969 to 1.059 mm <mean, 1.021 S.D., 0.028>; **[LMI]** 0.612 to 0.838 <mean, 0.747 S.D.,

0.072>; [RMI] 0.861 to 1.168 <mean, 1.029 S.D., 0.083>; [R2I] 3.179 to 4.90 <mean, 4.011 S.D., 0.541>; [R1:2I] 1.006 to 1.326 <mean, 1.199 S.D., 0.087>; [Pcl] 0.201 to 0.297 mm <mean, 0.258 S.D., 0.024>; [T3] 0.787 to 1.024 mm <mean, 0.91 S.D., 0.073>; [T1] 0.654 to 0.785 mm <mean, 0.70 S.D., 0.063>.

**Comparisons:** Its distribution in Saharan oases and the northern and eastern vegetated fringes of the desert isolates *A. desertorum* from most other species. It may overlap at the eastern end of its range with *A. messinae*, *A. vilis*, and possibly *A. corpulentus*, with all of which it shares some features, and it might also be marginally sympatric with *A. loennbergianus*, *A. gallagheri*, *A. sciangallorum*, *A. somaliensis* and *A. stephensoni* which it does not resemble at all. It is most like *A. hastatus* from the other end of the continent, being separable in the imago by the larger principal mandibular indices and six right molar plate ridges. The molar ridges similarly separate *A. vilis*; *A. corpulentus*, is larger. *A. messinae* has a slightly lobed anterior margin of the pronotum and spine-like setae on the fore coxae of all castes. The soldier of *A. desertorum* has a slightly narrower head at the lateral mandibular insertions than *A. hastatus*, and the point of the marginal tooth midway from base to apex. *A. vilis* has the marginal tooth erect and blunt; *A. corpulentus* is larger, with more incurved mandibles and the marginal tooth within the apical half. The workers of *A. desertorum* and *A. hastatus* are only separable by difficult characters of the intestine; the feature usually visible without dissection is the point of attachment of the Malpighian tubules which is within the basal third of the mixed segment in *A. desertorum*, and beyond in *A. hastatus*, *A. vilis* and *A. corpulentus*. These species also have a shorter mesenteron in front of the mixed segment; *A. corpulentus* is larger.

**Material examined:** Imagos and workers only, ALGERIA: Souf near Touquart, 1898 (Lameere) (Type series), (in Desneux colls., Institut Royal des Sciences Naturelles Bruxelles and Naturhistoriska Rikmuseum, Stockholm); soldiers and workers, TUNISIA: Cheri-Chera, 1921 (topotypes, collected and identified by Santschi) (also compared with type series, A.E.Emerson), LIBYA: Wadi Solfeggin, 1963 (Fiori), imagos, soldiers and workers, EGYPT: Abu Rawash 1966 (Kaschef), (in British Museum (Natural History)).

**Biology, economic significance:** A nest, probably not the main calie, was described as protruding 25-30 cm above the surrounding yellow sand, irregularly chambered and lined with dark carton having a smooth surface texture. The species is recorded as a pest of date palms and building timbers, especially in Egypt.

***Amitermes evuncifer* Silvestri (1912)**

(Figures 95-101: Imago, 102-105: Soldier, 106-113: Worker, 114-122: Worker, configuration of intestines)

*Hamitermes evuncifer* Silvestri, 1912: 21. Type series, soldiers and workers, PORTUGUESE GUINEA: Bolama and Rio Cassine (Museo Civico di Storia Naturale di Genova).

**Imago:** Head capsule dark sepia brown, genae and postclypeus sepia brown, labrum pale yellow-brown. Antennal flagellum and basal segments yellow-brown. Fontanelle brown. Pronotum sepia brown, mesonotum and metanotum brown. Legs, coxae and femora yellow-brown, tibiae pale brown, tarsi pale yellow. Wing membrane pale brown, main venation brown. Abdominal tergites dark sepia brown, sternites brown.

Posterior margin of head capsule semi-circular and evenly rounded. Fontanelle centred behind a line joining posterior margins of compound eyes, smaller than ocellus, narrowly oval, slightly or partly depressed; medial spot in front of fontanelle parallel-sided. Frons smooth or at most weakly indented in front of fontanelle, posterior margin of postclypeus arcuate. Anterior margin of pronotum straight. Vertex pilosity dense; fore coxae without prominent spine-like setae.

Third marginal tooth of left mandible distinctly protrudes from cutting edge of first plus second marginals, fourth marginal tooth of left mandible in front view with proximal end hidden behind molar prominence. First marginal tooth of right

mandible with posterior edge longer than that of second, notch at proximal end of right molar plate weakly developed, shallowly obtuse, molar ridges in front of notch five in number, prominent.

Measurements and indices (18 individuals from 11 localities): **[HW]** 1.02 to 1.11 mm <mean, 1.06 S.D., 0.025>; **[E]** 0.28 to 0.31 mm <mean, 0.295 S.D., 0.009>; **[Ow]** 0.06 to 0.09 mm <mean, 0.076 S.D., 0.008>; **[OI]** 0.1 to 0.16 mm <mean, 0.12 S.D., 0.017>; **[O-E]** 0.02 to 0.07 mm <mean, 0.048 S.D., 0.014>; **[LM1]** 0.56 to 0.69 < mean, 0.61 >, **[RMI]** 0.853 to 0.95 <mean 0.888> **[R21]**, 1.712 to 2.14 <mean 1.951>; **[PW]** 0.86 to 0.97 mm <mean, 0.898 S.D., 0.033>; **[PL]** 0.54 to 0.61 mm <mean, 0.566 S.D., 0.026>; **[T3]** 0.97 to 1.14 mm <mean, 1.071 S.D., 0.041>; **[Fw]** 8.9 to 10.7 mm <mean, 9.45 S.D., 0.51>.

**Soldier:** Head capsule, front and sides yellow, back, pale yellow, mandibles, darkest part brown, antennae pale yellow, pronotum and legs pale yellow.

Head capsule in profile flattened behind fontanelle, rounded, convexly curved from fontanelle to occiput. Mandible length more than 4.4 times shank width behind marginal tooth, outline regularly rounded, apical hook incurved by 2.6-3.5 shank widths; point of marginal tooth within basal half, truncated, erect from inner curve of blade; shape of inner margin entirely concave distal to marginal tooth. Pronotum with anterior lobe larger than posterior; fore coxae without prominent spine-like setae on anterior surface.

Measurements and indices (18 individuals from 11 localities): **[HL]** 1.14 to 1.66 mm <mean, 1.422 S.D., 0.102>; **[HW]** 1.02 to 1.3 mm <mean, 1.173 S.D., 0.06>; **[Hw]** 0.7 to 0.87 mm <mean, 0.804 S.D., 0.044>; **[HD]** 0.82 to 1.04 mm <mean, 0.95 S.D., 0.05>; **[ML]** 0.61 to 0.77 mm <mean, 0.707 S.D., 0.047>; **[ML:Hw]** 0.821 to 0.962 <mean, 0.878 S.D., 0.035>; **[PI]** 0.3 to 0.4 mm <mean, 0.351 S.D., 0.024>; **[Pw]** 0.61 to 0.75 mm <mean, 0.676 S.D., 0.03>; **[T3]** 0.78 to 1.11 mm <mean, 0.988 S.D., 0.075>.

**Worker (first full description):** Head capsule yellow-white, antennal flagellum pale yellow.

Fore coxae flattened, flanged on both sides, without prominent spine-like setae on anterior surface or flange. Left mandible, third marginal tooth distinctly protrudes from cutting edge of first plus second marginals, fourth marginal tooth in front view with proximal end hidden behind molar prominence. Right first marginal tooth with posterior edge longer than that of second marginal; notch at proximal end of right molar plate weakly developed, shallowly obtuse, molar plate ridges fewer than five or five in number, concave.

Intestine with anterior part of mesenteron shorter than mixed segment, mixed segment starting slightly to left or beneath heart in dorsal view of unopened abdomen; mesenteric part of mixed segment at its narrowest point approximately equal in width to proctodeal part, strongly inflated at posterior end, length of inflation not more than three times thickness, reaching to proctodeal dilation; posterior termination of mixed segment in ventral view of unopened abdomen to left of or just reaching ventral nerve cord; attachment of Malpighian tubules at mesenteric-proctodeal interface beyond basal one-third of mixed segment, in dorsal view of unopened abdomen distinctly to right of line of heart; proctodeal first segment dilated to more than twice its basal width, termination at enteric valve conical, length less than twice width; enteric valve entering directly into third segment of proctodeum, in dorsal view of unopened abdomen at or very near heart line, behind curve of mesenteron; colon within mesenteric loop in dorsal view of unopened abdomen forming a single simple coil.

Measurements and indices (45 individuals from 12 localities): **[HW]** 0.94 to 1.16 mm <mean, 1.081 S.D., 0.057>; **[LMI]** 0.515 to 0.752 <mean, 0.638 S.D., 0.061>; **[RMI]** 0.817 to 1.165 <mean, 0.974 S.D., 0.081>; **[R21]** 1.93 to 3.161 <mean, 2.454 S.D., 0.327>; **[R1:21]** 0.974 to 1.439 <mean, 1.14 S.D., 0.126>; **[Pcl]** 0.212 to 0.298 mm <mean, 0.257 S.D., 0.023>; **[T3]** 0.73 to 1.06 mm <mean, 0.916 S.D., 0.086>; **[T1]** 0.565 to 0.859 mm <mean, 0.717 S.D., 0.078>.



**Comparisons:** *A. evuncifer* closely resembles *A. truncatidens*, from which it differs in the alate caste by the smooth frons, the smaller, narrower fontanelle, the longer right first marginal tooth, and smaller right mandible index; the four latter characters also separate *A. unidentatus*. The extensively sympatric *A. guineensis* is distinguished by the more broadly arcuate posterior margin of the head, the grooved frons, the higher principal mandibular indices, the left fourth marginal tooth clear of the molar prominence, and more numerous right molar ridges. The presence of spine-like setae on the fore coxae distinguishes both soldier and worker castes. In the soldier, *A. truncatidens* is separated by the more inflated vertex and the more transversely truncated mandibular marginal tooth; *A. unidentatus* has less curved mandibles with weaker marginal teeth. The group of smaller species, including the sympatric *A. spinifer*, has fore coxal spine-like setae in all castes. The worker of *A. truncatidens* is most readily distinguished by the shorter right first marginal tooth, giving a lower first to second marginal index, but there are also differences in the configuration of the intestine; *A. unidentatus* has the same mandibular difference and more features of the gut, notably the tubular first section of the proctodeum.

**Material examined:** Many nest series, numbering several hundred, from SENEGAL to ERITREA and from Sahelian savanna to rain forest. The type series was examined for the 1959 study. The species is too widely distributed in the region to be worth listing separate localities. It does not appear to cross the Red Sea into the Arabian Peninsula.

**Biology, economic significance:** Nest structures range from moderately large (up to 2m high) carton and soil mounds, either free standing or around stumps or parts of tree trunks, in moist savanna or rain forest, to totally subterranean nests in Sahel savanna. *A. evuncifer* often shares the mounds of species of other genera, *Cubitermes*, *Trinervitermes* and *Macrotermes* being the most frequent. The relationship with *Trinervitermes* in Guinean savanna is particularly interesting in that the chambers of the *Amitermes* nest almost exactly complement in form the pillars and floors of the original mound builder. The result is often a completely interlaced joint mound with the thinnest possible walls separating the two genera, which immediately fight to the death if the walls are broken. *A. evuncifer* is a significant pest of yams in West Africa and has also been recorded damaging groundnuts and sugar cane. It has prevented the establishment of seedling teak in sub-optimal conditions, and attacks on root systems of *Eucalyptus* in drier areas caused gummosis of trees five or more years old.

***Amitermes gallagheri* Chhotani, 1988.**

(Figures 123-127: Imago, 128-132: Soldier, 133-139: Worker, 140-145: Worker, configuration of intestines)

*Amitermes gallagheri* Chhotani, 1988:367-369. Type series, soldiers and workers only, OMAN: Jaabal Hamar (Oman Natural History Museum, Muscat).

**Imago (first description):** Head capsule sepia brown, genae and postclypeus yellow-brown, labrum pale yellow, antennae and fontanelle pale yellow-brown. Pronotum brown, mesonotum and metanotum yellow-brown; legs, coxae, femora and tarsi pale yellow, tibiae pale yellow-brown; wing membrane yellow-brown, main venation brown. Abdominal tergites brown, sternites pale yellow-brown.

Posterior margin of head capsule semi-circular and evenly rounded. Fontanelle centred on a line joining posterior margins of compound eyes, smaller than ocellus, broad oval, slightly or partly depressed; medial spot in front of fontanelle circular. Frons smooth or at most weakly indented in front of fontanelle, posterior margin of postclypeus semi-circular. Anterior margin of pronotum straight. Vertex pilosity sparse. Fore coxae without prominent spine-like setae.

Third marginal tooth of left mandible protrudes slightly from cutting edge of first plus second marginals, fourth marginal tooth of left mandible in front view with proximal end hidden behind molar prominence. First marginal tooth of right mandible with posterior edge longer than that of second; notch at proximal end

of right molar plate strongly developed, nearly a right angle, almost as deep as long, right molar plate ridges in front of notch five in number, prominent.

Measurements and indices (four individuals from one locality): [**HW**] 1.16 to 1.171 mm <mean, 1.168 S.D., 0.005>; [**E**] 0.26 to 0.288 mm <mean, 0.276 S.D., 0.013>; [**Ow**] 0.072 to 0.087 mm <mean, 0.082 S.D., 0.007>; [**Ol**] 0.097 to 0.119 mm <mean, 0.111 S.D., 0.010>; [**O-E**] 0.09 to 0.106 mm <mean, 0.097 S.D., 0.007>; [**LMI**] 0.726 to 0.91 <mean, 0.818>; [**RMI**] 0.92 to 1.212 <mean, 1.066>; [**R2I**] 2.223 to 3.847 <mean, 3.035>; [**PW**] 0.905 to 0.92 mm <mean, 0.912 S.D., 0.008>; [**PL**] 0.598 to 0.627 mm <mean, 0.614 S.D., 0.014>; [**T3**] 1.27 to 1.32 mm <mean, 1.295 S.D., 0.021>; [**Fw**] 8.63 to 8.7 mm <mean, 8.68 S.D., 0.055>.

**Soldier:** Head capsule, front and sides pale brown, back yellow, mandibles, darkest part sepia brown, antennae, pronotum and legs yellow.

Head capsule in profile flattened behind fontanelle, rounded, convexly curved from fontanelle to occiput. Mandible length more than 4.4 times shank width behind marginal tooth, outline regularly rounded, apical hook incurved by 1.5-2.5 shank widths; point of marginal tooth within apical half, sharp, erect from inner curve of blade; shape of inner margin entirely concave distal to marginal tooth. Pronotum with anterior lobe smaller than posterior or both lobes equal in size; fore coxae without prominent spine-like setae on anterior surface.

Measurements and indices (18 individuals from five localities): [**HL**] 1.38 to 1.73 mm <mean, 1.505 S.D., 0.091>; [**HW**] 1.25 to 1.49 mm <mean, 1.352 S.D., 0.076>; [**Hw**] 0.91 to 1.08 mm <mean, 0.977 S.D., 0.050>; [**HD**] 1.05 to 1.2 mm <mean, 1.135 S.D., 0.038>; [**ML**] 0.79 to 0.953 mm <mean, 0.873 S.D., 0.056>; [**ML:Hw**] 0.833 to 0.973 <mean, 0.894 S.D., 0.041>; [**PL**] 0.4 to 0.495 mm <mean, 0.450 S.D., 0.030>; [**PW**] 0.74 to 0.91 mm <mean, 0.816 S.D., 0.053>; [**T3**] 1.2 to 1.53 mm <mean, 1.359 S.D., 0.098>.

**Worker (first full description):** Head capsule and antennal flagellum yellow.

Fore coxae conical, without prominent spine-like setae on anterior surface or flange. Left mandible, third marginal tooth continuous in line with cutting edge of first plus second marginals, not protruding, fourth marginal tooth in front view with proximal end hidden behind molar prominence. Right first marginal tooth with posterior edge equal to that of second marginal; notch at proximal end of right molar plate strongly developed, nearly a right angle, almost as deep as long, molar plate ridges five in number, prominent.

Intestine with anterior part of mesenteron shorter than mixed segment, mixed segment starting well to right of heart in dorsal view of unopened abdomen; mesenteric part of mixed segment at its narrowest point less than half width of proctodeal part, not inflated, terminating short of proctodeal dilation; posterior termination of mixed segment in ventral view of unopened abdomen well to right of ventral nerve cord; attachment of Malpighian tubules at mesenteric-proctodeal interface within basal one-third of mixed segment, in dorsal view of unopened abdomen distinctly to right of line of heart; proctodeal first segment dilated to twice its basal width, termination at enteric valve short tubular, length two to four times width; enteric valve entering a short diverticulum from third segment of proctodeum, in dorsal view of unopened abdomen at or very near heart line, behind curve of mesenteron; colon within mesenteric loop in dorsal view of unopened abdomen thrown into one or more loops additional to the main coil, mainly to left of heart.

Measurements and indices (27 individuals from five localities): [**HW**] 1.192 to 1.455 mm <mean, 1.344 S.D., 0.073>; [**LMI**] 0.711 to 1.03 <mean, 0.832 S.D., 0.083>; [**RMI**] 0.911 to 1.217 <mean, 1.026 S.D., 0.069>; [**R2I**] 2.495 to 3.718 <mean, 3.253 S.D., 0.352>; [**R1:2I**] 0.865 to 1.381 <mean, 1.121 S.D., 0.122>; [**Pcl**] 0.257 to 0.359 mm <mean, 0.309 S.D., 0.034>; [**T3**] 0.972 to 1.39 mm <mean, 1.196 S.D., 0.122>; [**T1**] 0.735 to 1.058 mm <mean, 0.910 S.D., 0.096>.

**Comparisons:** The species is very closely related to *A. loennbergianus* but has smaller imagos with the left third marginal tooth very slightly protruding from the first plus second. Among other sympatric or neighbouring species, *A. vilis* and *A. messinae* are generally smaller in the imago, with larger fontanelles, the latter with a lobed anterior margin to the pronotum; *A. corpulentus* has a proportionately larger pronotum, and ocelli much closer to the compound eyes. Soldiers of *A. loennbergianus* have slightly shorter mandibles. *A. stephensoni* and *A. messinae* have fore coxal spine-like setae in both soldiers and workers, and the soldier mandibles of these and the other three sympatric species are more slender and incurved. Workers of *A. loennbergianus*, *A. vilis* (which is also smaller) and *A. corpulentus* have fewer right molar ridges and the two latter species have Malpighian tubules attached beyond the basal one-third of the mixed segment.

**Material examined:** SAUDI ARABIA: Jizan, 35 km from Jizan, 1971 (Sands); YEMEN: el Kod, 1988 (Cowie); OMAN: Jaabal Hamar, 1984 (Gallagher No.7116) ('topotypes', different series from types); SOUTH YEMEN: Wadi Hadramaut, (Kerfoot).

**Biology, economic significance:** no free-standing nest has been recorded, the species being found associated with ungulate dung and woody debris around the Arabian peninsula. Carton structures containing alates were encountered in a building, indicating that economic damage may sometimes occur.

#### ***Amitermes guineensis* sp.n.**

(Figures 146-151: Imago, 153-157: Soldier, 158-165: Worker, 166-171: Worker, configuration of intestines)

*Amitermes guineensis* sp.n. (West African records of '*A.stephensoni*' Sands, 1959 now recognized as different.)

**Imago:** Head capsule dark sepia brown, genae and postclypeus sepia brown, labrum yellow-brown; antennal flagellum pale brown, basal segments pale yellow-brown or yellow-brown; fontanelle pale brown. Pronotum dark sepia brown, mesonotum pale brown, metanotum sepia brown; legs, coxae, femora and tarsi, yellow-brown, tibiae brown. Wing membrane brown, main venation sepia brown. Abdominal tergites and sternites sepia brown.

Posterior margin of head capsule arcuate or sinuate. Fontanelle centred on a line joining posterior margins of compound eyes, smaller than ocellus, broad oval, flat; medial spot in front of fontanelle parallel-sided, frons with two diverging grooves or smooth in front of fontanelle. Posterior margin of postclypeus semi-circular. Anterior margin of pronotum straight. Vertex pilosity dense. Fore coxae without prominent spine-like setae.

Third marginal tooth of left mandible protrudes slightly from cutting edge of first plus second marginals; fourth marginal tooth of left mandible in front view with proximal end clear of molar prominence. First marginal tooth of right mandible with posterior edge longer than that of second; notch at proximal end of right molar plate weakly developed, shallowly obtuse, right molar plate ridges in front of notch six in number, much reduced.

Measurements and indices (15 individuals from seven localities): [HW] 1.0 to 1.11 mm <mean, 1.058 S.D., 0.032>; [E] 0.24 to 0.29 mm <mean, 0.266 S.D., 0.014.>; [Ow] 0.08 to 0.09 mm <mean, 0.083 S.D., 0.005>; [OI] 0.11 to 0.13 mm <mean, 0.120 S.D., 0.008>; [O-E] 0.04 to 0.08 mm <mean, 0.067 S.D., 0.011>; [LMI] 0.858 to 1.042 <mean, 0.950>; [RMI] 1.284 to 1.546 <mean, 1.430>; [R2I] 1.848 to 3.472 <mean, 2.660>; [PW] 0.82 to 0.97 mm <mean, 0.914 S.D., 0.042>; [PL] 0.54 to 0.64 mm <mean, 0.599 S.D., 0.029>; [T3] 0.97 to 1.13 mm <mean, 1.054 S.D., 0.045>; [Fw] 8.8 to 10.0 mm <mean, 9.447 S.D., 0.374>.

**Soldier:** Head capsule, front and sides brown, back pale yellow, mandibles, darkest part sepia brown, antennae, pronotum and legs, yellow.

Head capsule in profile with a small bulge behind fontanelle, flattened or sinuate from behind fontanelle to occiput. Mandible length more than 4.4 times shank width behind marginal tooth, outline regularly rounded, apical hook incurved by 2.6-3.5 shank widths; point of marginal tooth midway from base to apex, blunt, rounded, erect from inner curve of blade; shape of inner margin straight, slightly sinuate, or entirely concave distal to marginal tooth. Pronotum with anterior lobe larger than posterior. Fore coxae with three or more prominent spine-like setae arranged in line or group on anterior surface.

Measurements and indices (17 individuals from 13 localities): [**HL**] 1.11 to 1.39 mm <mean, 1.272 S.D., 0.073>; [**HW**] 0.96 to 1.14 mm <mean, 1.057 S.D., 0.050>; [**Hw**] 0.72 to 0.84 mm <mean, 0.779 S.D., 0.030>; [**HD**] 0.8 to 0.91 mm <mean, 0.875 S.D., 0.033>; [**ML**] 0.72 to 0.88 mm <mean, 0.814 S.D., 0.042>; [**ML:Hw**] 1.0 to 1.128 <mean, 1.046 S.D., 0.04>; [**PL**] 0.32 to 0.46 mm <mean, 0.401 S.D., 0.034>; [**PW**] 0.57 to 0.75 mm <mean, 0.682 S.D., 0.047>; [**T3**] 0.72 to 0.88 mm <mean, 0.861 S.D., 0.060>.

**Worker:** Head capsule pale yellow, antennal flagellum pale yellow.

Fore coxae flattened, flanged on both sides, with three or more prominent spine-like setae arranged in line or group on anterior flange.

Left mandible, third marginal tooth protrudes slightly from cutting edge of first plus second marginals, fourth marginal tooth in front view with proximal end clear of molar prominence. Right first marginal tooth with posterior edge longer than that of second marginal; notch at proximal end of right molar plate moderately developed, obtuse angled but depth over half length or weakly developed, shallowly obtuse, molar plate ridges six in number, concave or much reduced.

Intestine with anterior part of mesenteron longer than mixed segment, mixed segment starting well to right of heart in dorsal view of unopened abdomen; mesenteric part of mixed segment at its narrowest point less than half width of proctodeal part, slightly inflated at posterior end, length of inflation more than three times thickness, terminating short of proctodeal dilation; posterior termination of mixed segment in ventral view of unopened abdomen well to right of ventral nerve cord; attachment of Malpighian tubules at mesenteric-proctodeal interface within basal one-third of mixed segment, in dorsal view of unopened abdomen distinctly to right of line of heart; proctodeal first segment dilated to twice or more than twice its basal width, termination at enteric valve short tubular, length twice up to more than four times width; enteric valve entering a short diverticulum from third segment of proctodeum, in dorsal view of unopened abdomen distinctly to right of heart line, behind curve of mesenteron; colon within mesenteric loop in dorsal view of unopened abdomen forming a single simple coil.

Measurements and indices (19 individuals from three localities): [**HW**] 0.87 to 0.992 mm <mean, 0.921 S.D., 0.033>; [**LMI**] 0.857 to 1.122 <mean, 0.987 S.D., 0.090>; [**RMI**] 1.057 to 1.418 <mean, 1.235 S.D., 0.112>; [**R2I**] 2.145 to 4.523 <mean, 3.058 S.D., 0.622>; [**R1:2I**] 1.269 to 1.718 <mean, 1.452 S.D., 0.148>; [**Pcl**] 0.228 to 0.305 mm <mean, 0.264 S.D., 0.020>; [**T3**] 0.703 to 0.941 mm <mean, 0.816 S.D., 0.070>; [**T1**] 0.532 to 0.696 mm <mean, 0.612 S.D., 0.049>.

**Comparisons:** The species is described here as new because better material of *A. stephensoni* Harris, with which it was previously confused, has shown up differences in the mandibles of the worker caste far greater than those found in any other related species pairs. Having separated the material, the longer legs in the soldier caste of *A. stephensoni* are obvious. Comparisons with *A. evuncifer* are given under that species. *A. spinifer*, which is also sympatric, is smaller in all castes, has fore coxal spine-like setae in the imago, and a narrower head in the soldier; in the worker, *A. spinifer* has fewer right molar ridges, a shorter mesenteron and a more convoluted colon.

**Material examined:** Imago, female (holotype), other imagos, soldiers and workers, NIGERIA: 43 miles from Maiduguri on Potiskum Rd, 18 miles from Tula on Numan Rd, 18 miles from Yola on Numan Rd, 24 miles and 34 miles from Yola on Jalingo Rd, Tula, 25 miles from Jos on Kaduna Rd, 32 miles from Damaturu on Potiskum Rd, 2 miles from Faro River S. of Yola, 28 miles from Sokoto on Argungu Rd, 2 miles from Gongola River on Gombe-Dadin Kowa Rd, 1957, GHANA: 11 miles from Accra on Kumasi Rd, Ejura, 55 miles from Tamale on Damongo Rd, 35 miles from Tamale on Yendi Rd, 52 miles S. of Wa on Sawla Rd, 25 miles N. of Wenchi on Bamboi Rd, 5 miles from Dunkwa on Obuasi Rd, 1959, GAMBIA: Nyambai (16°40'W, 13°18'N), 35 miles from Banjul on Manso Konko Rd, 1966 (Sands) (paratypes).

**Biology, economic significance:** Widely distributed from Sudan savanna to rain forest areas in West Africa, the species is mostly recorded from the mounds of other genera; from this habit and the proportions of the worker mandibles, it appears that this species may fill a similar ecological niche in the West African savannas to that of *A. importunus* in Central Africa.

***Amitermes hastatus*** (Haviland 1898)

(Figures 172-178: Imago, 179-184: Soldier, 185-192: Worker, 193-199: Worker, configuration of intestines)

*Termes hastatus* Haviland, 1898:358-442. Type series, all castes, REPUBLIC OF SOUTH AFRICA: Cape Province, Port Elizabeth (Haviland Coll., Museum of Zoology, Cambridge, U.K.), (examined). Nine species described by Fuller, 1922, and two by Silvestri, 1908, 1914, were synonymised in Sands, 1959.

**Imago:** Head capsule very dark sepia brown, genae and postclypeus dark sepia brown, labrum yellow-brown; antennal flagellum sepia brown, basal segments brown, fontanelle pale brown. Pronotum, mesonotum and metanotum sepia brown; legs, coxae, femora and tibiae sepia brown, tarsi pale yellow-brown; imago wing membrane pale brown, main venation brown; abdominal tergites dark sepia brown, sternites sepia brown.

Posterior margin of head capsule semi-circular and evenly rounded; fontanelle centred on or behind a line joining posterior margins of compound eyes, equal in size to ocellus, broad oval, slightly or partly depressed, medial spot in front of fontanelle oval; frons sometimes with two diverging grooves or smooth, posterior margin of postclypeus semi-circular; anterior margin of pronotum straight; vertex pilosity sparse, fore coxae without prominent spine-like setae.

Third marginal tooth of left mandible continuous in line with cutting edge of first plus second, fourth marginal tooth of left mandible in front view with proximal end hidden behind molar prominence; first marginal tooth of right mandible with posterior edge longer than that of second, notch at proximal end of right molar plate moderately developed, obtuse angled but depth over half length, right molar plate ridges in front of notch five in number, concave.

Measurements and indices (31 individuals from 12 localities): [HW] 0.95 to 1.16 mm <mean, 1.043 S.D., 0.064>; [E] 0.22 to 0.29 mm <mean, 0.25 S.D., 0.014>; [Ow] 0.06 to 0.1 mm <mean, 0.077 S.D., 0.009>; [Ol] 0.09 to 0.14 mm <mean, 0.111 S.D., 0.012>; [O-E] 0.03 to 0.08 mm <mean, 0.058 S.D., 0.013>; [LMI] 0.526 to 0.579 <mean, 0.553>; [RMI] 0.857 to 0.91 <mean, 0.884>; [R2I] 2.848 to 3.791 <mean, 3.32>; [PW] 0.76 to 1.04 mm <mean, 0.883 S.D., 0.073>; [PL] 0.44 to 0.64 mm <mean, 0.533 S.D., 0.047>; [T3] 0.91 to 1.25 mm <mean, 1.055 S.D., 0.11>; [Fw] 8.0 to 12.6 mm <mean, 10.304 S.D., 1.418>.

**Soldier:** Head capsule, front and sides yellow-brown, back yellow, mandibles, darkest part brown, antennae, pronotum and legs, pale yellow.

Head capsule in profile with a small bulge behind fontanelle, flattened or sinuate from behind fontanelle to occiput. Mandible length more than 4.4 times shank width behind marginal tooth, outline regularly rounded, apical hook incurved by 2.6-3.5 shank widths; point of marginal tooth within apical half, sharp, in line with entirely concave inner curve of blade, distal to marginal tooth. Pronotum

with anterior and posterior lobes equal in size, fore coxae without prominent spine-like setae on anterior surface.

Measurements and indices (22 individuals from nine localities): [**HL**] 1.22 to 1.61 mm <mean, 1.392 S.D., 0.113>; [**HW**] 1.00 to 1.29 mm <mean, 1.100 S.D., 0.092>; [**Hw**] 0.72 to 0.84 mm <mean, 0.757 S.D., 0.036>; [**HD**] 0.82 to 1.04 mm <mean, 0.916 S.D., 0.065>; [**ML**] 0.68 to 0.86 mm <mean, 0.771 S.D., 0.053>; [**ML:Hw**] 0.944 to 1.108 <mean, 1.018 S.D., 0.047>; [**PL**] 0.32 to 0.40 mm <mean, 0.332 S.D., 0.021>; [**PW**] 0.57 to 0.75 mm <mean, 0.632 S.D., 0.048>; [**T3**] 0.80 to 1.14 mm <mean, 0.931 S.D., 0.088>.

**Worker (first full description):** Head capsule and antennal flagellum pale yellow.

Fore coxae conical, without prominent spine-like setae on anterior surface or flange. Left mandible, third marginal tooth continuous in line with cutting edge of first plus second marginals, not protruding, fourth marginal tooth in front view with proximal end hidden behind molar prominence. Right first marginal tooth with posterior edge longer than that of second marginal; notch at proximal end of right molar plate moderately developed, obtuse angled but depth over half length or weakly developed, shallowly obtuse, molar plate ridges five in number, concave.

Intestine with anterior part of mesenteron shorter than mixed segment, mixed segment starting well to right of heart in dorsal view of unopened abdomen; mesenteric part of mixed segment at its narrowest point approximately half width of proctodeal part, strongly inflated at posterior end, length of inflation not more than three times thickness, reaching to proctodeal dilation; posterior termination of mixed segment in ventral view of unopened abdomen to left of or just reaching ventral nerve cord; attachment of Malpighian tubules at mesenteric-proctodeal interface beyond basal one-third of mixed segment, in dorsal view of unopened abdomen distinctly to right of line of heart; proctodeal first segment dilated to more than twice its basal width, termination at enteric valve long tubular, length more than four times width; enteric valve entering a short diverticulum from third segment of proctodeum, in dorsal view of unopened abdomen distinctly to right of heart line, behind curve of mesenteron; colon within mesenteric loop in dorsal view of unopened abdomen forming a single simple coil.

Measurements and indices (29 individuals from 12 localities): [**HW**] 0.87 to 1.044 mm <mean, 0.968 S.D., 0.04>; [**LMI**] 0.505 to 0.779 <mean, 0.628 S.D., 0.083>; [**RMI**] 0.681 to 1.227 <mean, 0.855 S.D., 0.102>; [**R2I**] 2.625 to 6.273 <mean, 3.562 S.D., 0.696>; [**R1:2I**] 1.064 to 1.767 <mean, 1.357 S.D., 0.162>; [**Pcl**] 0.187 to 0.279 mm <mean, 0.235 S.D., 0.024>; [**T3**] 0.709 to 0.926 mm <mean, 0.813 S.D., 0.07>; [**T1**] 0.518 to 0.731 mm <mean, 0.635 S.D., 0.07>.

**Comparisons:** The differences between all castes of *A. hastatus* and *A. desertorum* have already been given under the latter. Among the sympatric species not already compared, the imago of *A. messinae* has a slightly lobed anterior margin to the pronotum, higher mandibular indices, and all castes of this species have spine-like setae on the fore coxae. *A. importunus*, *A. truncatidens*, *A. unidentatus* and *A. mitchelli* also have differently proportioned mandibles with higher principal indices, the last species being rather smaller. The soldiers of all of these species other than *A. messinae* have erect marginal teeth. The worker left third marginal tooth of the other four sympatric species protrudes from the cutting edge of the first plus second, and they each differ in their gut configuration. *A. importunus* has a longer mesenteron, uninflated posteriorly; in *A. truncatidens* the first part of the proctodeum enters the third (the enteric valve is the second) directly, to the left of the heart line in dorsal view of the unopened abdomen; the mesenteron is also longer in *A. unidentatus*, the Malpighian tubules are attached within the basal third of the mixed segment, and the first segment of the proctodeum is tubular. *A. mitchelli* shares with the two latter species the shorter right first marginal tooth, and like *A. truncatidens*, the enteric valve enters the third part of the proctodeum directly.

**Material examined:** Imagos, soldiers and workers, REPUBLIC OF SOUTH AFRICA: (type series of species and its synonyms), various localities and collectors from temperate and sub-tropical South Africa.

**Biology, economic significance:** The biology of the species, known in South Africa as 'the black-mound termite' was described in detail by Skaife (1955), who stated that it was of no economic significance.

***Amitermes importunus* Sands (1959)**

(Figures 200-205: Imago, 206-211: Soldier, 212-219: Worker, 220-228: Worker, configuration of intestines)

*Amitermes importunus* Sands, 1959:139. Type series, soldiers and workers only, MALAWI: Central Province, 33 miles from Kasungu (British Museum (Natural History)).

**Imago (first description):** Head capsule dark sepia brown, genae and postclypeus sepia brown, labrum pale yellow-brown; antennal flagellum sepia brown, basal segments pale yellow-brown; fontanelle brown; pronotum dark sepia brown, mesonotum and metanotum sepia brown; legs, coxae yellow-brown, femora yellow-brown, tibiae brown, tarsi yellow-brown; imago wing membrane brown, main venation sepia brown; abdominal tergites dark sepia brown, sternites yellow-brown.

Posterior margin of head capsule semi-circular and evenly rounded; fontanelle centred in front of a line joining posterior margins of compound eyes, smaller than ocellus, broad oval, slightly or partly depressed; medial spot in front of fontanelle oval; frons smooth or at most weakly indented in front of fontanelle, posterior margin of postclypeus semi-circular; anterior margin of pronotum straight, vertex pilosity dense, fore coxae without prominent spine-like setae.

Third marginal tooth of left mandible continuous in line with cutting edge of first plus second, fourth marginal in front view with proximal end hidden behind molar prominence; first marginal tooth of right mandible with posterior edge longer than that of second, notch at proximal end of right molar plate weakly developed, shallowly obtuse, right molar plate ridges in front of notch five in number, much reduced.

Measurements and indices (eight individuals from one locality): [HW] 1.075 to 1.122 mm <mean, 1.088 S.D., 0.017>; [E] 0.3 to 0.325 mm <mean, 0.311 S.D., 0.008>; [Ow] 0.069 to 0.079 mm <mean, 0.075 S.D., 0.003>; [OI] 0.104 to 0.125 mm <mean, 0.116 S.D., 0.007>; [O-E] 0.038 to 0.06 mm <mean, 0.050 S.D., 0.007>; [LMI] 1.015 to 1.137 <mean, 1.047>; [RMI] 1.3 to 1.522 <mean, 1.394>; [R2I] 2.527 to 2.837 <mean, 2.707>; [PW] 0.918 to 0.969 mm <mean, 0.937 S.D., 0.018>; [PL] 0.612 to 0.663 mm <mean, 0.657 S.D., 0.016>; [T3] 1.079 to 1.148 mm <mean, 1.122 S.D., 0.014> [Fw] 10.8 to 11.5 mm <mean, 11.1 S.D., 0.288>.

**Soldier:** Head capsule, front and sides pale yellow-brown, back pale yellow; mandibles, darkest part sepia brown; antennae and pronotum pale yellow, legs yellow-white.

Head capsule in profile with a small bulge behind fontanelle, flattened or sinuate from behind fontanelle to occiput. Mandible length more than 4.4 times shank width behind marginal tooth, outline regularly rounded, apical hook incurved by 2.6-3.5 shank widths; point of marginal tooth midway from base to apex, truncated, erect from inner curve of blade; shape of inner margin entirely concave distal to marginal tooth. Pronotum with anterior and posterior lobes equal in size; fore coxae without prominent spine-like setae on anterior surface.

Measurements and indices (13 individuals from 11 localities): [HL] 1.04 to 1.61 mm <mean, 1.416 S.D., 0.161>; [HW] 0.9 to 1.16 mm <mean, 1.076 S.D., 0.080>; [Hw] 0.75 to 0.89 mm <mean, 0.820 S.D., 0.049>; [HD] 0.77 to 1.0 mm <mean, 0.906 S.D., 0.069>; [ML] 0.68 to 0.86 mm <mean, 0.767 S.D., 0.044>; [ML:Hw] 0.876-1.0 <mean, 0.936 S.D., 0.037>; [PL] 0.32 to 0.43 mm

<mean, 0.388 S.D., 0.031>; [PW] 0.61 to 0.75 mm <mean, 0.691 S.D., 0.037>; [T3] 0.89 to 1.002 mm <mean, 0.959 S.D., 0.043>.

**Worker (first full description):** Head capsule yellow-white, antennal flagellum yellow.

Fore coxae flanged anteriorly, without prominent spine-like setae on anterior surface or flange. Left mandible, third marginal tooth protrudes slightly from cutting edge of first plus second marginals; fourth marginal tooth in front view with proximal end hidden behind molar prominence. Right first marginal tooth with posterior edge longer than that of second marginal; notch at proximal end of right molar plate moderately developed, obtuse angled but depth over half length or weakly developed, shallowly obtuse, molar plate ridges five in number, much reduced.

Intestine with anterior part of mesenteron approximately equal in length to mixed segment, mixed segment starting well to right of heart in dorsal view of unopened abdomen; mesenteric part of mixed segment at its narrowest point less than half width of proctodeal part, not inflated, terminating short of proctodeal dilation; posterior termination of mixed segment in ventral view of unopened abdomen well to right of ventral nerve cord; attachment of Malpighian tubules at mesenteric-proctodeal interface within basal one-third of mixed segment, in dorsal view of unopened abdomen distinctly to right of line of heart; proctodeal first segment dilated to twice its basal width, termination at enteric valve short tubular, length two to four times width; enteric valve entering a short diverticulum from third segment of proctodeum, in dorsal view of unopened abdomen at or very near heart line, behind curve of mesenteron; colon within mesenteric loop in dorsal view of unopened abdomen thrown into one or more loops additional to the main coil, mainly to left of heart.

Measurements and indices (41 individuals from 12 localities): [HW] 0.92 to 1.084 mm <mean, 1.002 S.D., 0.040>; [LMI] 0.87 to 1.4 <mean, 1.146 S.D., 0.135>; [RMI] 1.196 to 1.846 <mean, 1.488 S.D., 0.167>; [R2I] 2.336 to 5.512 <mean, 3.330 S.D., 0.618>; [R1:2I] 0.918 to 1.42 <mean, 1.158 S.D., 0.133>; [Pcl] 0.242 to 0.354 mm <mean, 0.292 S.D., 0.027>; [T3] 0.682 to 0.984 mm <mean, 0.865 S.D., 0.090>; [T1] 0.55 to 0.799 mm <mean, 0.682 S.D., 0.074>.

**Comparisons:** Of the sympatric species not already compared, the imago of *A. messinae* is smaller, has the front margin of the pronotum slightly lobed, and (present in all castes) spine-like fore coxal setae, as well as lower principal mandibular indices; *A. truncatidens* and *A. unidentatus* have larger fontanelles at least equal in size to the ocellus, the former species with diverging grooves in front of the fontanelle, and, in common with *A. mitchelli*, lower mandibular indices and the left third marginal tooth distinct from the cutting edge of first plus second. The soldier of *A. messinae* has the marginal tooth in line with the inner curve. In *A. truncatidens*, the head profile is rounded from fontanelle to occiput, the mandible is shorter in proportion to the width at mandible insertions, less incurved, and the marginal tooth is in the basal third; the curvature of the mandible is again less in *A. unidentatus*, and the marginal teeth less prominent. By contrast, *A. mitchelli* has more incurved mandibles with very prominent marginal teeth and the inner margin distal to them straight or slightly sinuate. The third marginal tooth of the *A. messinae* worker left mandible is in line with the cutting edge of first plus second, and the fourth marginal reaches the tip of the molar prominence. The enteric valve enters the third pouch of the proctodeum directly, and the colon forms a single simple coil, features shared by two of the other three sympatric species. In the *A. truncatidens* worker, the left mandible index is lower, the right first marginal tooth has a shorter hind edge than the second (a character shared by *A. unidentatus* and *A. mitchelli*), and the molar plate has less than five ridges. The mesenteric part of the mixed segment is strongly inflated posteriorly and reaches the proctodeal dilation (*A. mitchelli* also), while the Malpighian tubules are attached well beyond the basal third. *A. unidentatus* also has a longer mesenteron and a tubular first section of the proctodeum.



**Material examined:** Soldiers and workers only, MALAWI: localities from Lilongwe northwards 1953 (Sands and Wilkinson) and ZAMBIA: Abercorn, 1948 (Glover), Ndola, 1957 (Coaton), Tunduma, 1953 (Sands and Wilkinson) (holotype and paratype series); imagos, soldiers and workers, Lusaka 1966, Chipepo, 1969, Chipongwe, 1970 (Bingham), ZIMBABWE: 1965 (Bingham), Lupane, 1972 (Mitchell).

**Biology, economic significance:** All of the records are from the mounds of other genera, mainly *Cubitermes* but a few from Macrotermitinae; this apparently entirely commensal habit distinguishes it from *A. truncatidens*. The longer apical teeth compared with most other *Amitermes* species, and the reduced molar ridges, suggest that this species may feed on more decomposed materials than the majority. *A. importunus* is of no economic significance.

***Amitermes loennbergianus* (Sjoestedt 1911)**

(Figures 229-234: Imago, 235-239: Soldier, 240-247: Worker, 248-253: Worker, configuration of intestines)

*Eutermes loennbergianus* Sjoestedt, 1911:1-3. Type series, soldiers and workers, KENYA: N. of Uaso Nyeru (examined) (Sjoestedt coll., Naturhistoriska Riksmuseum, Stockholm).

*Amitermes lacertosus* Ghidini, 1941:30-34. Type series, soldiers and workers, ETHIOPIA: Murle (examined) (Museo Civico di Storia Naturale, Genova, and British Museum (Natural History)).

**Imago:** Head capsule dark sepia brown, genae and postclypeus yellow-brown, labrum pale yellow-brown; antennal flagellum brown, basal segments yellow-brown; fontanelle brown. Pronotum dark sepia brown, mesonotum and metanotum brown; legs, coxae, femora and tarsi yellow, tibiae pale yellow-brown; wing membrane pale brown, main venation sepia brown. Abdominal tergites dark sepia brown, sternites yellow-brown.

Posterior margin of head capsule semi-circular and evenly rounded; fontanelle centred in front of a line joining posterior margins of compound eyes, smaller than ocellus, broad oval, slightly or partly depressed; medial spot in front of fontanelle oval, frons smooth or at most weakly indented in front of fontanelle, posterior margin of postclypeus semi-circular. Anterior margin of pronotum straight. Vertex pilosity dense. Fore coxae without prominent spine-like setae.

Third marginal tooth of left mandible continuous in line with cutting edge of first plus second marginals, fourth marginal tooth of left mandible in front view with proximal end hidden behind molar prominence. First marginal tooth of right mandible with posterior edge longer than that of second, notch at proximal end of right molar plate strongly developed, nearly a right angle, almost as deep as long, right molar plate ridges in front of notch five in number, prominent.

Measurements and indices (12 individuals from four localities): [HW] 1.18 to 1.25 mm <mean, 1.214 S.D., 0.026>; [E] 0.27 to 0.31 mm <mean, 0.291 S.D., 0.010>; [Ow] 0.08 to 0.1 mm <mean, 0.088 S.D., 0.006>; [OI] 0.12 to 0.14 mm <mean, 0.130 S.D., 0.008>; [O-E] 0.08 to 0.11 mm <mean, 0.091 S.D., 0.010>; [LMI] 0.879 to 0.91 <mean, 0.894>; [RMI] 1.044 to 1.336 <mean, 1.190>; [R2I] 3.76 to 4.74 <mean, 4.250>; [PW] 0.873 to 1.02 mm <mean, 0.964 S.D., 0.038>; [PL] 0.567 to 0.648 mm <mean, 0.620 S.D., 0.023>; [T3] 1.287 to 1.36 mm <mean, 1.327 S.D., 0.024>.

**Soldier:** Head capsule, front and sides pale brown, back yellow, mandibles, darkest part sepia brown, antennae, pronotum and legs, yellow.

Head capsule in profile flattened behind fontanelle, rounded, convexly curved from fontanelle to occiput. Mandible length less than 4.2 times shank width behind marginal tooth, outline regularly rounded, apical hook incurved by 1.5-2.5 shank widths; point of marginal tooth midway from base to apex, blunt, rounded, erect from inner curve of blade; shape of inner margin entirely concave distal to marginal tooth. Pronotum with anterior lobe smaller than posterior, fore coxae without prominent spine-like setae on anterior surface.

Measurements and indices (10 individuals from seven localities): **[HL]** 1.43 to 1.75 mm <mean, 1.612 S.D., 0.086>; **[HW]** 1.29 to 1.52 mm <mean, 1.399 S.D., 0.074>; **[Hw]** 0.97 to 1.09 mm <mean, 1.025 S.D., 0.048>; **[HD]** 1.07 to 1.29 mm <mean, 1.168 S.D., 0.074>; **[ML]** 0.76 to 0.86 mm <mean, 0.818 S.D., 0.041>; **[ML:Hw]** 0.78-0.82 <mean, 0.798 S.D., 0.012>; **[PL]** 0.4 to 0.47 mm <mean, 0.432 S.D., 0.022>; **[PW]** 0.78 to 0.88 mm <mean, 0.818 S.D., 0.030>; **[T3]** 1.18 to 1.39 mm <mean, 0.304 S.D., 0.074>.

**Worker (first full description):** Head capsule and antennal flagellum yellow.

Fore coxae conical, without prominent spine-like setae on anterior surface or flange. Left mandible, third marginal tooth continuous in line with cutting edge of first plus second marginals, not protruding, fourth marginal tooth in front view with proximal end hidden behind molar prominence. Right first marginal tooth with posterior edge equal to that of second marginal; notch at proximal end of right molar plate strongly developed, nearly a right angle, almost as deep as long, molar plate ridges five in number, prominent.

Intestine with anterior part of mesenteron shorter than mixed segment, mixed segment starting well to right of heart in dorsal view of unopened abdomen; mesenteric part of mixed segment at its narrowest point less than half width of proctodeal part, not inflated, terminating short of proctodeal dilation; posterior termination of mixed segment in ventral view of unopened abdomen well to right of ventral nerve cord; attachment of Malpighian tubules at mesenteric-proctodeal interface within basal one-third of mixed segment, in dorsal view of unopened abdomen distinctly to right of line of heart; proctodeal first segment dilated to twice its basal width, termination at enteric valve short tubular, length two to four times width, enteric valve entering a short diverticulum from third segment of proctodeum, in dorsal view of unopened abdomen at or very near heart line, behind curve of mesenteron; colon within mesenteric loop in dorsal view of unopened abdomen thrown into one or more loops additional to the main coil, mainly to left of heart.

Measurements and indices (46 individuals from nine localities): **[HW]** 1.133 to 1.44 mm <mean, 1.292 S.D., 0.064> **[LMI]** 0.565 to 1.165 S.D., 0.110>; **[RMI]** 0.737 to 1.294 S.D., 0.115>; **[R2I]** 2.38 to 5.817 <mean, 3.576 S.D., 0.762>; **[R1:2I]** 0.939 to 1.399 <mean, 1.114 S.D., 0.107>; **[Pcl]** 0.239 to 0.334 mm <mean, 0.290 S.D., 0.023>; **[T3]** 0.894 to 1.255 mm <mean, 1.084 S.D., 0.073>; **[T1]** 0.66 to 0.94 mm <mean, 0.828 S.D., 0.073>.

**Comparisons:** Three obviously related species, separable on a number of features from the 'typical' members of the genus, are found in arid and semi-arid parts of eastern Africa. One, *A. socotrensis*, is endemic to its island home and differs from *A. loennbergianus* and *A. gallagheri* in the length of the soldier mandibles. The distinguishing features of *A. gallagheri* have been listed under that species. The imago of *A. socotrensis* is slightly larger, with lower principal mandibular indices and six ridges on the right molar plate; the only other sympatric species similar in size, *A. unidentatus*, has the fontanelle larger than the ocelli and a distinctly protruding left third marginal tooth. In the soldier caste, *A. unidentatus* has much longer, more slender mandibles, with a differently shaped marginal tooth. The worker caste of *A. socotrensis* has the first marginal tooth of the right mandible longer than the second, and the front part of the mesenteron markedly longer than the mixed segment. The latter character also distinguishes *A. unidentatus*, in which the third marginal tooth of the left mandible is distinct from the first plus second, and the first section of the proctodeum is tubular.

**Material examined:** Soldiers and workers only (Type series), KENYA: N. of Uaso Nyeru, 1911 (Loennberg) (Sjoestedt coll., Naturhistoriska Riksmuseum, Stockholm), (Type series of *A. lacertosus*), ETHIOPIA, Murle, 1939 (Ghidini) (Museo Civico di Storia Naturale, Genova and British Museum (Natural History)), imagos, soldiers and workers, many series from ERITREA, ETHIOPIA, UGANDA and SOMALIA southwards to northern TANZANIA, 1950-1988 (various collectors).

**Biology, economic significance:** The species is common as a consumer of dead wood and dung of ungulates and pachyderms in arid and semi-arid zones from Eritrea to northern Tanzania. It has only once been recorded from a low mound, possibly of its own construction, but the nest is probably subterranean or in the mounds of other genera. Although it probably has the potential to become a pest it has not been so recorded, perhaps due to the lack of habitation and agriculture over most of its range.

***Amitermes messinae* Fuller (1922)**

(Figures 254-260: Imago, 261-265: Soldier, 266-273: Worker, 274-280: Worker, configuration of intestines)

*Hamitermes messinae* Fuller, 1922:70-131. Type series, all castes, REPUBLIC OF SOUTH AFRICA: Northern Transvaal, Messina (examined) (National Collection of Isoptera, Pretoria).

*Amitermes harleyi* Harris, 1957:425. Type series, soldiers and workers only, SOUTH YEMEN (examined) (British Museum (Natural History)).

**Imago:** Head capsule dark sepia brown, genae sepia brown, postclypeus brown, labrum yellow. Antennal flagellum sepia brown, basal segments yellow-brown. Fontanelle pale brown. Pronotum dark sepia brown, mesonotum and metanotum sepia brown; legs, coxae yellow-brown, femora pale yellow-brown, tibiae pale brown, tarsi pale yellow-brown; imago wing membrane pale brown, main venation sepia brown. Abdominal tergites dark sepia brown, sternites brown.

Posterior margin of head capsule semi-circular and evenly rounded. Fontanelle centred on or behind a line joining posterior margins of compound eyes, equal in size to ocellus, broad oval, slightly or partly depressed; medial spot in front of fontanelle parallel-sided. Frons with two diverging grooves or smooth in front of fontanelle, posterior margin of postclypeus faceted. Anterior margin of pronotum slightly lobed in middle. Vertex pilosity dense. Fore coxae with one to five prominent spine-like setae in line or group near middle of front surface.

Third marginal tooth of left mandible continuous in line with cutting edge of first plus second marginals, fourth marginal tooth in front view just reaching to tip of molar prominence. First marginal tooth of right mandible with posterior edge longer than that of second; notch at proximal end of right molar plate weakly developed, shallowly obtuse; right molar plate ridges in front of notch five in number, concave.

Measurements and indices (11 individuals from three localities): [**HW**] 0.87 to 1.02 mm <mean, 0.989 S.D., 0.043>; [**E**] 0.22 to 0.26 mm <mean, 0.246 S.D., 0.011>; [**Ow**] 0.06 to 0.07 mm <mean, 0.068 S.D., 0.004>; [**OI**] 0.09 to 0.1 mm <mean, 0.092 S.D., 0.004>; [**O-E**] 0.07 to 0.09 mm <mean, 0.074 S.D., 0.007>; [**LMI**] 0.825 to 1.0 <mean, 0.913>; [**RMI**] 1.07 to 1.191 <mean, 1.131>; [**R2I**] 2.784 to 3.15 <mean, 2.067>; [**PW**] 0.72 to 0.86 mm <mean, 0.802 S.D., 0.043>; [**PL**] 0.47 to 0.57 mm <mean, 0.530 S.D., 0.042>; [**T3**] 0.89 to 1.07 mm <mean, 1.011 S.D., 0.055>; [**Fw**] 8.6 to 10.5 mm <mean, 9.527 S.D., 0.717>.

**Soldier:** Head capsule, front and sides pale brown, back pale yellow, mandibles, darkest part sepia brown. Antennae, pronotum and legs, yellow.

Head capsule in profile with a small bulge behind fontanelle, rounded, convexly curved from fontanelle to occiput. Mandible length more than 4.4 times shank width behind marginal tooth, outline regularly rounded, apical hook incurved by more than 3.6 shank widths; point of marginal tooth midway from base to apex, sharp, in line with entirely concave inner curve of blade distal to marginal tooth. Pronotum with anterior lobe larger than posterior; fore coxae with three or more prominent spine-like setae arranged in line or group on anterior surface.

Measurements and indices (27 individuals from 15 localities): [**HL**] 1.02 to 1.55 mm <mean, 1.293 S.D., 0.157>; [**HW**] 0.78 to 1.18 mm <mean, 0.989 S.D., 0.103>; [**Hw**] 0.64 to 0.89 mm <mean, 0.789 S.D., 0.070>; [**HD**] 0.68 to 1.0 mm <mean, 0.846 S.D., 0.089>; [**ML**] 0.65 to 0.88 mm <mean, 0.800 S.D.,

0.065>; [ML:Hw] 0.907 to 1.147 <mean, 1.017 S.D., 0.06>; [PL] 0.32 to 0.43 mm <mean, 0.391 S.D., 0.035>; [PW] 0.5 to 0.75 mm <mean, 0.636 S.D., 0.061>; [T3] 0.68 to 0.93 mm <mean, 0.833 S.D., 0.065>.

**Worker (first full description):** Head capsule pale yellow, antennal flagellum yellow-white.

Fore coxae flattened, flanged on both sides, with three or more prominent spine-like setae arranged in line or group on anterior flange. Left mandible, third marginal tooth continuous in line with cutting edge of first plus second marginals, not protruding, fourth marginal tooth in front view reaches tip of molar prominence. Right first marginal tooth with posterior edge longer than that of second marginal; notch at proximal end of right molar plate strongly developed, nearly a right angle, almost as deep as long or moderately developed, obtuse angled but depth over half length, molar plate ridges fewer than five or five in number, prominent or concave.

Intestine with anterior part of mesenteron approximately equal in length to mixed segment, mixed segment starting well to right of heart in dorsal view of unopened abdomen; mesenteric part of mixed segment at its narrowest point approximately half width of proctodeal part, not inflated, terminating short of proctodeal dilation; posterior termination of mixed segment in ventral view of unopened abdomen well to right of ventral nerve cord; attachment of Malpighian tubules at mesenteric-proctodeal interface within basal one-third of mixed segment, in dorsal view of unopened abdomen distinctly to right of line of heart; proctodeal first segment dilated to twice its basal width, termination at enteric valve long tubular, length more than four times width; enteric valve entering directly into third segment of proctodeum, in dorsal view of unopened abdomen distinctly to right of heart line, behind curve of mesenteron; colon within mesenteric loop in dorsal view of unopened abdomen forming a single simple coil.

Measurements and indices (30 individuals from nine localities): [HW] 0.824 to 1.04 mm <mean, 0.910 S.D., 0.062>; [LMI] 0.754 to 1.016 <mean, 0.905 S.D., 0.061>; [RMI] 1.01 to 1.403 <mean, 1.183 S.D., 0.100>; [RMI] 3.036 to 5.082 <mean, 3.733 S.D., 0.495>; [R1:2I] 0.955 to 1.535 <mean, 1.201 S.D., 0.141>; [Pcl] 0.19 to 0.283 mm <mean, 0.226 S.D., 0.025>; [T3] 0.593 to 0.937 mm <mean, 0.735 S.D., 0.077>; [T1] 0.458 to 0.707 mm <mean, 0.559 S.D., 0.063>.

**Comparisons:** The distinctive front margin of the imago pronotum separates *A. messinae* from its sympatric congeners. *A. sciangallorum* is also smaller, and shares with *A. somaliensis* and *A. spinifer* the lower left mandible indices; the same character separates *A. corpulentus*. The other genera which have fore coxal spine-like setae in soldier and worker castes all have the marginal teeth erect from the inner curve of the soldier mandible. The workers of *A. sciangallorum* and *A. somaliensis* have the left third marginal tooth recognisably protruding from the cutting edge of the first plus second, and the posterior termination of the mesenteric part of the mixed segment strongly inflated; they, like *A. spinifer*, have the enteric valve in the unopened abdomen hidden in dorsal view beneath the curve of the mesenteron, and an extra loop to the colon within the mesenteric coil. *A. stephensoni* has the left fourth marginal tooth hidden proximally behind the molar prominence, and the enteric valve entering the third proctodeal segment on a short diverticulum rather than directly; the same character serves to separate *A. guineensis*, which also has six ridges on the right molar plate.

**Material examined:** All castes, REPUBLIC OF SOUTH AFRICA: N. Transvaal, Messina, 1916 (Fuller) (Type series), in National Collection of Isoptera, Pretoria; SOUTH YEMEN: Wadi Bana, Abyan, Al Sura, 1951 (Harris) (type series, *A. harleyi*). Other material: Many nest series from SAUDI ARABIA southwards throughout eastern Africa to the Limpopo.

**Biology, economic significance:** Dark brown carton nests commonly incorporate remains of dead stumps etc., or form converted parts of walls of mounds of

other genera, especially those of *Macrotermes*. The range of mandibular indices would suggest a tendency towards more decomposed food materials, but not so far as in *A. importunus*. *A. messinae* appears to have no problems in excavating hard dead *Acacia* stumps in quite arid areas.

***Amitermes mitchelli* sp.n.**

(Figures 281-286: Imago, 287-294: Soldier, 295-301: Worker, 302-309: Worker, configuration of intestines)

*Amitermes mitchelli* sp.n. (This species named in honour of its collector, Mr. B.L.Mitchell, whose contributions to Central African termitology are well-known).

*Amitermes* sp.1. Mitchell, B.L. 1980.

**Imago:** Head capsule including genae and postclypeus brown, labrum yellow-brown; antennal flagellum sepia brown, basal segments yellow-brown; fontanelle pale brown. Pronotum, mesonotum and metanotum brown; legs, coxae, femora and tarsi yellow, tibiae pale yellow-brown. Wing membrane pale brown, main venation sepia brown. Abdominal tergites brown, sternites pale brown.

Posterior margin of head capsule arcuate or sinuate. Fontanelle centred behind a line joining posterior margins of compound eyes, smaller than ocellus, broad oval, slightly or partly depressed; medial spot in front of fontanelle parallel-sided, frons with two diverging grooves, or smooth, or at most weakly indented in front of fontanelle. Posterior margin of postclypeus arcuate. Anterior margin of pronotum straight. Vertex pilosity sparse. Fore coxae without prominent spine-like setae.

Third marginal tooth of left mandible distinctly protrudes from cutting edge of first plus second marginals, fourth marginal tooth of left mandible in front view with proximal end hidden behind molar prominence. First marginal tooth of right mandible with posterior edge equal in length to that of second; notch at proximal end of right molar plate strongly developed, nearly a right angle, almost as deep as long, right molar plate ridges in front of notch five in number, prominent.

Measurements and indices (17 individuals from four localities): [HW] 0.913 to 0.987 mm <mean, 0.964 S.D., 0.02>; [E] 0.242 to 0.265 mm <mean, 0.251 S.D., 0.009>; [Ow] 0.057 to 0.08 mm <mean, 0.074 S.D., 0.006>; [OI] 0.099 to 0.128 mm <mean, 0.110 S.D., 0.010>; [O-E] 0.025 to 0.059 mm <mean, 0.043 S.D., 0.009>; [LMI] 0.651 to 0.686 <mean, 0.669>; [RMI] 1.23 to 1.37 <mean, 1.300>; [R2I] 2.33 to 3.33 <mean, 2,780>; [PW] 0.77 to 0.843 mm <mean, 0.803 S.D., 0.022>; [PL] 0.463 to 0.523 mm <mean, 0.493 S.D., 0.017>; [T3] 0.938 to 1.044 mm <mean, 0.991 S.D., 0.032>; [Fw] 8.7 to 10.118 mm <mean, 9.505 S.D., 0.489>.

**Soldier:** Head capsule, front and sides pale yellow-brown, back pale yellow, mandibles, darkest part brown, antennae yellow, pronotum and legs yellow-white.

Head capsule in profile with a small bulge behind fontanelle, rounded, convexly curved from fontanelle to occiput. Mandible length more than 4.4 times shank width behind marginal tooth, outline regularly rounded, apical hook incurved by more than 3.6 shank widths; point of marginal tooth midway from base to apex, sharp, erect from inner curve of blade; shape of inner margin straight or slightly sinuate distal to marginal tooth. Pronotum with anterior and posterior lobes equal in size. Fore coxae without spine-like setae on anterior surface.

Measurements and indices (15 individuals from five localities): [HL] 1.09 to 1.224 mm <mean, 1.152 S.D., 0.036>; [HW] 0.902 to 0.988 mm <mean, 0.949 S.D., 0.028>; [Hw] 0.699 to 0.844 mm <mean, 0.736 S.D., 0.035>; [HD] 0.777 to 0.858 mm <mean, 0.814 S.D., 0.023>; [ML] 0.792 to 0.884 mm <mean, 0.840 S.D., 0.027>; [ML:Hw] 0.938 to 1.247 <mean, 1.143 S.D., 0.069>; [PL] 0.296 to 0.34 mm <mean, 0.332 S.D., 0.014>; [PW] 0.55 to 0.636 mm <mean, 0.594 S.D., 0.025>; [T3] 0.795 to 0.866 mm <mean, 0.829 S.D., 0.021>.

**Worker:** Head capsule pale yellow, antennal flagellum pale yellow.

Fore coxae conical or flanged anteriorly, without prominent spine-like setae on anterior surface or flange.

Left mandible, third marginal tooth distinctly protrudes from cutting edge of first plus second marginals, fourth marginal tooth in front view with proximal end hidden behind molar prominence. Right first marginal tooth with posterior edge shorter than that of second marginal; notch at proximal end of right molar plate strongly developed, nearly a right angle, almost as deep as long or moderately developed, obtuse angled but depth over half length, molar plate ridges five in number, concave.

Intestine with anterior part of mesenteron shorter than mixed segment, mixed segment starting slightly to left or beneath heart in dorsal view of unopened abdomen; mesenteric part of mixed segment at its narrowest point approximately half width of proctodeal part, strongly inflated at posterior end, length of inflation not more than three times thickness, reaching to proctodeal dilation; posterior termination of mixed segment in ventral view of unopened abdomen to left of or just reaching ventral nerve cord; attachment of Malpighian tubules at mesenteric-proctodeal interface beyond basal one-third of mixed segment, in dorsal view of unopened abdomen out of sight to right of heart, visible in lateral view only; proctodeal first segment dilated to more than twice its basal width, termination at enteric valve short tubular, length two to four times width; enteric valve entering directly into third segment of proctodeum, in dorsal view of unopened abdomen at or very near heart line, behind curve of mesenteron; colon within mesenteric loop in dorsal view of unopened abdomen forming a single simple coil.

Measurements and indices (29 individuals from five localities): **[HW]** 0.822 to 0.964 mm <mean, 0.886 S.D., 0.037>; **[LMI]** 0.667 to 0.916 <mean, 0.777 S.D., 0.063>; **[RMI]** 1.059 to 1.515 <mean, 1.291 S.D., 0.118>; **[R2I]** 2.206 to 3.623 <mean, 3.022 S.D., 0.379>; **[R1:2]** 0.797 to 1.234 <mean, 1.016 S.D., 0.104>; **[Pcl]** 0.21 to 0.265 mm <mean, 0.242 S.D., 0.016>; **[T3]** 0.665 to 0.859 mm <mean, 0.773 S.D., 0.056>; **[T1]** 0.514 to 0.692 mm <mean, 0.608 S.D., 0.053>.

**Comparisons:** The soldier mandible of *A. mitchelli* is totally distinctive among known African species. Comparisons with preceding sympatric species have already been made (see, in particular, *A. braunsi*, *A. hastatus* and *A. importunus*). In the imago, *A. truncatidens* has the posterior edge of the right first marginal tooth shorter than the second, a character that also separates the worker; *A. unidentatus* is larger with a larger fontanelle and its worker, also larger, has the anterior mesenteron longer than the mixed segment, as well as a tubular first proctodeal segment.

**Material examined:** Imagos, soldiers and workers, ZIMBABWE: Chiredzi, Nyazugwi, 1974 (Mitchell) (holotype, female imago, paratypes, type colony, all castes), 24 km NE of Chiredzi, 1970, Wankie Nat.Pk., 1972, 32 km ex Piccadilly Circus to Devuli, Nuanetsi, Bikita, 32 km ex Turgwe R., 1973, Buhera, 1974, Urungwe, Nuanetsi, Gona ne Zhou, 1975 (Mitchell), Gwanda, 1972, Beit Bridge, 16 km ex Beit Bridge, 1973 (Bissett) (Paratypes), holotype and paratypes in National Museum, Bulawayo, paratypes in British Museum (Natural History). Mitchell (1980), who recognised the species as new but did not name it, reports other series deposited in the collection at the Atlantica Ecological Research Station near Harare.

**Biology, economic significance:** Widely distributed in wooded grasslands and savannas, nests have been found in mounds of other genera such as *Cubitermes* and *Macrotermes falciger*, both live and dead, under stones, logs, etc. Alates were collected from nests between late October and the end of January. The species appears to be of no economic significance.

***Amitermes sciangallorum*** Ghidini (1941)

(Figures 310-323: Imago and Soldier, 324-334: Worker, 335-343: Worker, configuration of intestines)

*Amitermes sciangallorum* Ghidini, 1941:30-34. Type series, soldiers and workers, ETHIOPIA: Murle (examined) (Museo Civico di Storia Naturale, Genova).

**Imago (first description):** Head capsule including genae, sepia brown, postclypeus yellow-brown, labrum yellow. Antennal flagellum yellow-brown, basal segments and fontanelle pale yellow-brown. Pronotum sepia brown, mesonotum and metanotum brown; legs, entirely yellow-brown; wing membrane pale brown, main venation brown. Abdominal tergites brown, sternites yellow-brown.

Posterior margin of head capsule semi-circular and evenly rounded. Fontanelle centred behind a line joining posterior margins of compound eyes, smaller than ocellus, broad oval, slightly or partly depressed; medial spot in front of fontanelle parallel-sided. Frons smooth or at most weakly indented in front of fontanelle, posterior margin of postclypeus semi-circular. Anterior margin of pronotum straight. Vertex pilosity sparse. Fore coxae with one to five prominent spine-like setae in line or group near middle of front surface.

Third marginal tooth of left mandible protrudes slightly from cutting edge of first plus second marginals, fourth marginal tooth in front view just reaching to tip of molar prominence. First marginal tooth of right mandible with posterior edge longer than that of second; notch at proximal end of right molar plate strongly developed, nearly a right angle, almost as deep as long, right molar plate ridges in front of notch four in number, concave.

Measurements and indices (eight individuals from one locality): **[HW]** 0.725 to 0.75 mm <mean, 0.738 S.D., 0.012>; **[E]** 0.213 to 0.225 mm <mean, 0.216 S.D., 0.006>; **[Ow]** 0.05 to 0.053 mm <mean, 0.051 S.D., 0.001>; **[OI]** 0.075 to 0.088 mm <mean, 0.081 S.D., 0.006>; **[O-E]** 0.038 to 0.06 mm <mean, 0.045 S.D., 0.009>; **[LMI]** 0.586 to 0.77 <mean, 0.678>; **[RMI]** 0.74 to 1.032 <mean, 0.886>; **[R2I]** 2.034 to 3.658 <mean, 2.846>; **[PW]** 0.575 to 0.6 mm <mean, 0.583 S.D., 0.012>; **[PL]** 0.375 to 0.388 mm <mean, 0.384 S.D., 0.006>; **[T3]** 0.563 to 0.7 mm <mean, 0.680 S.D., 0.013> **[Fw]** 6.9 to 7.5 mm <mean, 7.225 S.D., 0.183>.

**Soldier:** Head capsule, front and sides pale brown or brown, back pale yellow-brown, mandibles, darkest part sepia brown. Antennae pale yellow-brown. Pronotum yellow and legs yellow.

Head capsule in profile with a small bulge behind fontanelle, rounded, convexly curved from fontanelle to occiput. Mandible length more than 4.4 times shank width behind marginal tooth, outline regularly rounded, apical hook incurved by 2.6-3.5 shank widths; point of marginal tooth within basal half, blunt, rounded, erect from inner curve of blade; shape of inner margin straight or slightly sinuate distal to marginal tooth. Pronotum with anterior lobe larger than posterior; fore coxae with three or more prominent spine-like setae arranged in line or group on anterior surface.

Measurements and indices (35 individuals from 23 localities): **[HL]** 0.909 to 1.04 mm <mean, 1.011 S.D., 0.045>; **[HW]** 0.774 to 0.88 mm <mean, 0.835 S.D., 0.025>; **[Hw]** 0.615 to 0.72 mm <mean, 0.658 S.D., 0.028>; **[HD]** 0.625 to 0.737 mm <mean, 0.694 S.D., 0.030>; **[ML]** 0.654 to 0.78 mm <mean, 0.701 S.D., 0.035>; **[ML:Hw]** 1.004 to 1.118 <mean, 1.066 S.D., 0.028>; **[PL]** 0.284 to 0.36 mm <mean, 0.318 S.D., 0.028>; **[PW]** 0.461 to 0.54 mm <mean, 0.521 S.D., 0.017>; **[T3]** 0.652 to 0.753 mm <mean, 0.707 S.D., 0.027>.

**Worker (first full description):** Head capsule and antennal flagellum yellow-white.

Fore coxae flattened, flanged on both sides, with three or more prominent spine-like setae arranged in line or group on anterior flange. Left mandible, third

marginal tooth distinctly protrudes from cutting edge of first plus second marginals, fourth marginal tooth in front view reaches tip of molar prominence. Right first marginal tooth with posterior edge longer than that of second marginal; notch at proximal end of right molar plate strongly developed, nearly a right angle, almost as deep as long, molar plate ridges fewer than five, prominent.

Intestine with anterior part of mesenteron shorter than mixed segment, mixed segment starting well to left of heart in dorsal view of unopened abdomen; mesenteric part of mixed segment at its narrowest point less than half width of proctodeal part, strongly inflated at posterior end, length of inflation not more than three times thickness, terminating short of proctodeal dilation; posterior termination of mixed segment in ventral view of unopened abdomen to left of or just reaching ventral nerve cord; attachment of Malpighian tubules at mesenteric-proctodeal interface within basal one-third of mixed segment, in dorsal view of unopened abdomen at or near line of heart; proctodeal first segment dilated to more than twice its basal width, termination at enteric valve long tubular, length more than four times width; enteric valve entering directly into third segment of proctodeum, in dorsal view of unopened abdomen distinctly to right of heart line, hidden beneath curve of mesenteron; colon within mesenteric loop in dorsal view of unopened abdomen thrown into one or more loops additional to the main coil, mainly to left of heart.

Measurements and indices (29 individuals from nine localities): [HW] 0.764 to 0.974 mm <mean, 0.877 S.D., 0.060>; [LMI] 0.557 to 0.961 <mean, 0.784 S.D., 0.104>; [RMI] 0.879 to 1.494 <mean, 1.125 S.D., 0.150>; [R2I] 2.407 to 5.176 <mean, 3.480 S.D., 0.680>; [R1:2I] 1.008 to 1.379 <mean, 1.198 S.D., 0.097>; [Pcl] 0.2 to 0.251 mm <mean, 0.232 S.D., 0.013>; [T3] 0.587 to 0.702 mm <mean, 0.642 S.D., 0.029>; [T1] 0.451 to 0.543 mm <mean, 0.496 S.D., 0.022>.

**Comparisons:** *A. sciangallorum* belongs to the group of small species that includes *A. acinacifer*, *A. somaliensis* and *A. spinifer*. The imagos of *A. somaliensis* and *A. spinifer* are generally larger, the latter with diverging grooves on the frons in front of the fontanelle. The only other possibly sympatric species, lacking, however, fore coxal spine-like setae in the imago, is *A. guineensis*; it is also larger, with the posterior margin of the head arcuate and six molar ridges on the right mandible. In the soldier caste, *A. sciangallorum* is distinguishable from *A. somaliensis* and *A. spinifer* by the less curved and longer mandible, and from *A. acinacifer*, by the less sinuate inner margin distal to the marginal tooth; *A. guineensis* is larger although otherwise somewhat similar in general appearance, but the vertex in profile bulges immediately above the fontanelle and is then flattened, not uniformly convex. The workers of *A. somaliensis* are virtually indistinguishable from *A. sciangallorum*, merely having a slightly less pronounced left third marginal tooth, although classification coefficients derived from canonical variates analysis correctly identified 100% of the latter and 89% of the former, the points for the species being fairly well separated in scatter plots of both cv's and principal components. *A. spinifer* has the left third marginal tooth in line with the cutting edge of the first plus second, and the proximal end of the fourth marginal clear of the molar prominence. *A. guineensis* (and *A. stephensoni*) workers are most clearly distinguished by gut characters such as the shorter mixed segment of the intestine, starting well to the right of the heart-line, with the posterior termination of the mesenteron scarcely inflated and the enteric valve entering the third segment of the proctodeum on a small diverticulum. Comparisons with *A. messinae* have already been made.

**Material examined:** soldiers and workers only (type series), ETHIOPIA: Murle, 1939 (Ghidini), Museo Civico di Storia Naturale, Genova; imagos, soldiers and workers from many localities from ETHIOPIA to NORTHERN TANZANIA.

**Biology, economic significance:** Commonly associated with plant remains of all kinds from dead logs to roots of growing maize and crop stubble, the species may have minor pest status, although it seems more probable that it is a scavenger. The only nest chambers found have been in mounds of other genera.



***Amitermes socotrensis* Harris (1954)**

(Figures 344-349: Imago, 350-354: Soldier, 355-359: Worker, 360-367: Worker, configuration of intestines)

*Amitermes socotrensis* Harris, 1954:494. Type series, soldiers and workers, SOUTH YEMEN: Socotra, Homil, Khor Garieh (examined) (British Museum (Natural History)).

**Imago (first description):** Head capsule dark sepia brown, genae pale brown, postclypeus yellow-brown, labrum yellow. Antennal flagellum brown, basal segments pale yellow-brown. Fontanelle pale yellow-brown. Pronotum dark sepia brown, mesonotum and metanotum sepia brown; legs, coxae and femora yellow, tibiae and tarsi yellow-brown; wing membrane brown, main venation sepia brown. Abdominal tergites dark sepia brown, sternites brown.

Posterior margin of head capsule semi-circular and evenly rounded. Fontanelle centred on a line joining posterior margins of compound eyes, smaller than ocellus, circular, flat; medial spot in front of fontanelle circular. Frons smooth or at most weakly indented in front of fontanelle, posterior margin of postclypeus semi-circular. Anterior margin of pronotum straight. Vertex pilosity sparse. Fore coxae without prominent spine-like setae.

Third marginal tooth of left mandible continuous in line with cutting edge of first plus second marginals, fourth marginal tooth of left mandible in front view with proximal end hidden behind molar prominence. First marginal tooth of right mandible with posterior edge longer than that of second; notch at proximal end of right molar plate strongly developed, nearly a right angle, almost as deep as long, right molar plate ridges in front of notch six in number, prominent.

Measurements and indices (eight individuals from one locality): [HW] 1.224 to 1.275 mm <mean, 1.252 S.D., 0.014>; [E] 0.296 to 0.313 mm <mean, 0.301 S.D., 0.005>; [Ow] 0.079 to 0.092 mm <mean, 0.086 S.D., 0.004>; [OI] 0.119 to 0.144 mm <mean, 0.129 S.D., 0.009>; [O-E] 0.075 to 0.094 mm <mean, 0.081 S.D., 0.008>; [LMI] 0.508 to 0.692 <mean, 0.600>; [RMI] 0.653 to 0.945 <mean, 0.799>; [R2I] 2.188 to 3.812 <mean, 3.000>; [PW] 1.071 to 1.148 mm <mean, 1.106 S.D., 0.027>; [PL] 0.663 to 0.714 mm <mean, 0.684 S.D., 0.021>; [T3] 1.2 to 1.25 mm <mean, 1.224 S.D., 0.019>; [Fw] 9.8 to 10.6 mm <mean, 10.138 S.D., 0.302>.

**Soldier:** Head capsule, entirely yellow-brown, mandibles, darkest part sepia brown. Antennae, pronotum and legs yellow.

Head capsule in profile flattened behind fontanelle, rounded, convexly curved from fontanelle to occiput. Mandible length more than 4.4 times shank width behind marginal tooth, outline angularly rounded, apical hook incurved by 2.6-3.5 shank widths; point of marginal tooth within basal half, blunt, rounded or truncated, erect from inner curve of blade; shape of inner margin straight or slightly sinuate distal to marginal tooth. Pronotum with anterior lobe smaller than posterior or lobes equal in size; fore coxae without prominent spine-like setae on anterior surface.

Measurements and indices (17 individuals from four localities): [HL] 1.387 to 1.48 mm <mean, 1.249 S.D., 0.031>; [HW] 0.853 to 0.921 mm <mean, 0.890 S.D., 0.019>; [HD] 0.917 to 1.011 mm <mean, 0.967 S.D., 0.025>; [ML] 1.005 to 1.111 mm <mean, 1.066 S.D., 0.028>; [ML:Hw] 1.144 to 1.267 <mean, 1.198 S.D., 0.033>; [PL] 0.342 to 0.443 mm <mean, 0.387 S.D., 0.021>; [PW] 0.702 to 0.79 mm <mean, 0.738 S.D., 0.023>; [T3] 1.275 to 1.435 mm <mean, 1.333 S.D., 0.041>.

**Worker (first full description):** Head capsule and antennal flagellum yellow.

Fore coxae conical, without prominent spine-like setae on anterior surface or flange. Left mandible, third marginal tooth continuous in line with cutting edge of first plus second marginals, not protruding, fourth marginal tooth in front view with proximal end hidden behind molar prominence. Right first marginal tooth with posterior edge longer than that of second marginal; notch at proximal end of

right molar plate strongly developed, nearly a right angle, almost as deep as long, molar plate ridges five or six in number, prominent.

Intestine with anterior part of mesenteron longer than mixed segment, mixed segment starting well to right of heart in dorsal view of unopened abdomen; mesenteric part of mixed segment at its narrowest point approximately half width of proctodeal part, not inflated, terminating short of proctodeal dilation; posterior termination of mixed segment in ventral view of unopened abdomen well to right of ventral nerve cord; attachment of Malpighian tubules at mesenteric-proctodeal interface within basal one-third of mixed segment, in dorsal view of unopened abdomen distinctly to right of line of heart; proctodeal first segment dilated to twice its basal width, termination at enteric valve short tubular, length two to four times width; enteric valve entering a short diverticulum from third segment of proctodeum, in dorsal view of unopened abdomen distinctly to right of heart line, behind curve of mesenteron; colon within mesenteric loop in dorsal view of unopened abdomen forming a single simple coil.

Measurements and indices (21 individuals from four localities): [**HW**] 1.136 to 1.305 mm <mean, 1.228 S.D., 0.055>; [**LMI**] 0.583 to 0.755 <mean, 0.652 S.D., 0.042>; [**RMI**] 0.731 to 0.977 <mean, 0.836 S.D., 0.058>; [**R2I**] 2.33 to 4.364 <mean, 3.119 S.D., 0.478>; [**R1:2I**] 1.068 to 1.415 <mean, 1.253 S.D., 0.111>; [**Pcl**] 0.266 to 0.354 mm <mean, 0.310 S.D., 0.027>; [**T3**] 0.953 to 1.166 mm <mean, 1.082 S.D., 0.076>; [**T1**] 0.727 to 0.958 mm <mean, 0.844 S.D., 0.067>.

**Comparisons:** The species is readily distinguished from close relatives *A. gallagheri* and *A. loennbergianus* in the soldier caste by the longer mandibles. For comparisons of other castes see the paragraphs under those species.

**Material examined:** Imagos, soldiers and workers, SOUTH YEMEN: Socotra, Homil, Khor Garieh 1953 (Popov) (type series, soldiers and workers only), Hammadera (alates, soldiers, workers), Suk (queen, soldiers, workers) 1967 (Guichard).

**Biology, economic significance:** A small 'clay' mound, either free-standing or surrounding woody remains, was described by one of the original collectors on the label. The species is not recorded as being of any economic significance.

***Amitermes somaliensis* Sjoestedt (1927)**

(Figures 368-374: Imago, 375-379: Soldier, 380-389: Worker, 390-397: Worker, configuration of intestines)

*Amitermes somaliensis* Sjoestedt, 1927: 97-104. Type series, soldiers and workers only, SOMALIA: Villagio Duca Abruzzi (examined) (Naturhistoriska Riksmuseum, Stockholm).

**Imago:** Head capsule including genae, sepia brown, postclypeus yellow-brown, labrum pale yellow. Antennae and fontanelle pale yellow-brown. Pronotum sepia brown, mesonotum and metanotum pale yellow-brown. Legs, entirely pale yellow-brown. Wing membrane pale brown, main venation brown. Abdominal tergites brown, sternites pale yellow-brown.

Posterior margin of head capsule semi-circular and evenly rounded. Fontanelle centred behind a line joining posterior margins of compound eyes, smaller than ocellus, broad oval, slightly or partly depressed; medial spot in front of fontanelle parallel-sided. Frons smooth or at most weakly indented in front of fontanelle, posterior margin of postclypeus semi-circular. Anterior margin of pronotum straight. Vertex pilosity dense. Fore coxae with one to five prominent spine-like setae in line or group near middle of front surface.

Third marginal tooth of left mandible distinctly protrudes from cutting edge of first plus second marginals, fourth marginal tooth of left mandible in front view just reaching to tip of molar prominence. First marginal tooth of right mandible with posterior edge longer than that of second; notch at proximal end of right molar plate strongly developed, nearly a right angle, almost as deep as long, right molar plate ridges in front of notch five in number, concave.

Measurements and indices (10 individuals from three localities): [HW] 0.86 to 0.93 mm <mean, 0.890 S.D., 0.026>; [E] 0.21 to 0.23 mm <mean, 0.224 S.D., 0.007>; [Ow] 0.07 to 0.08 mm <mean, 0.072 S.D., 0.004>; [OI] 0.08 to 0.1 mm <mean, 0.092 S.D., 0.008>; [O-E] 0.04 to 0.08 mm <mean, 0.052 S.D., 0.014>; [LMI] 0.598 to 0.782 <mean, 0.690>; [RMI] 0.994 to 1.286 <mean, 1.140>; [R2I] 2.458 to 4.082 <mean, 3.270>; [PW] 0.68 to 0.75 mm <mean, 0.732 S.D., 0.026>; [PL] 0.43 to 0.5 mm <mean, 0.457 S.D., 0.025>; [T3] 0.82 to 0.89 mm <mean, 0.846 S.D., 0.023>; [Fw] 8.2 to 8.9 mm <mean, 8.56 S.D., 0.222>.

**Soldier:** Head capsule, front and sides brown, back yellow-brown. Mandibles, darkest part sepia brown. Antennae pale yellow-brown. Pronotum and legs yellow.

Head capsule in profile flattened behind fontanelle, rounded, convexly curved from fontanelle to occiput. Mandible length less than 4.2 times shank width behind marginal tooth, outline regularly rounded, apical hook incurved by 1.5-2.5 shank widths; point of marginal tooth within apical half, blunt, rounded, erect from inner curve of blade; shape of inner margin entirely concave distal to marginal tooth. Pronotum with anterior lobe larger than posterior. Fore coxae with three or more prominent spine-like setae arranged in line or group on anterior surface.

Measurements and indices (five individuals from five localities): [HL] 1.11 to 1.18 mm <mean, 1.158 S.D., 0.032>; [HW] 0.78 to 0.86 mm <mean, 0.824 S.D., 0.030>; [Hw] 0.66 to 0.72 mm <mean, 0.696 S.D., 0.022>; [HD] 0.68 to 0.72 mm <mean, 0.712 S.D., 0.018>; [ML] 0.57 to 0.62 mm <mean, 0.580 S.D., 0.022>; [ML:Hw] 0.792 to 0.886 <mean, 0.843 S.D., 0.039>; [PL] 0.31 to 0.32 mm <mean, 0.318 S.D., 0.005>; [PW] 0.52 to 0.54 mm <mean, 0.532 S.D., 0.011>; [T3] 0.68 to 0.7 mm <mean, 0.684 S.D., 0.009>.

**Worker (first full description):** Head capsule pale yellow, antennal flagellum yellow.

Fore coxae flattened, flanged on both sides, with three or more prominent spine-like setae arranged in line or group on anterior flange. Left mandible, third marginal tooth protrudes slightly from cutting edge of first plus second marginals, fourth marginal tooth in front view reaches tip of molar prominence. Right first marginal tooth with posterior edge longer than that of second marginal; notch at proximal end of right molar plate strongly developed, nearly a right angle, almost as deep as long, molar plate ridges fewer than five, prominent.

Intestine with anterior part of mesenteron shorter than mixed segment, mixed segment starting well to left of heart in dorsal view of unopened abdomen; mesenteric part of mixed segment at its narrowest point less than half width of proctodeal part, strongly inflated at posterior end, length of inflation not more than three times thickness, terminating short of proctodeal dilation; posterior termination of mixed segment in ventral view of unopened abdomen to left of or just reaching ventral nerve cord; attachment of Malpighian tubules at mesenteric-proctodeal interface within basal one-third of mixed segment, in dorsal view of unopened abdomen at or near line of heart; proctodeal first segment dilated to more than twice its basal width, termination at enteric valve long tubular, length more than four times width; enteric valve entering directly into third segment of proctodeum, in dorsal view of unopened abdomen distinctly to right of heart line, hidden beneath curve of mesenteron; colon within mesenteric loop in dorsal view of unopened abdomen thrown into one or more loops additional to the main coil, mainly to left of heart.

Measurements and indices (18 individuals from three localities): [HW] 0.763 to 0.909 mm <mean, 0.852 S.D., 0.048>; [LMI] 0.523 to 0.874 <mean, 0.729 S.D., 0.106>; [RMI] 0.734 to 1.296 <mean, 0.991 S.D., 0.132>; [R2I] 2.666 to 4.636 <mean, 3.675 S.D., 0.541> [R1:2] 1.22 to 1.843 <mean, 1.442 S.D., 0.159>; [Pcl] 0.201 to 0.242 mm <mean, 0.220 S.D., 0.048>; [T3] 0.538 to 0.65 mm <mean, 0.587 S.D., 0.034>; [T1] 0.417 to 0.513 mm <mean, 0.469 S.D., 0.030>.

**Comparisons:** Another member of the group of smaller species, *A. somaliensis* is distinguishable from them and all others in the region in the soldier caste by the short, stout mandibles resembling a miniature *A. loennbergianus*. The imagos of *A. spinifer* have diverging grooves in front of the fontanelle and less prominent left third marginal teeth, as well as less ample wings; *A. guineensis* is generally larger, lacks fore coxal spine-like setae in the imago, and has higher principal mandibular indices, as well as six ridges on the right molar plate. The workers of *A. spinifer* are difficult to separate from *A. somaliensis*, the third marginal tooth of the left mandible being continuous in line with the first and second, while the fourth marginal is clear of the molar prominence at its proximal end; *A. stephensoni* and *A. guineensis* have five or more ridges on the right molar plate and, among other gut characters, the anterior mesenteron longer than the mixed segment, its posterior termination scarcely or not inflated. Comparisons with other relevant species have already been made.

**Material examined:** Imagos, soldiers and workers, SOMALIA: Villagio Duca Abruzzi, 1926 (Paoli) (type series), Naturhistoriska Riksmuseum, Stockholm; 1978 (Nicholson), ETHIOPIA: N. of Meki Kebele, 1987 (Wood and Cowie), KENYA: Marsabit 1953 (Sands), Amboseli, 1971 (Dewhurst), MALAWI, 12 miles W. of Mpatamanga, 1953 (Sands and Wilkinson), in British Museum (Natural History).

**Biology, economic significance:** The nest system has been found within the mounds of *Macrotermes* spp. A few records of crop damage suggest a minor pest status, but the species is not sufficiently abundant in any habitat for this to be serious.

*Amitermes spinifer* Silvestri (1914)

(Figures 398-403: Imago, 404-410: Soldier, 411-420: Worker, 421-429: Worker, configuration of intestines)

*Hamitermes spinifer* Silvestri, 1914: 75-77. Type series, soldiers and workers only, SENEGAL: Dakar, Hann; Thies (examined) (Silvestri coll., Istituto di Entomologia Agraria, Portici, Napoli).

**Imago:** Head capsule dark sepia brown, genae sepia brown, postclypeus yellow-brown, labrum yellow. Antennal flagellum brown, basal segments yellow-brown. Fontanelle brown. Pronotum dark sepia brown, mesonotum and metanotum yellow-brown. Legs, coxae femora and tarsi, yellow, tibiae pale yellow-brown. Wing membrane brown, main venation sepia brown. Abdominal tergites and sternites sepia brown.

Posterior margin of head capsule semi-circular and evenly rounded. Fontanelle centred behind a line joining posterior margins of compound eyes, smaller than ocellus, broad oval, slightly or partly depressed; medial spot in front of fontanelle parallel-sided. Frons with two diverging grooves in front of fontanelle, posterior margin of postclypeus arcuate. Anterior margin of pronotum straight. Vertex pilosity dense. Fore coxae with one to five prominent spine-like setae in line or group near middle of front surface.

Third marginal tooth of left mandible protrudes slightly from cutting edge of first plus second marginals, fourth marginal tooth of left mandible in front view just reaching to tip of molar prominence. First marginal tooth of right mandible with posterior edge longer than that of second; notch at proximal end of right molar plate strongly developed, nearly a right angle, almost as deep as long, right molar plate ridges in front of notch five in number, concave.

Measurements and indices (eight individuals from one locality): [HW] 0.89 to 0.91 mm <mean, 0.895 S.D., 0.009>; [E] 0.22 to 0.23 mm <mean, 0.225 S.D., 0.005>; [Ow] 0.07 to 0.09 mm <mean, 0.077 S.D., 0.007>; [OI] 0.1 to 0.13 mm <mean, 0.114 S.D., 0.011>; [O-E] 0.02 to 0.04 mm <mean, 0.034 S.D., 0.007>; [LMI] 0.591 to 0.775 <mean, 0.683>; [RMI] 0.874 to 1.166 <mean, 1.020>; [R2I] 3.138 to 4.762 <mean, 3.750>; [PW] 0.68 to 0.77 mm <mean, 0.725 S.D., 0.029>; [PL] 0.43 to 0.47 mm <mean, 0.440 S.D., 0.015>; [T3] 0.82 to 0.93 mm <mean, 0.885 S.D., 0.033>; [Fw] 7.7 to 8.1 mm <mean, 7.988 S.D., 0.146>.

**Soldier:** Head capsule, front and sides brown, back yellow-brown, mandibles, darkest part brown, antennae pale yellow-brown. Pronotum and legs yellow.

Head capsule in profile with a small bulge behind fontanelle, rounded, convexly curved from fontanelle to occiput. Mandible length more than 4.4 times shank width behind marginal tooth, outline regularly rounded, apical hook incurved by 2.6-3.5 shank widths; point of marginal tooth midway from base to apex, sharp to truncated, erect from or, rarely, in line with, inner curve of blade; shape of inner margin entirely concave distal to marginal tooth. Pronotum with anterior lobe larger than posterior; fore coxae with three or more prominent spine-like setae arranged in line or group on anterior surface.

Measurements and indices (23 individuals from 11 localities): [**HL**] 0.89 to 1.18 mm <mean, 1.034 S.D., 0.066>; [**HW**] 0.74 to 0.91 mm <mean, 0.828 S.D., 0.045>; [**Hw**] 0.58 to 0.68 mm <mean, 0.639 S.D., 0.028>; [**HD**] 0.61 to 0.72 mm <mean, 0.648 S.D., 0.037>; [**ML**] 0.61 to 0.72 mm <mean, 0.654 S.D., 0.030>; [**ML:Hw**] 0.968 to 1.115 <mean, 1.023 S.D., 0.043>; [**PL**] 0.25 to 0.32 mm <mean, 0.296 S.D., 0.016>; [**PW**] 0.47 to 0.54 mm <mean, 0.498 S.D., 0.018>; [**T3**] 0.68 to 0.75 mm <mean, 0.710 S.D., 0.023>.

**Worker:** Head capsule and antennal flagellum pale yellow.

Fore coxae flattened, flanged on both sides, with three or more prominent spine-like setae arranged in line or group on anterior flange. Left mandible, third marginal tooth continuous in line with cutting edge of first plus second marginals, not protruding, fourth marginal tooth in front view with proximal end clear of molar prominence. Right first marginal tooth with posterior edge longer than that of second marginal; notch at proximal end of right molar plate strongly developed, nearly a right angle, almost as deep as long or moderately developed, obtuse-angled but depth over half length, molar plate ridges fewer than five, concave.

Intestine with anterior part of mesenteron shorter than mixed segment, mixed segment starting slightly to left or beneath heart in dorsal view of unopened abdomen; mesenteric part of mixed segment at its narrowest point less than half width of proctodeal part, slightly inflated at posterior end, length of inflation more than three times thickness, terminating short of proctodeal dilation; posterior termination of mixed segment in ventral view of unopened abdomen to left of or just reaching ventral nerve cord; attachment of Malpighian tubules at mesenteric-proctodeal interface within basal one-third of mixed segment; in dorsal view of unopened abdomen at or distinctly to right of line of heart; proctodeal first segment dilated to twice its basal width, termination at enteric valve long tubular, length more than four times width; enteric valve entering directly into third segment of proctodeum, in dorsal view of unopened abdomen distinctly to right of heart line, hidden beneath curve of mesenteron; colon within mesenteric loop in dorsal view of unopened abdomen thrown into one or more loops additional to the main coil, mainly to left of heart.

Measurements and indices (47 individuals from six localities): [**HW**] 0.746 to 0.91 mm <mean, 0.841 S.D., 0.037>; [**LMI**] 0.623 to 1.136 <mean, 0.863 S.D., 0.122>; [**RMI**] 0.76 to 1.178 <mean, 1.000 S.D., 0.088>; [**R2I**] 2.288 to 5.103 <mean, 3.579 S.D., 0.664>; [**R1:2I**] 1.08 to 1.84 <mean, 1.390 S.D., 0.146>; [**Pcl**] 0.174 to 0.229 mm <mean, 0.209 S.D., 0.014>; [**T3**] 0.527 to 0.701 mm <mean, 0.624 S.D., 0.042>; [**T1**] 0.413 to 0.534 mm <mean, 0.482 S.D., 0.033>.

**Comparisons:** The last and most widely distributed of the smaller species in the group that includes *A. acinacifer*, *A. sciangallorum* and *A. somaliensis*, *A. spinifer* has already been compared with these and most other relevant species. In the imago, *A. guineensis* is larger with higher principal mandibular indices and lacks fore coxal spine-like setae. The soldiers of *A. stephensoni* are considerably larger with the head capsule in profile sinuate or flat on top, while the mandibles are less incurved with a differently shaped interior border distal to the marginal tooth; *A. guineensis* soldiers are similar to those of *A. stephensoni*

but smaller and therefore less distinct, the head capsule being wider than in *A. spinifer*. The workers of *A. stephensoni* and *A. guineensis* have five or more ridges on the right molar plate, the anterior mesenteron is longer than the mixed segment, and the enteric valve enters the proctodeal third segment on a small diverticulum which is visible behind the curve of the mesenteron in the dorsal view of the unopened abdomen.

**Material examined:** Imagos, soldiers and workers, SENEGAL: Dakar, Hann, Thies, (type series, soldiers and workers only), 1912 (Silvestri); numerous other records from SIERRA LEONE to northern TANZANIA.

**Biology, economic significance:** Collected from the mounds of other genera, mainly *Cubitermes* and *Macrotermes*, but occasionally from beneath or within dead wood, *A. spinifer* appears to be associated with savanna-woodland. It has not been recorded as having any economic significance.

*Amitermes stephensoni* Harris (1957)  
(Figures 430-433: Soldier, 434-440: Worker,  
441-446: Worker, configuration of intestine)

*Amitermes stephensoni* Harris, 1957:421-33. Type series, soldiers and workers only, SOUTH YEMEN: Wadi Hadhramaut, Saiun (examined) (British Museum (Natural History)).

**Imago:** Unknown; the description in Sands (1959), attributed in error to this species, actually belongs to a new species, *A. guineensis*, that incorporates all previous West African records of *A. stephensoni*.

**Soldier:** Head capsule, front and sides pale brown, back pale yellow, mandibles, darkest part brown, antennae yellow. Pronotum and legs pale yellow.

Head capsule in profile with a small bulge behind fontanelle, flattened or sinuate from behind fontanelle to occiput. Mandible length more than 4.4 times shank width behind marginal tooth, outline regularly rounded, apical hook incurved by 2.6 to more than 3.6 shank widths, point of marginal tooth midway from base to apex, blunt, rounded, erect from inner curve of blade; shape of inner margin straight or slightly sinuate distal to marginal tooth. Pronotum with anterior and posterior lobes equal in size; fore coxae with three or more prominent spine-like setae arranged in line or group on anterior surface.

Measurements and indices (11 individuals from two localities): [HL] 1.337 to 1.467 mm <mean, 1.418 S.D., 0.041>; [HW] 1.049 to 1.157 mm <mean, 1.113 S.D., 0.031>; [Hw] 0.747 to 0.841 mm <mean, 0.781 S.D., 0.027>; [HD] 0.838 to 0.933 mm <mean, 0.903 S.D., 0.029>; [ML] 0.794 to 0.868 mm <mean, 0.832 S.D., 0.027>; [ML:Hw] 1.022 to 1.109 <mean, 1.066 S.D., 0.026>; [PL] 0.37 to 0.417 mm <mean, 0.393 S.D., 0.016>; [PW] 0.661 to 0.726 mm <mean, 0.690 S.D., 0.019>; [T3] 1.085 to 1.221 mm <mean, 1.132 S.D., 0.039>.

**Worker (first full description):** Head capsule pale yellow, antennal flagellum yellow.

Fore coxae flattened, flanged on both sides, with three or more prominent spine-like setae arranged in line or group on anterior flange. Left mandible, third marginal tooth continuous in line with cutting edge of first plus second marginals, not protruding, fourth marginal tooth in front view with proximal end hidden behind molar prominence. Right first marginal tooth with posterior edge equal to that of second marginal; notch at proximal end of right molar plate strongly developed, nearly a right angle, almost as deep as long, molar plate ridges five in number, prominent or concave.

Intestine with anterior part of mesenteron longer than mixed segment, mixed segment starting well to right of heart in dorsal view of unopened abdomen; mesenteric part of mixed segment at its narrowest point approximately half width of proctodeal part, not inflated, terminating short of proctodeal dilation; posterior termination of mixed segment in ventral view of unopened abdomen well to right of ventral nerve cord; attachment of Malpighian tubules at mesenteric-proctodeal interface within basal one-third of mixed segment, in dorsal view of

unopened abdomen distinctly to right of line of heart; proctodeal first segment dilated to twice or more its basal width, termination at enteric valve short tubular, length two to four times width; enteric valve entering a short diverticulum from third segment of proctodeum, in dorsal view of unopened abdomen distinctly to right of heart line, behind curve of mesenteron; colon within mesenteric loop in dorsal view of unopened abdomen forming a single simple coil.

Measurements and indices (16 individuals from two localities): [**HW**] 0.988 to 1.13 mm <mean, 1.065 S.D., 0.034>; [**LMI**] 0.801 to 1.121 <mean, 0.949 S.D., 0.090>; [**RMI**] 1.081 to 1.493 <mean, 1.223 S.D., 0.104>; [**R2I**] 2.632 to 5.832 <mean, 4.061 S.D., 0.877>; [**R1:2I**] 0.9 to 1.282 <mean, 1.051 S.D., 0.105>; [**Pcl**] 0.249 to 0.313 mm <mean, 0.282 S.D., 0.017>; [**T3**] 0.814 to 1.061 mm <mean, 0.927 S.D., 0.090>; [**T1**] 0.58 to 0.742 mm <mean, 0.661 S.D., 0.064>.

**Comparisons:** The type series had few workers in poor condition, and at that time of my earlier revision of the genus (1959), the significance of the characters of the worker caste was not fully recognised; additional material from elsewhere in the Arabian Peninsula has enabled them to be worked out. The molar areas of the worker mandibles of *A. stephensoni* are much more heavily developed, with fewer, coarser ridges than in *A. guineensis*, the new species created to correct the misidentification of the West African material. Having recognised the existence of the two species, it is easy to see why, in the soldier caste, they were confused previously, the only character giving clear separation being the much shorter hind tibiae (approximately 33%) of *A. guineensis*. *A. vilis*, which is sympatric, lacks spine-like fore coxal setae in both soldier and worker castes, the head capsule of the former being convex in profile from fontanelle to occiput, the latter having the anterior mesenteron shorter than the mixed segment and the Malpighian tubules attached beyond the basal one-third of the mixed segment. Other relevant comparisons have been made already.

**Material examined:** soldiers and workers only, SOUTH YEMEN: Hadhramaut, Saiun, 1951 (Harris) (type series); OMAN: N. of Khawr Sawli, 1982 (Gallaher).

**Biology, economic significance:** The nest is unknown, both series having been collected from tunnels associated with woody plant material. The species is of no economic significance.

#### *Amitermes truncatidens* Sands (1959)

(Figures 447-452: Imago, 453-456: Soldier, 457-466: Worker, 467-472: Worker, configuration of intestine)

*Amitermes truncatidens* Sands, 1959:153. Type series, all castes, TANZANIA: Nachingwea; MALAWI, ZAMBIA, ZIMBABWE: numerous localities (examined) (British Museum (Natural History)).

**Imago:** Head capsule and genae sepia brown, postclypeus yellow-brown, labrum and antennal flagellum pale yellow, basal segments pale brown. Fontanelle brown. Pronotum sepia brown, mesonotum and metanotum brown. Legs, coxae, femora and tarsi pale yellow, tibiae pale yellow-brown. Wing membrane brown, main venation sepia brown. Abdominal tergites and sternites brown.

Posterior margin of head capsule semi-circular and evenly rounded. Fontanelle centred on or behind a line joining posterior margins of compound eyes, equal in size to ocellus, broad oval, flat; medial spot in front of fontanelle parallel-sided. Frons with two diverging grooves in front of fontanelle, posterior margin of postclypeus semi-circular. Anterior margin of pronotum straight. Vertex pilosity sparse. Fore coxae without prominent spine-like setae.

Third marginal tooth of left mandible distinctly protrudes from cutting edge of first plus second marginals, fourth marginal tooth of left mandible in front view with proximal end hidden behind molar prominence. First marginal tooth of right mandible with posterior edge shorter than that of second; notch at proximal end of right molar plate moderately developed, obtuse angled but depth over half length, right molar plate ridges in front of notch five in number, concave.

Measurements and indices (six individuals from one locality): **[HW]** 1.07 mm; **[E]** 0.29 to 0.3 mm <mean, 0.293 S.D., 0.005>; **[Ow]** 0.08 to 0.09 mm <mean, 0.086 S.D., 0.005>; **[Ol]** 0.12 to 0.13 mm <mean, 0.127 S.D., 0.005>; **[O-E]** 0.05 to 0.07 mm <mean, 0.067 S.D., 0.008>; **[LMI]** 0.587 to 0.617 <mean, 0.603>; **[RMI]** 1.016 to 1.22 <mean, 1.120>; **[R2I]** 2.612 to 3.483 <mean, 3.165>; **[PW]** 0.89 mm; **[T3]** 1.07 to 1.13 mm <mean, 1.080 S.D., 0.046>; **[Fw]** 9.5 to 10.0 mm <mean, 9.667 S.D., 0.197>.

**Soldier:** Head capsule, entirely pale yellow, mandibles, darkest part sepia brown, antennae pale yellow. Pronotum and legs yellow-white.

Head capsule in profile with a small bulge behind fontanelle, flattened or sinuate from behind fontanelle to occiput. Mandible length less than 4.2 times shank width behind marginal tooth, outline regularly rounded, apical hook incurved by 2.6-3.5 shank widths; point of marginal tooth within basal half, truncated, erect from inner curve of blade; shape of inner margin entirely concave distal to marginal tooth. Pronotum with anterior lobe larger than posterior; fore coxae without prominent spine-like setae on anterior surface.

Measurements and indices (14 individuals from nine localities): **[HL]** 1.33 to 1.61 mm <mean, 1.501 S.D., 0.071>; **[HW]** 1.07 to 1.3 mm <mean, 1.198 S.D., 0.061>; **[Hw]** 0.78 to 0.9 mm <mean, 0.834 S.D., 0.043>; **[HD]** 0.91 to 1.12 mm <mean, 1.027 S.D., 0.053>; **[ML]** 0.64 to 0.74 mm <mean, 0.699 S.D., 0.034>; **[ML:Hw]** 0.787 to 0.878 <mean, 0.834 S.D., 0.027>; **[PL]** 0.32 to 0.4 mm <mean, 0.364 S.D., 0.024>; **[PW]** 0.62 to 0.72 mm <mean, 0.669 S.D., 0.030>; **[T3]** 0.89 to 1.04 mm <mean, 0.974 S.D., 0.048>.

**Worker (first full description):** Head capsule and antennal flagellum pale yellow.

Fore coxae flanged anteriorly, without prominent spine-like setae on anterior surface or flange although two or three large normal setae present in this position. Left mandible, third marginal tooth distinctly protrudes from cutting edge of first plus second marginals, fourth marginal tooth in front view with proximal end hidden behind molar prominence. Right first marginal tooth with posterior edge shorter than that of second marginal; notch at proximal end of right molar plate moderately developed, obtuse angled but depth over half length, or weakly developed, shallowly obtuse; molar plate ridges fewer than five, prominent.

Intestine with anterior part of mesenteron shorter than mixed segment, mixed segment starting slightly to left or beneath heart in dorsal view of unopened abdomen; mesenteric part of mixed segment at its narrowest point approximately equal in width to proctodeal part, strongly inflated at posterior end, length of inflation not more than three times thickness, reaching to proctodeal dilation; posterior termination of mixed segment in ventral view of unopened abdomen to left of or just reaching ventral nerve cord; attachment of Malpighian tubules at mesenteric-proctodeal interface beyond basal one-third of mixed segment, in dorsal view of unopened abdomen distinctly to right of line of heart or out of sight to right of heart, visible in lateral view only; proctodeal first segment dilated to more than twice its basal width, termination at enteric valve short tubular, length two to four times width; enteric valve entering directly into third segment of proctodeum, in dorsal view of unopened abdomen distinctly to left of heart line, behind curve of mesenteron; colon within mesenteric loop in dorsal view of unopened abdomen forming a single simple coil.

Measurements and indices (35 individuals from five localities): **[HW]** 0.981 to 1.136 mm <mean, 1.066 S.D., 0.047>; **[LMI]** 0.517 to 0.806 <mean, 0.670 S.D., 0.075>; **[RMI]** 0.931 to 1.527 <mean, 1.188 S.D., 0.161>; **[R2I]** 2.63 to 4.422 <mean, 3.128 S.D., 0.368>; **[R1:2I]** 0.699 to 0.931 <mean, 0.851 S.D., 0.062>; **[Pcl]** 0.219 to 0.306 mm <mean, 0.263 S.D., 0.022>; **[T3]** 0.811 to 1.043 mm <mean, 0.926 S.D., 0.064>; **[T1]** 0.617 to 0.835 mm <mean, 0.726 S.D., 0.061>.



**Comparisons:** *A. truncatidens* closely resembles *A. evuncifer*, from which it is easily distinguished in the alate and worker castes by the right mandibular indices. Most relevant comparisons have been made earlier, the only remaining sympatric species being *A. unidentatus*. In the imago, *A. unidentatus* has a smooth or very weakly indented frons, and the posterior cutting edge of the first marginal tooth of the right mandible equal in length to that of the second. In the soldier of *A. unidentatus*, the mandibles are proportionately longer and less incurved with less abruptly erect and truncated marginal teeth, while the head profile is flattened or sinuate from behind fontanelle to occiput. The worker of *A. unidentatus* has the anterior mesenteron longer than the mixed segment, which starts well to the right of the heart line in dorsal view of the unopened abdomen, and has the attachment of the Malpighian tubules within its basal one-third; also, the first segment of the proctodeum is tubular, and the enteric valve enters the third segment of the proctodeum on a short diverticulum, distinctly to the right of the heart line in unopened dorsal view.

**Material examined:** All castes, TANZANIA: Nachingwea, 1950 (Harris), MALAWI: Several localities, 1953 (Sands and Wilkinson), ZAMBIA: various localities, 1957 (Coaton), Barotseland, 1956 (Cooling), ANGOLA: Munhango, 1928 (Burr), Zimbabwe: Harare, 1911 (Marshall) (type series); additional material, ZAMBIA, ZIMBABWE: various localities, 1962-69 (Bingham).

**Biology, economic significance:** Common throughout its range in dead wood and its own carton nests, *A. truncatidens* has not been recorded as having any pest status, which is curious considering its close similarity and apparent relationship to *A. evuncifer*.

***Amitermes unidentatus* (Wasmann 1897)**

(Figures 473-481: Imago, 482-486: Soldier, 487-493: Worker, 494-499: Worker, configuration of intestines)

*Termes unidentatus* Wasmann, 1897:137-182. Type series, TANZANIA: Zanzibar, Bawi island (examined) (Wasmann coll., Naturhistoriska Riksmuseum, Stockholm).

Four species described by Sjoestedt, Silvestri, Fuller and Ghidini were synonymised with *A. unidentatus* by Sands, 1959.

**Imago:** Head capsule dark sepia brown, genae sepia brown and postclypeus sepia brown, labrum pale yellow-brown. Antennal flagellum brown, basal segments yellow-brown. Fontanelle brown. Pronotum dark sepia brown, mesonotum and metanotum sepia brown; legs, coxae and tibiae, yellow-brown, femora and tarsi pale yellow-brown. Wing membrane brown, main venation sepia brown. Abdominal tergites sepia brown, sternites brown.

Posterior margin of head capsule semi-circular and evenly rounded. Fontanelle centred behind a line joining posterior margins of compound eyes, larger than ocellus, broad oval, flat to deeply depressed; medial spot in front of fontanelle parallel-sided. Frons smooth or at most weakly indented in front of fontanelle, posterior margin of postclypeus semi-circular. Anterior margin of pronotum straight. Vertex pilosity sparse. Fore coxae without prominent spine-like setae.

Third marginal tooth of left mandible distinctly protrudes from cutting edge of first plus second marginals, fourth marginal tooth of left mandible in front view with proximal end hidden behind molar prominence. First marginal tooth of right mandible with posterior edge equal in length to that of second; notch at proximal end of molar plate weakly developed, shallowly obtuse, molar plate ridges in front of notch five in number, concave.

Measurements and indices (22 individuals from eight localities): [HW] 1.04 to 1.22 mm <mean, 1.121 S.D., 0.053>; [E] 0.26 to 0.32 mm <mean, 0.295 S.D., 0.019>; [Ow] 0.07 to 0.09 mm <mean, 0.078 S.D., 0.007>; [Ol] 0.09 to 0.13 mm <mean, 0.103 S.D., 0.011>; [O-E] 0.05 to 0.09 mm <mean, 0.067 S.D., 0.008>; [LMI] 0.618 to 0.802 <mean, 0.710>; [RMI] 1.014 to 1.306 <mean, 1.160>; [R2I] 1.988 to 3.612 <mean, 2.800>; [PW] 0.86 to 1.11 mm

<mean, 0.980 S.D., 0.064>; [PL] 0.56 to 0.75 mm <mean, 0.646 S.D., 0.052>; [T3] 1.04 to 1.33 mm <mean, 1.201 S.D., 0.086>; [Fw] 8.4 to 12.0 mm <mean, 9.998 S.D., 0.908>.

**Soldier:** Head capsule, front and sides pale yellow-brown, back yellow, mandibles, darkest part brown, antennae yellow. Pronotum yellow, legs pale yellow.

Head capsule in profile with a small bulge behind fontanelle, flattened or sinuate from behind fontanelle to occiput. Mandible length more than 4.4 times shank width behind marginal tooth, outline regularly rounded, apical hook incurved by 1.5-2.5 shank widths; point of marginal tooth within basal half or midway from base to apex, blunt, rounded, erect from inner curve of blade; shape of inner margin entirely concave distal to marginal tooth. Pronotum with anterior and posterior lobes equal in size; fore coxae without prominent spine-like setae on anterior surface.

Measurements and indices (35 individuals from 14 localities): [HL] 1.13 to 1.79 mm <mean, 1.539 S.D., 0.169>; [HW] 0.96 to 1.39 mm <mean, 1.159 S.D., 0.107>; [Hw] 0.72 to 0.93 mm <mean, 0.839 S.D., 0.063>; [HD] 0.75 to 1.11 mm <mean, 0.955 S.D., 0.099>; [ML] 0.66 to 0.9 mm <mean, 0.808 S.D., 0.057>; [ML:Hw] 0.899 to 1.042 <mean, 0.964 S.D., 0.031>; [PL] 0.32 to 0.47 mm <mean, 0.386 S.D., 0.036>; [PW] 0.57 to 0.84 mm <mean, 0.721 S.D., 0.067>; [T3] 0.87 to 1.14 mm <mean, 1.032 S.D., 0.077>.

**Worker (first full description):** Head capsule pale yellow, antennal flagellum pale yellow.

Fore coxae flanged anteriorly, without prominent spine-like setae on anterior surface or flange. Left mandible, third marginal tooth distinctly protrudes from cutting edge of first plus second marginals, fourth marginal tooth in front view with proximal end hidden behind molar prominence. Right first marginal tooth with posterior edge shorter than that of second marginal; notch at proximal end of right molar plate strongly developed, nearly a right angle, almost as deep as long or moderately developed, obtuse angled but depth over half length, molar plate ridges fewer than five or five in number, prominent.

Intestine with anterior part of mesenteron longer than mixed segment, mixed segment starting well to right of heart in dorsal view of unopened abdomen; mesenteric part of mixed segment at its narrowest point approximately equal in width to proctodeal part, slightly inflated at posterior end, length of inflation more than three times thickness, reaching to proctodeal dilation; posterior termination of mixed segment in ventral view of unopened abdomen well to right of ventral nerve cord; attachment of Malpighian tubules at mesenteric-proctodeal interface within basal one-third of mixed segment, in dorsal view of unopened abdomen distinctly to right of line of heart; proctodeal first segment tubular, termination at enteric valve long tubular, length more than four times width, entering a short diverticulum from third segment of proctodeum; enteric valve in dorsal view of unopened abdomen distinctly to right of heart line, behind curve of mesenteron; colon within mesenteric loop in dorsal view of unopened abdomen forming a single simple coil.

Measurements and indices (33 individuals from five localities): [HW] 0.977 to 1.163 mm <mean, 1.080 S.D., 0.043>; [LMI] 0.646 to 0.956 <mean, 0.796 S.D., 0.081>; [RMI] 1.104 to 1.577 <mean, 1.287 S.D., 0.139>; [R2I] 2.338 to 4.641 <mean, 3.336 S.D., 0.527>; [R1:2I] 0.651 to 1.057 <mean, 0.888 S.D., 0.105>; [Pcl] 0.23 to 0.319 mm <mean, 0.270 S.D., 0.024>; [T3] 0.756 to 1.021 mm <mean, 0.890 S.D., 0.081>; [T1] 0.571 to 0.821 mm <mean, 0.682 S.D., 0.071>.

**Comparisons:** All of the appropriate comparisons have already been made between *A. unidentatus* and species likely to occur sympatrically. Reference should be made to the comparisons under *A. braunsi*, *A. hastatus*, *A. importunus*, *A. loennbergianus*, *A. messinae*, *A. mitchelli* and *A. truncatidens* for differences between them and *A. unidentatus*.

**Material examined:** Many series from SUDAN to the REPUBLIC OF SOUTH AFRICA, including syntypes of all of the synonymised species. It is the most widespread species in East and Central Africa, ranging from near Khartoum to the Northern Transvaal.

**Biology, economic significance:** Low hard mounds are constructed from soil and carton, and runways, to dead woody material. There are a few records of sharing the mounds of other genera such as *Cubitermes* and *Pseudacanthotermes*, but the commonest nest site is in the base of dead trees and stumps. There is no record of any economic damage done by this species.

***Amitermes vilis*** (Hagen, 1858)

(Figures 500-507: Imago, 508-521: Soldier, 522-528: Worker, 529-535 :Worker, configuration of intestine)

*Termes vilis* Hagen, 1858: 185-6. Type series, imago only, IRAN: Shiraz (type lost according to Weidner, 1958 – original depository, Vienna Museum).

*Amitermes wahrmani* Spaeth, 1964:27-29. Type series, soldiers and workers only, ISRAEL: Allonim (American Museum of Natural History), **syn.n.**

*Amitermes rhizophagus* Belyaeva, 1974: 62-73. Type series, imagos, soldiers and workers, TURKMEN SSR: Kazandzhik region (Department of Entomology, Moscow State University). **syn.n.**

**Imago:** Head capsule and genae dark sepia brown, postclypeus sepia brown, labrum yellow-brown; antennal flagellum and basal segments brown; fontanelle brown. Pronotum dark sepia brown, mesonotum, metanotum and legs, sepia brown, apart from pale yellow tarsi. Wing membrane yellow-brown, main venation brown. Abdominal tergites sepia brown, sternites brown.

Posterior margin of head capsule semi-circular and evenly rounded. Fontanelle centred on a line joining posterior margins of compound eyes, larger than ocellus, narrowly oval, flat or slightly or partly depressed; medial spot in front of fontanelle parallel-sided, frons with two diverging grooves in front of fontanelle. Posterior margin of postclypeus arcuate. Anterior margin of pronotum concave. Vertex pilosity dense. Fore coxae without prominent spine-like setae.

Third marginal tooth of left mandible protrudes slightly from cutting edge of first plus second marginals, fourth marginal tooth of left mandible in front view with proximal end hidden behind molar prominence. First marginal tooth of right mandible with posterior edge longer than that of second; notch at proximal end of right molar plate moderately developed, obtuse angled but depth over half length, right molar plate ridges in front of notch five in number, prominent.

Measurements and indices (16 individuals from four localities): [HW] 1.024 to 1.078 mm <mean, 1.046 S.D., 0.016>; [E] 0.249 to 0.278 mm <mean, 0.265 S.D., 0.009>; [Ow] 0.06 to 0.094 mm <mean, 0.074 S.D., 0.010>; [OI] 0.07 to 0.132 mm <mean, 0.101 S.D., 0.018>; [O-E] 0.041 to 0.074 mm <mean, 0.058 S.D., 0.008>; [LMI] 0.716 to 0.879 <mean, 0.760>; [RMI] 0.919 to 1.104 <mean, 0.995>; [R2I] 2.873 to 4.325 <mean, 3.567>; [PW] 0.851 to 1.075 mm <mean, 0.942 S.D., 0.051>; [PL] 0.538 to 0.677 mm <mean, 0.605 S.D., 0.033>; [T3] 0.949 to 1.157 mm <mean, 1.078 S.D., 0.055>; [Fw] 8.372 to 9.903 mm <mean, 8.858 S.D., 0.407>.

**Soldier:** Head capsule, front and sides yellow-brown, back pale yellow-brown, mandibles, darkest part sepia brown, antennae pale yellow-brown, pronotum and legs yellow.

Head capsule in profile with a small bulge behind fontanelle, rounded, convexly curved from fontanelle to occiput. Mandible length more than 4.4 times shank width behind marginal tooth, outline regularly rounded, apical hook incurved by 2.6-3.5 shank widths; point of marginal tooth midway from base to apex or within apical half, blunt, rounded or truncated, erect from inner curve of blade; shape of inner margin entirely concave distal to marginal tooth. Pronotum with

anterior lobe larger than posterior. Fore coxae without prominent spine-like setae on anterior surface.

Measurements and indices (14 individuals from four localities): [HL] 1.226 to 1.385 mm <mean, 1.317 S.D., 0.045>; [HW] 0.985 to 1.157 mm <mean, 1.069 S.D., 0.054>; [Hw] 0.632 to 0.742 mm <mean, 0.707 S.D., 0.033>; [HD] 0.842 to 0.954 mm <mean, 0.889 S.D., 0.032>; [ML] 0.634 to 0.78 mm <mean, 0.710 S.D., 0.058>; [ML:Hw] 0.877 to 1.094 <mean, 1.005 S.D., 0.065> [PL] 0.277 to 0.359 mm <mean, 0.321 S.D., 0.022>; [PW] 0.539 to 0.681 mm <mean, 0.620 S.D., 0.035>; [T3] 0.865 to 1.06 mm <mean, 0.953 S.D., 0.069>.

**Worker (first full description):** Head capsule and antennal flagellum yellow.

Fore coxae flanged anteriorly, without prominent spine-like setae on anterior surface or flange. Left mandible, third marginal tooth protrudes slightly from cutting edge of first plus second marginals, fourth marginal tooth in front view with proximal end hidden behind molar prominence. Right first marginal tooth with posterior edge longer than that of second marginal; notch at proximal end of right molar plate strongly developed, nearly a right angle, almost as deep as long, molar plate ridges five in number, prominent.

Intestine with anterior part of mesenteron shorter than mixed segment, mixed segment starting well to right of heart in dorsal view of unopened abdomen; mesenteric part of mixed segment at its narrowest point approximately equal in width to proctodeal part, slightly inflated at posterior end, length of inflation more than three times thickness, reaching to proctodeal dilation; posterior termination of mixed segment in ventral view of unopened abdomen well to right of ventral nerve cord; attachment of Malpighian tubules at mesenteric-proctodeal interface beyond basal one-third of mixed segment, in dorsal view of unopened abdomen distinctly to right of line of heart; proctodeal first segment dilated to more than twice its basal width, termination at enteric valve long tubular, length more than four times width; enteric valve entering a short diverticulum from third segment of proctodeum, in dorsal view of unopened abdomen distinctly to right of heart line, behind curve of mesenteron; colon within mesenteric loop in dorsal view of unopened abdomen forming a single simple coil.

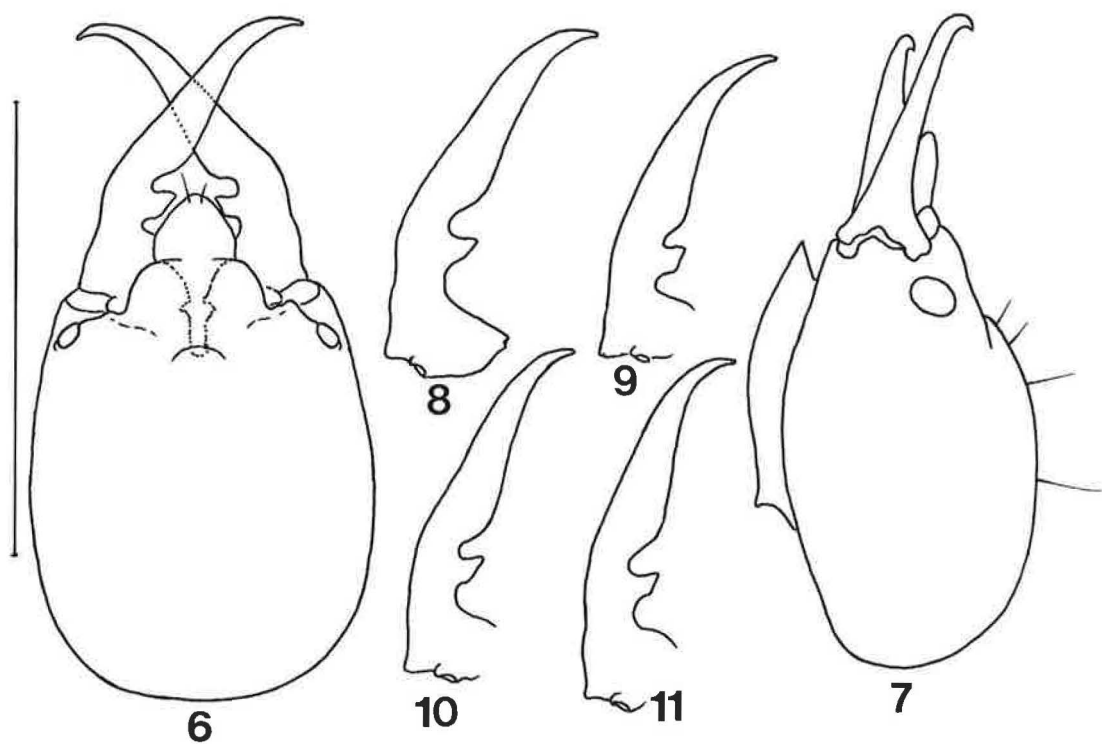
Measurements and indices (32 individuals from four localities): [HW] 0.943 to 1.138 mm <mean, 1.019 S.D., 0.057>; [LMI] 0.534 to 0.896 <mean, 0.714 S.D., 0.089>; [RMI] 0.768 to 1.119 <mean, 0.943 S.D., 0.078>; [R2I] 2.814 to 5.909 <mean, 3.969 S.D., 0.784>; [R1:2I] 1.009 to 1.608 <mean, 1.178 S.D., 0.114>; [Pcl] 0.195 to 0.259 mm <mean, 0.230 S.D., 0.018>; [T3] 0.71 to 1.043 mm <mean, 0.835 S.D., 0.085>; [T1] 0.53 to 0.839 mm <mean, 0.641 S.D., 0.080>.

**Comparisons:** The original sketchy and, by today's standards, inadequate description of the imago by Hagen (1858) was formally linked to soldier and worker castes by Harris (1957) on the basis of comparison with imago material labelled as 'Metatype' by Emerson, who used this term to designate specimens that he personally had compared with types. The type specimens were in this case said to be in the Museum of Comparative Zoology, Harvard, USA, but it is not clear whether they were a part or the whole of Hagen's type series, which seems to have disappeared from the Vienna Museum. Weidner (1960) described a soldier tentatively as '*Amitermes vilis* (Hagen) oder n.sp.' from several localities in Iraq, while Spaeth (1964) referred to "an undescribed soldier of *A. vilis* (Hagen)" in comparison with a proposed new species, *A. wahrmani* from Israel. Similarly, Belyaeva (1974) referred to a comparison, supposedly authoritative, by Weidner of a further species, *A. rhizophagus* sp.n. from Turkmenia, with a single soldier specimen in his possession, determined by Harris as *A. vilis*. The range of variation in form and measurements encountered over a wide geographical distribution easily encompasses these additional 'species' and is still no greater than has been found in some other widespread species; both are therefore synonymised here, although it has not been possible to examine the type series directly, despite requests for the specimens on loan from the institutions of supposed deposit.

All relevant comparisons have already been made under the descriptions of other sympatric or neighbouring species, and reference should be made to *A. corpulentus*, *A. desertorum*, *A. gallagheri*, *A. messinae* and *A. stephensoni*.

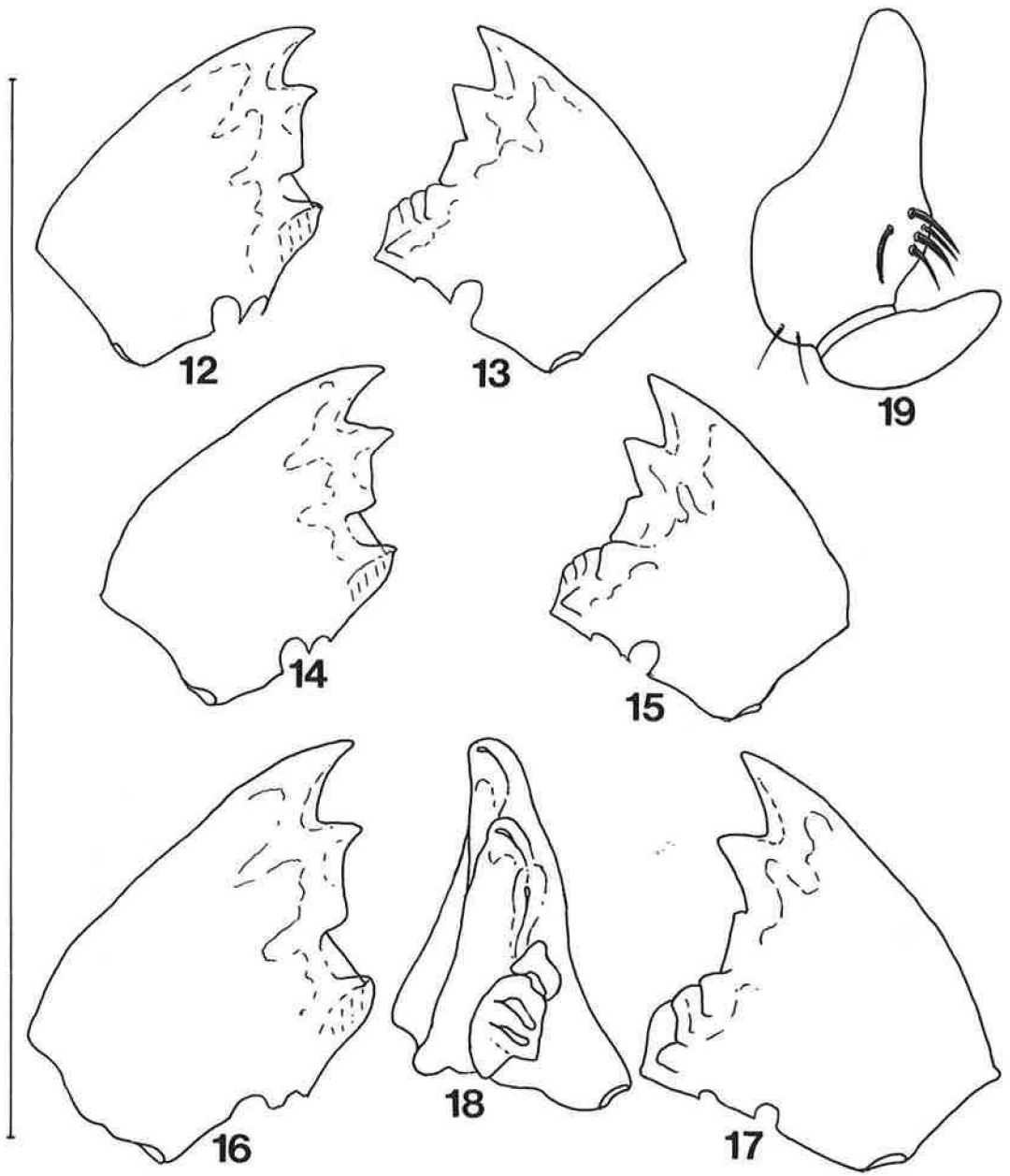
**Material examined:** Imagos, soldiers and workers, IRAN: Tadzirish, near Tehran, 1927 (Siazov), Abadan Island, 1956 (Bingham); IRAQ: Baghdad, 1952 (Weber) 'Metatype', det. Emerson; ISRAEL: 1962 (Calderon), Golan Heights, Banay, Givat Brener near Tel Aviv, 1977 (Thier); JORDAN: Zerga River, 1951 (Trought), Dagania, 1937 (Palmoni); OMAN: 23°37'N, 58°35'E, 1982, near Siya, 1983, Wattaya, W. of Muscat, 3 km N of Halron, 1984 (Gallaher); PDR YEMEN: El Kod, 1982 (Cowie); SOUTH YEMEN: Seiyun, 1951 (Harris).

**Biology, economic significance:** Damage to trees, crops and building timbers has been recorded throughout its range for this species, although it is not generally regarded as a serious pest. The nests are commonly excavated within dead stumps to begin with, extending below ground level as they are enlarged. They are said also to occupy parts of the nests of *Anacanthotermes*, and to be able to expel the original builders.



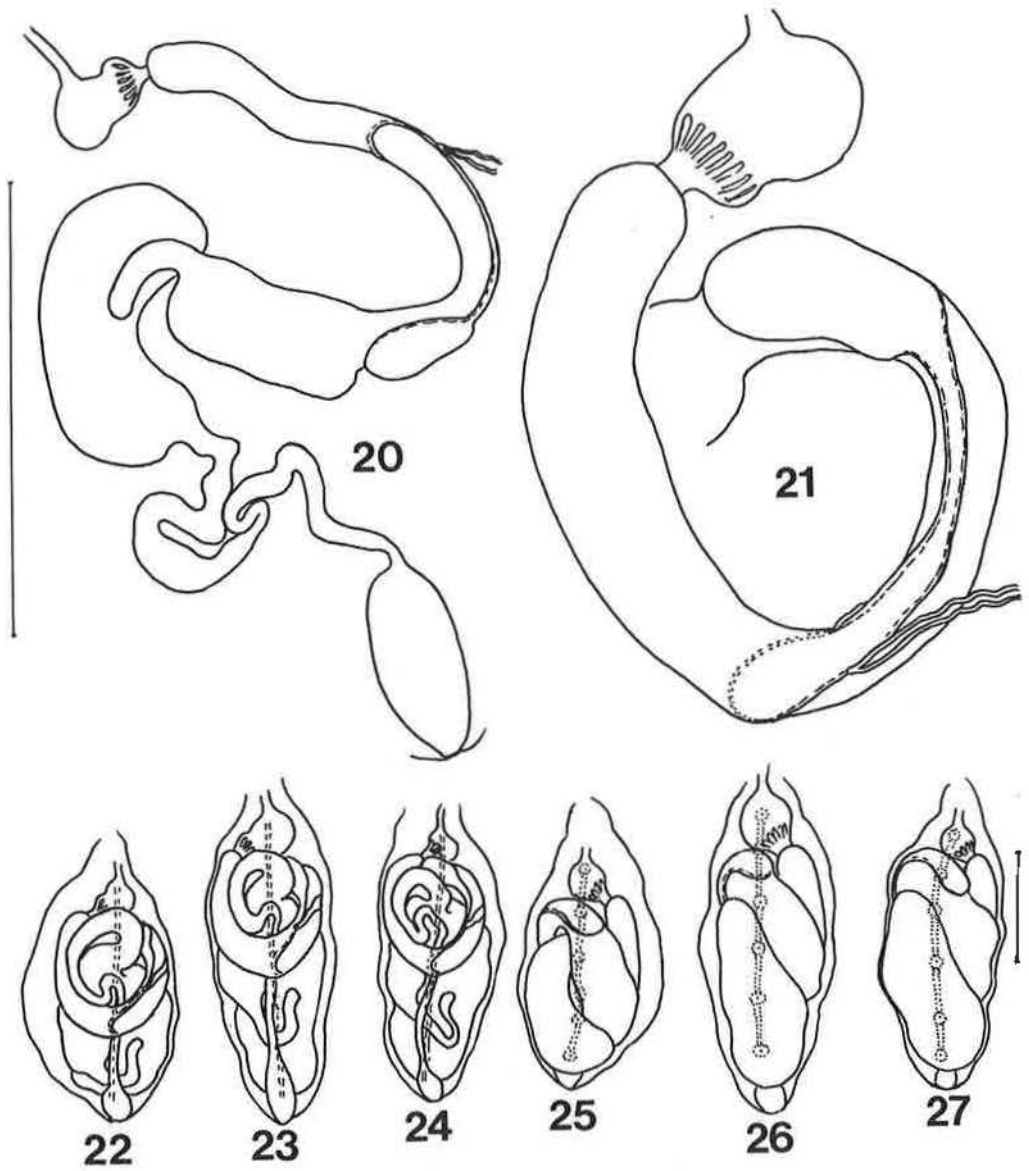
**Figures 6-11**

Soldier caste of *A. acinacifer*: 6,7, Head and mandibles in plan and profile; 8-11, Mandibles, variation. Bar (left) = 1 mm.



**Figures 12-19**

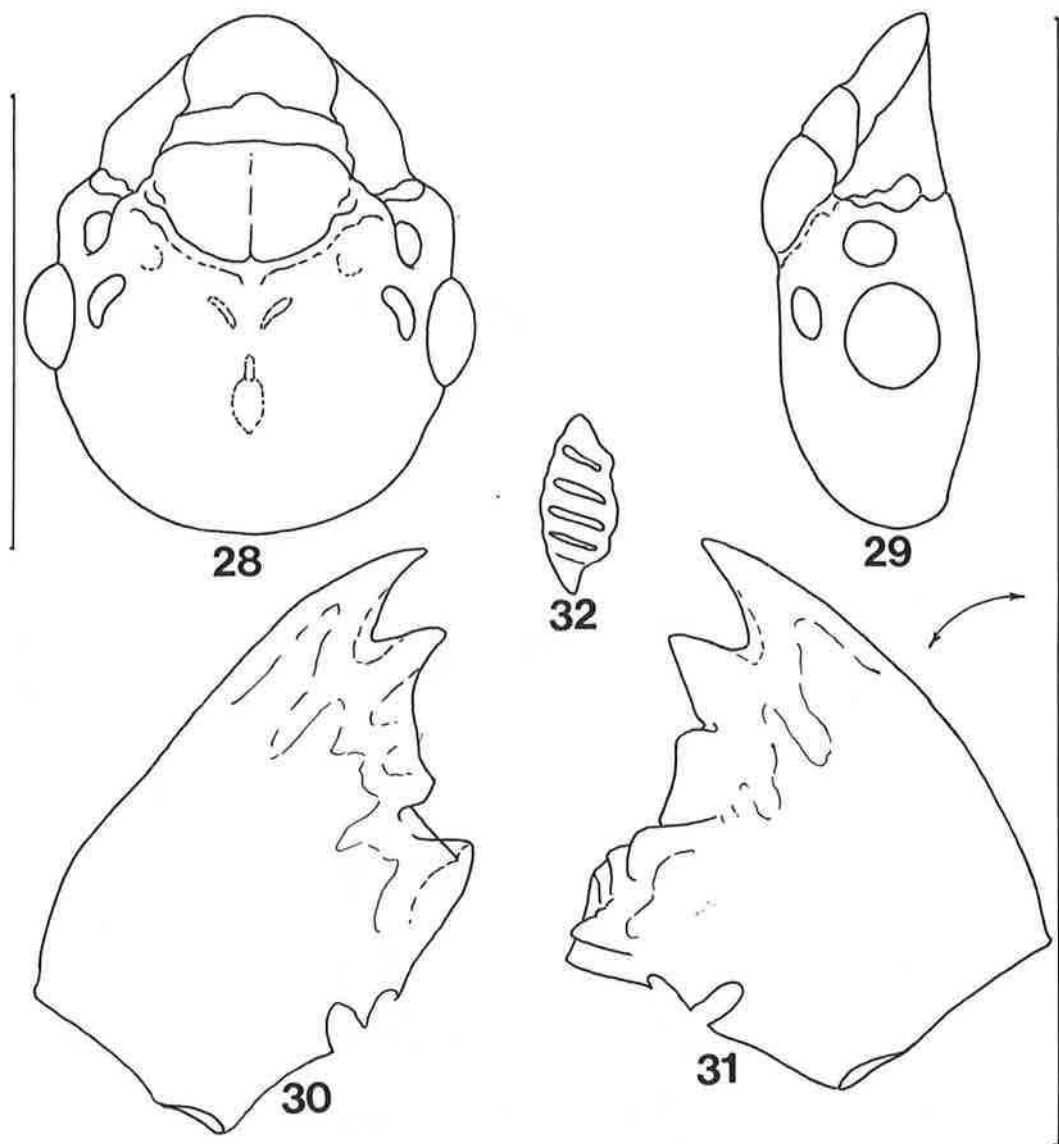
Worker castes of *A. acinacifer*: 12,13 Mandibles of early, 14, 15, Middle, and 16-18, Late instar; 18, Molar view; 19, Fore coxa. Bar (left) = 1 mm.



**Figures 20-27**

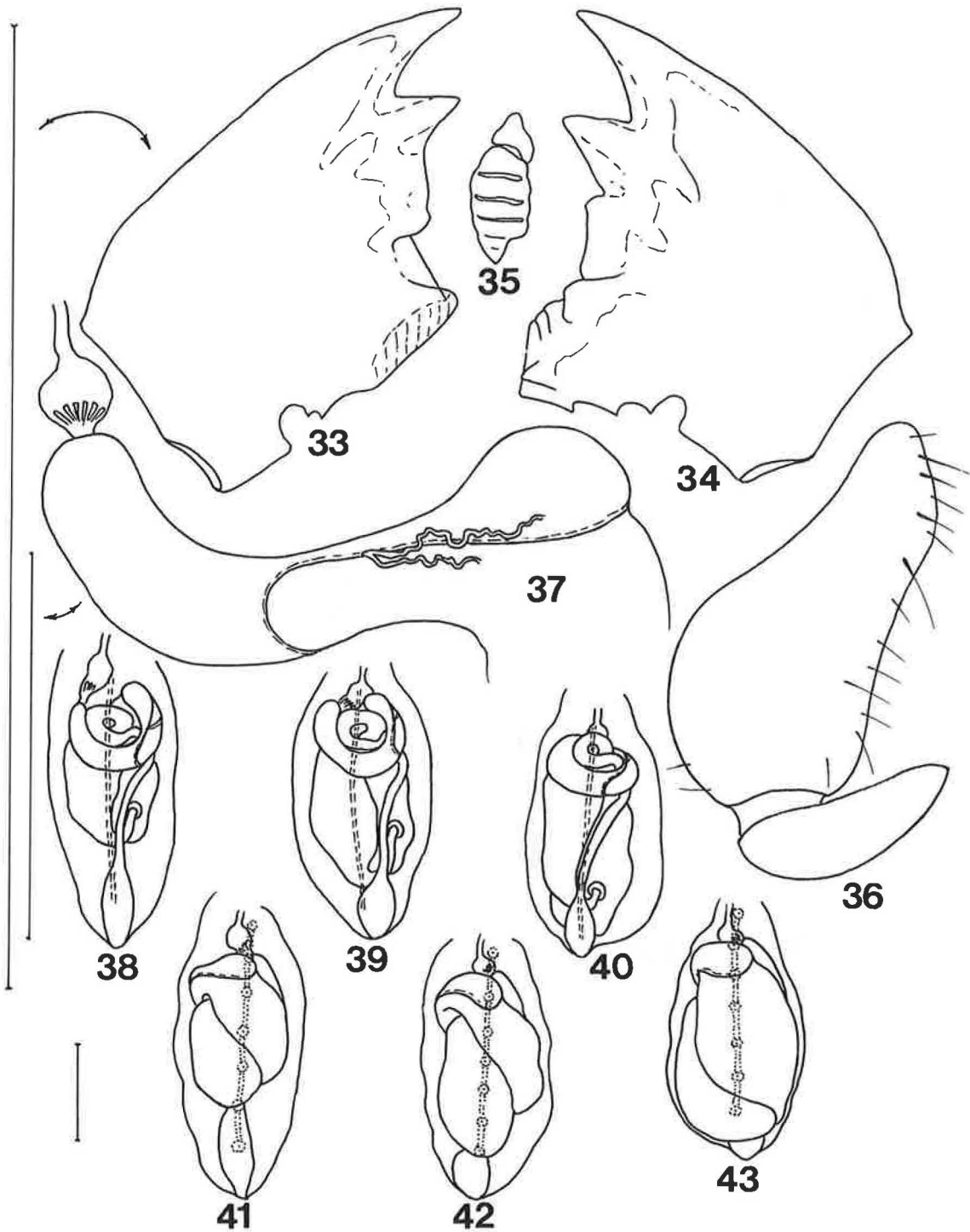
Worker castes of *A. acinacifer*: 20, Gut entire; 21, Mesenteron and mixed segment enlarged to show minimum width of mesenteric part of mixed segment and attachment of Malpighian tubules; 22-27, Dorsal (22-24) and ventral (25-27) views of abdomens with guts *in situ*. Bars (left, gut entire; right, abdomens) = 1 mm.





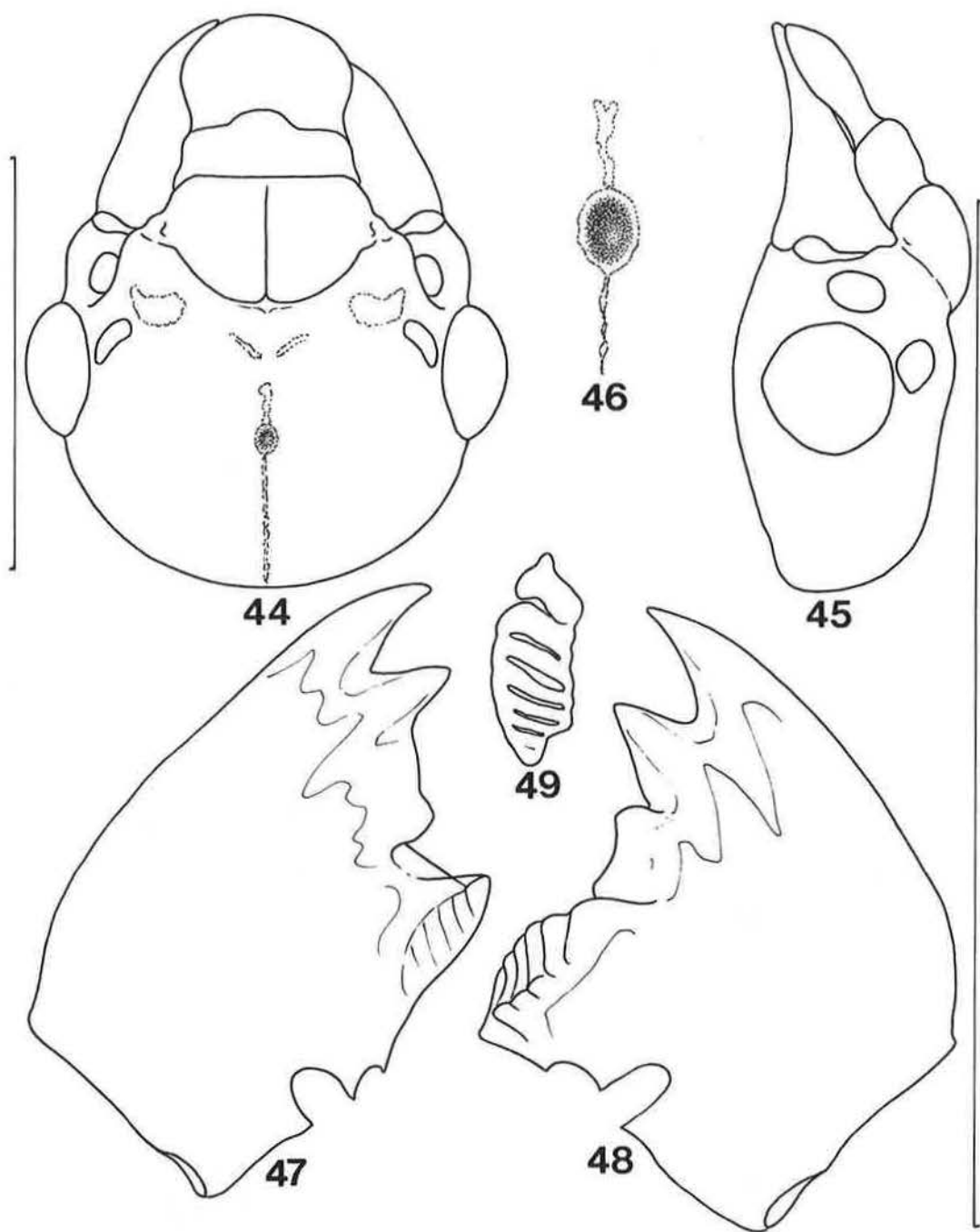
**Figures 28-32**

Imago of *A. braunsi*: 28,29, Head capsule, front and side views; 30,31, Mandibles, 32, Right molar plate in surface view. Bars (left, head, right, mandibles) = 1 mm.



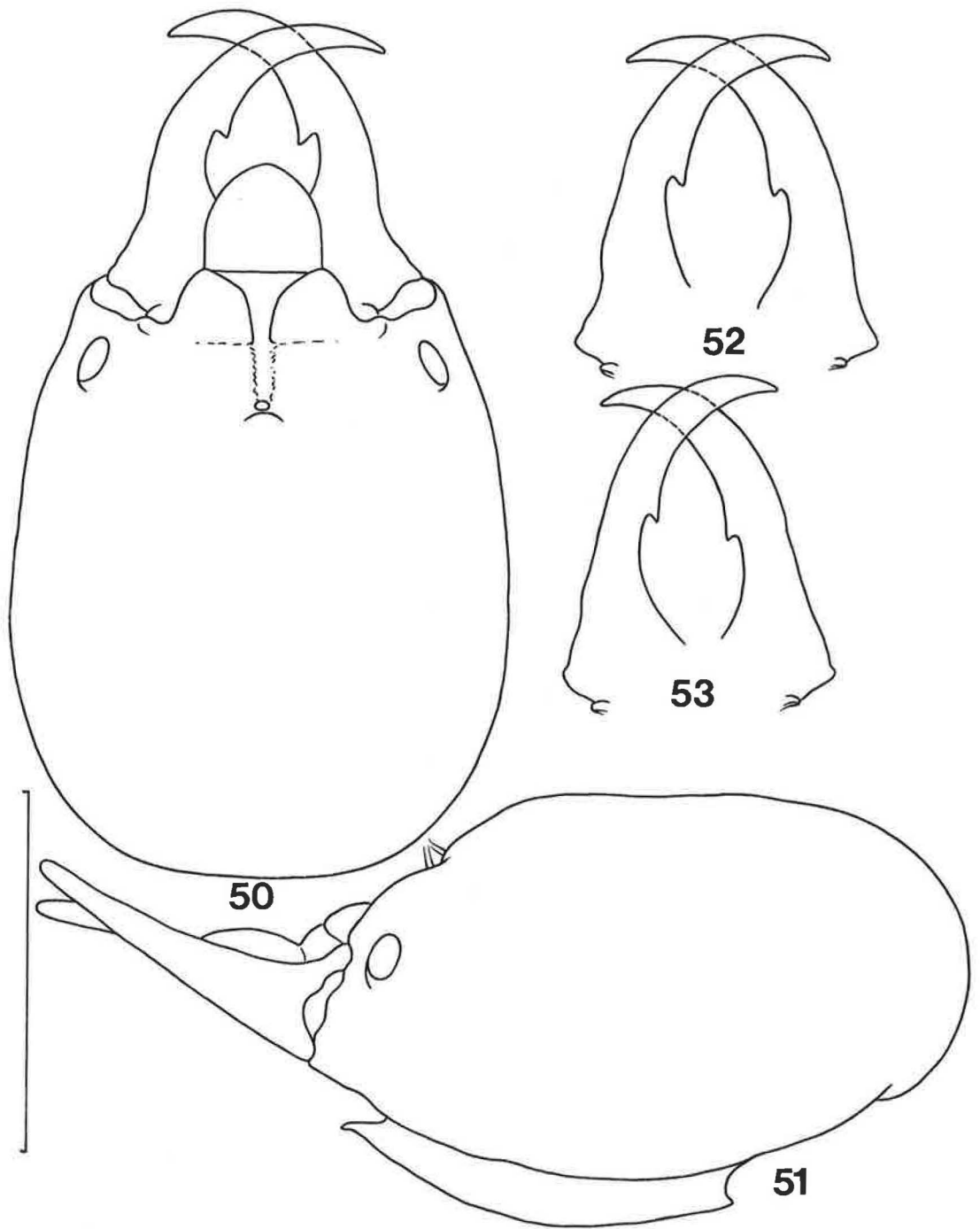
**Figures 33-43**

Worker caste of *A. braunsi*: 33-35, Mandibles, 35, Right molar plate in surface view; 36, Fore coxa; 37, Mesenteron and mixed segment enlarged to show attachment of Malpighian tubules and inflation of posterior termination of mesenteron; 38-43, Dorsal (38-40) and ventral (41-43) views of abdomens with guts *in situ*. Bars (arrows indicate application except shortest, for abdomens) = 1 mm.



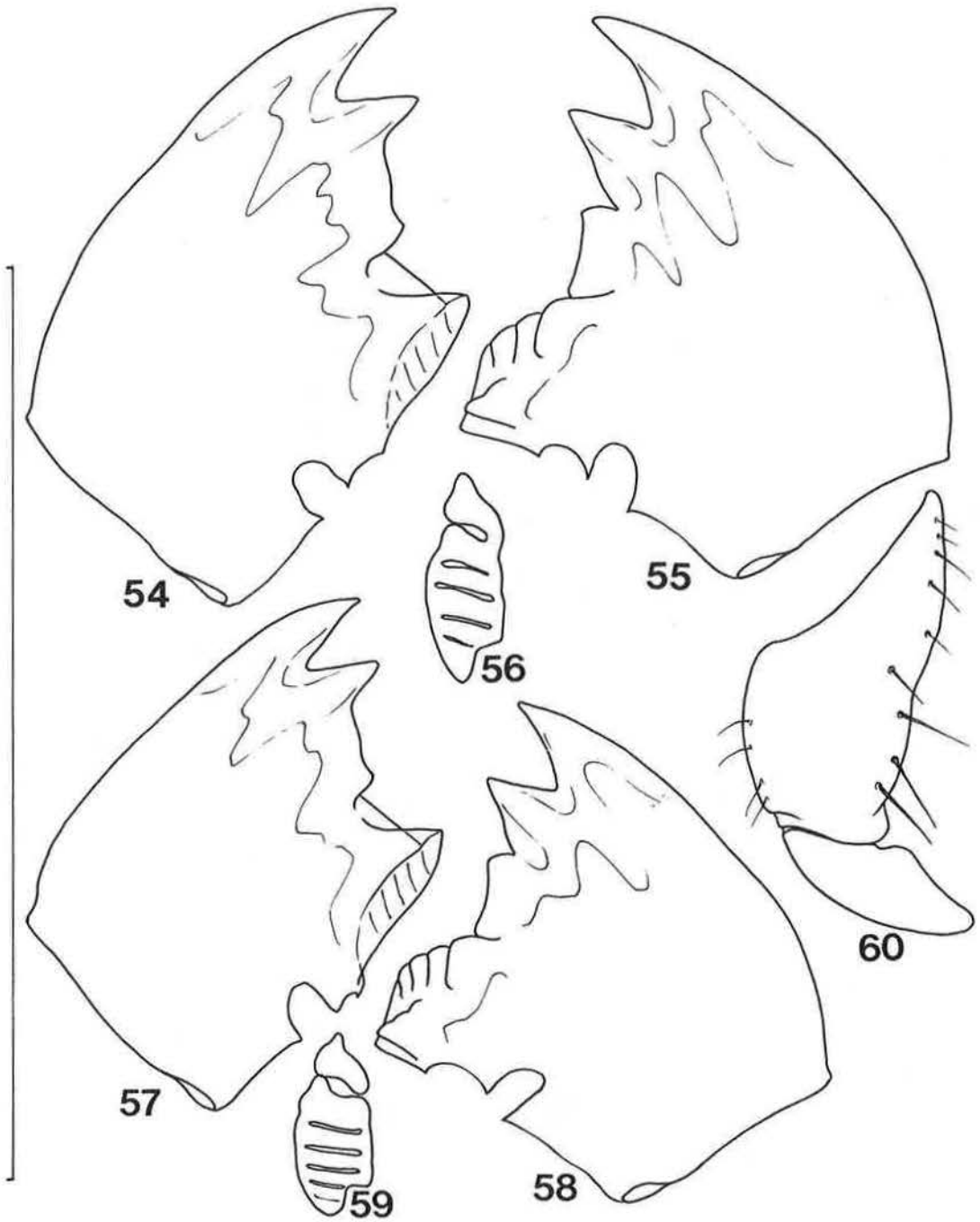
**Figures 44-49**

Imago of *A. corpulentus*: 44,45, Head capsule, front and side views; 46, Fontanelle enlarged; 47-49, Mandibles, 49, Right molar plate, surface view. Bars (left, head, right, mandibles and fontanelle) = 1 mm.



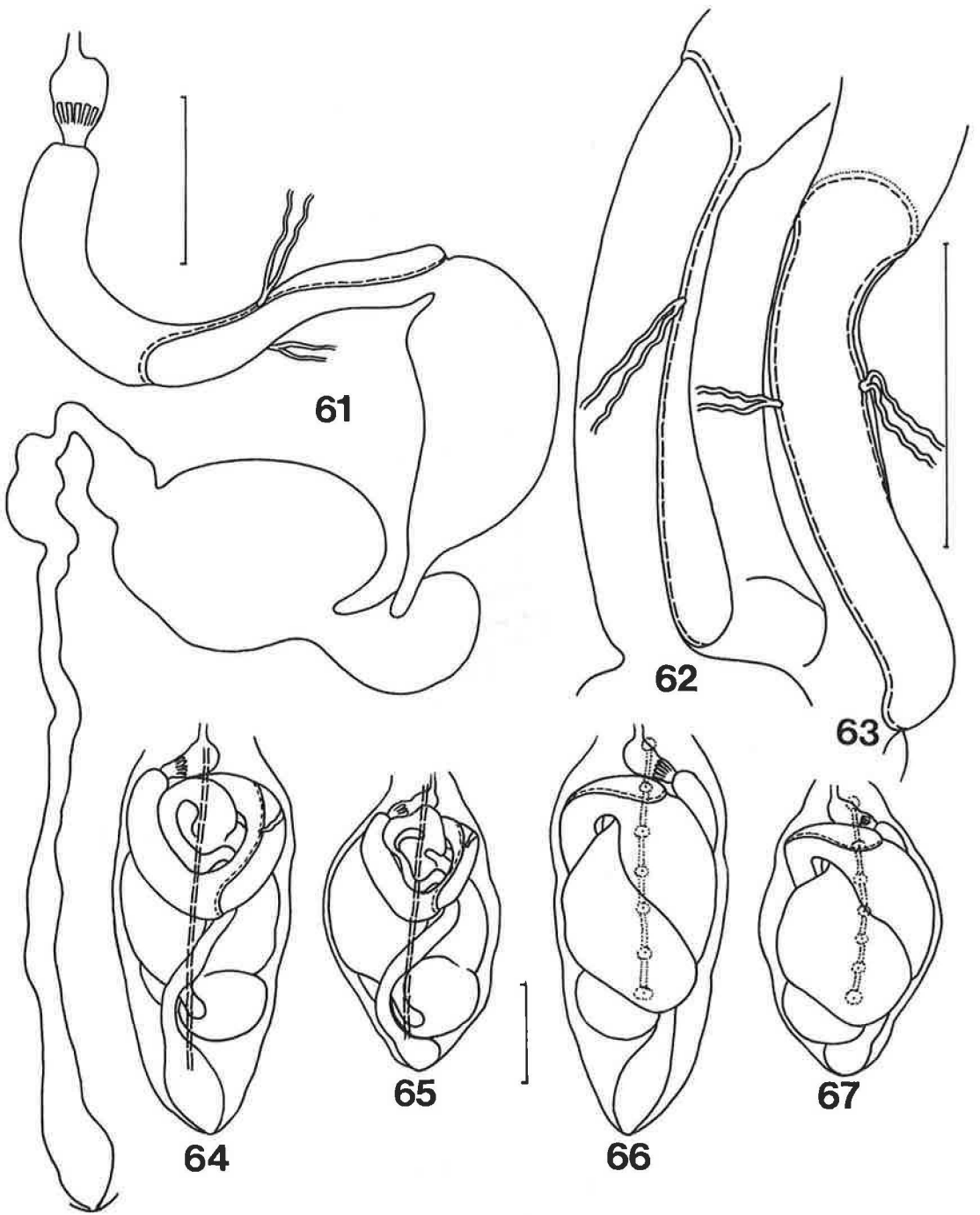
**Figures 50-53**

Soldier caste of *A. corpulentus*: 50,51, Head and mandibles, plan and profile; 52,53, Mandibles, variation. Bar (left) = 1 mm.



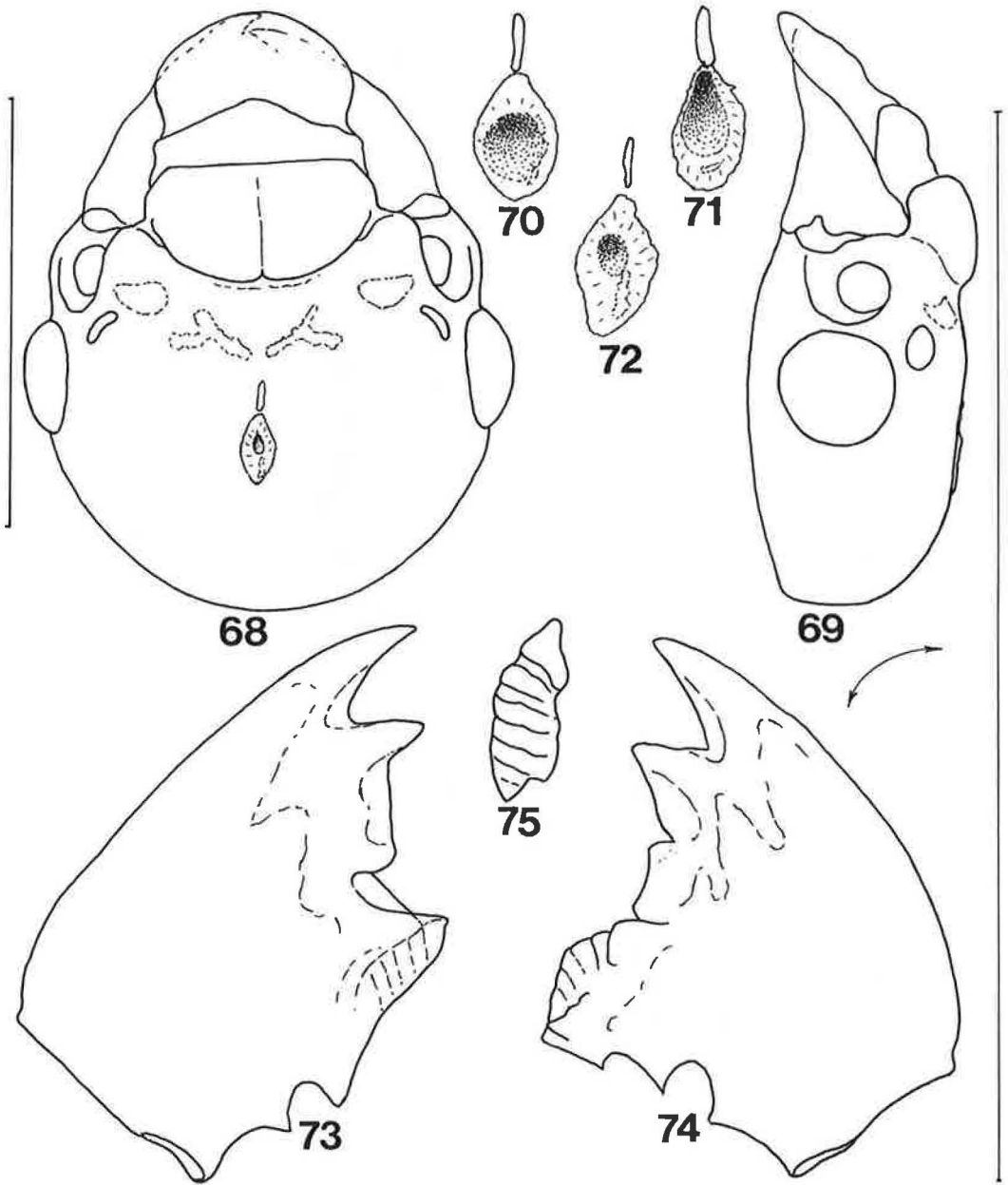
**Figures 54-60**

Worker castes of *A. corpulentus*: 54-56, Mandibles of late and 57-59, Early instars, 56,59, Right molar plates in surface view; 60, Fore coxa late instar (slightly reduced). Bar (left) = 1 mm.



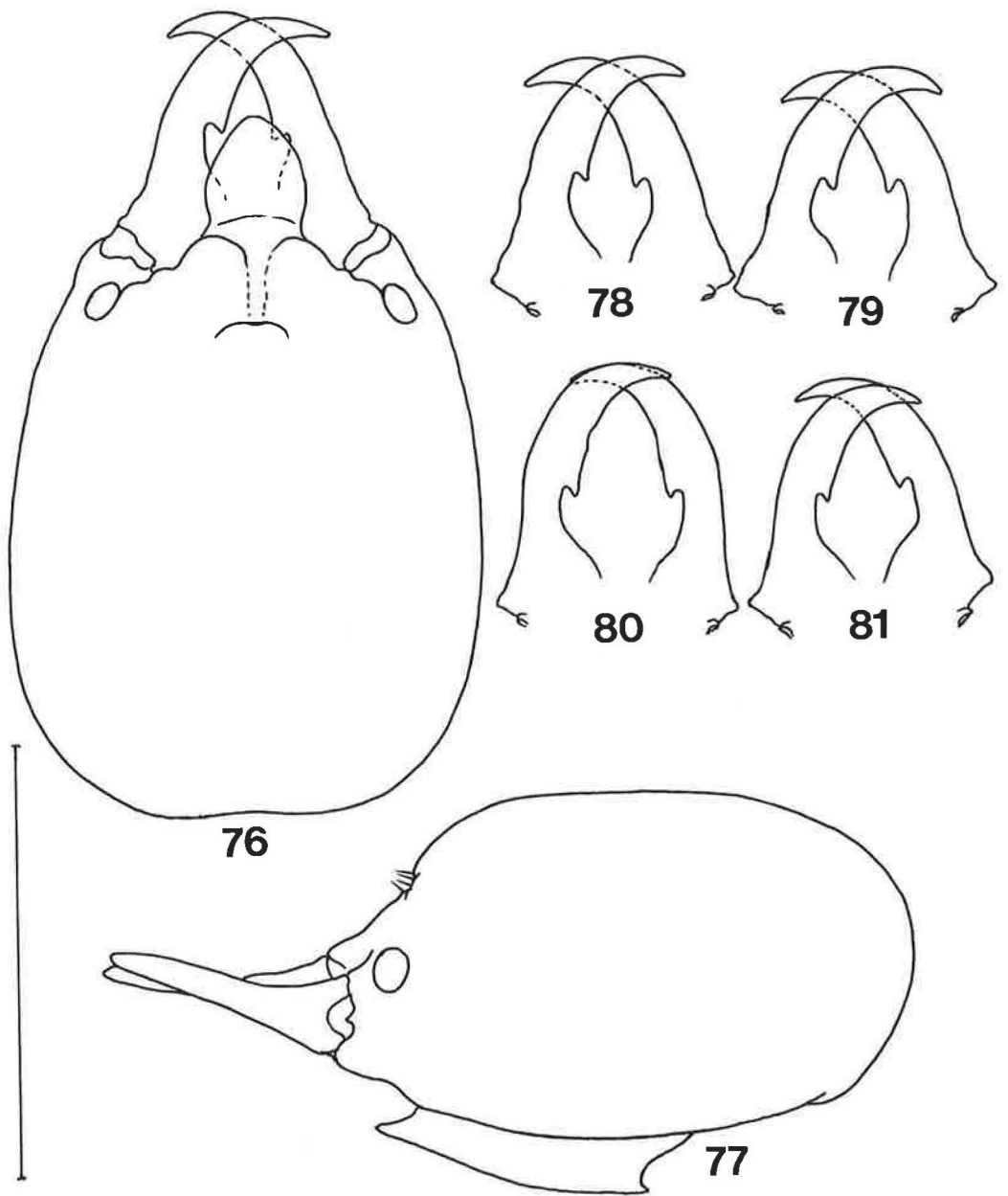
**Figures 61-67**

Worker caste of *A. corpulentus*: 61, Gut entire; 62,63, mixed segments enlarged to show least width of mesenteron and attachment of Malpighian tubules; 64,65, Dorsal and 66,67, Ventral views of abdomens with guts *in situ*. Bars (top, gut entire, right, mixed segments, bottom, abdomens) = 1 mm.



**Figures 68-75**

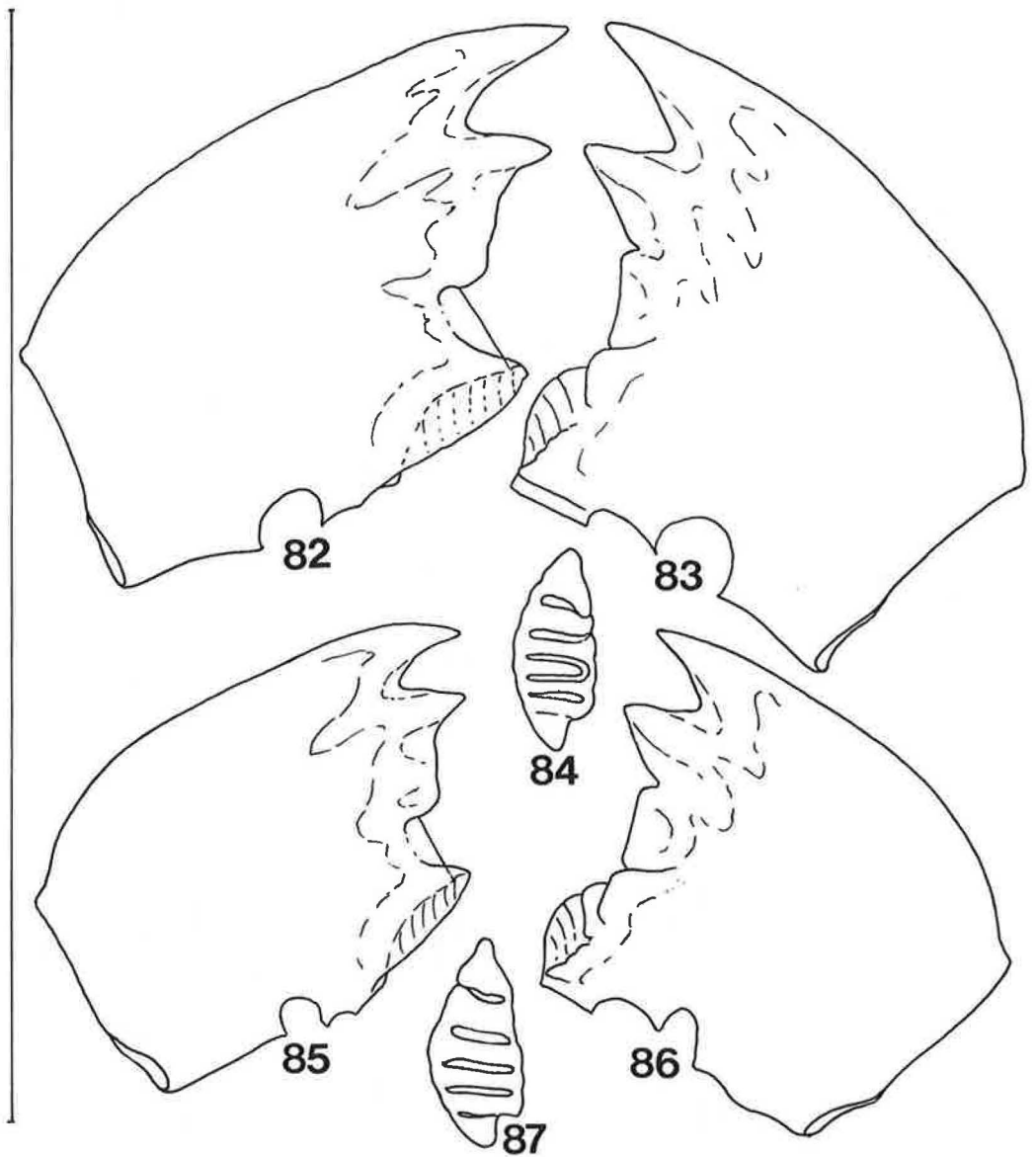
Imago of *A. desertorum*: 68,69, Head capsule, front and side views; 70-72, Fontanelles enlarged to show variation; 73-75, Mandibles, 75, Right molar plate in surface view. Bars (left, head, right, mandibles and fontanelles) = 1 mm.



**Figures 76-81**

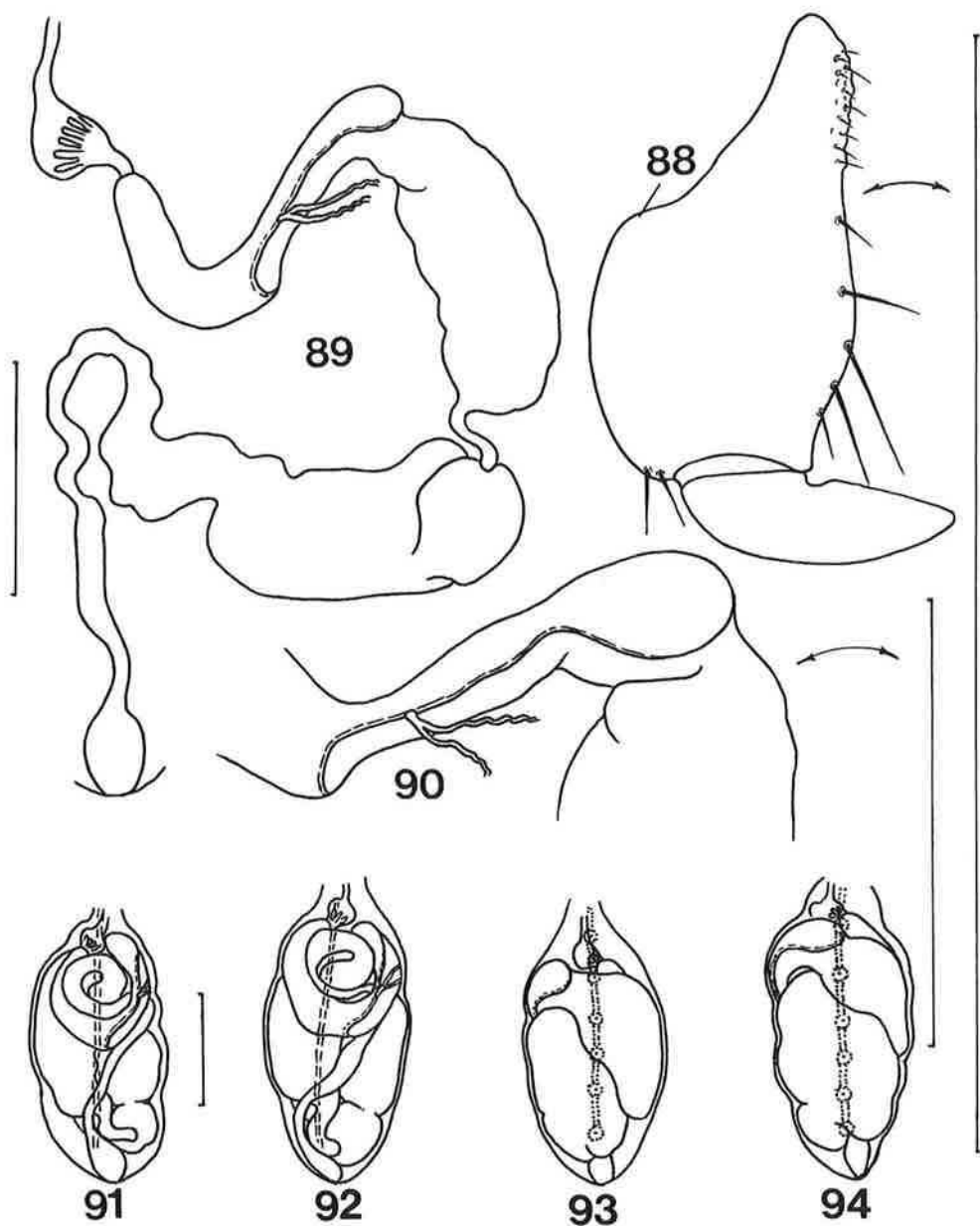
Soldier caste of *A. desertorum*: 76,77, Head and mandibles in plan and profile; 78-81, Mandibles, variation. Bar (left) = 1 mm.





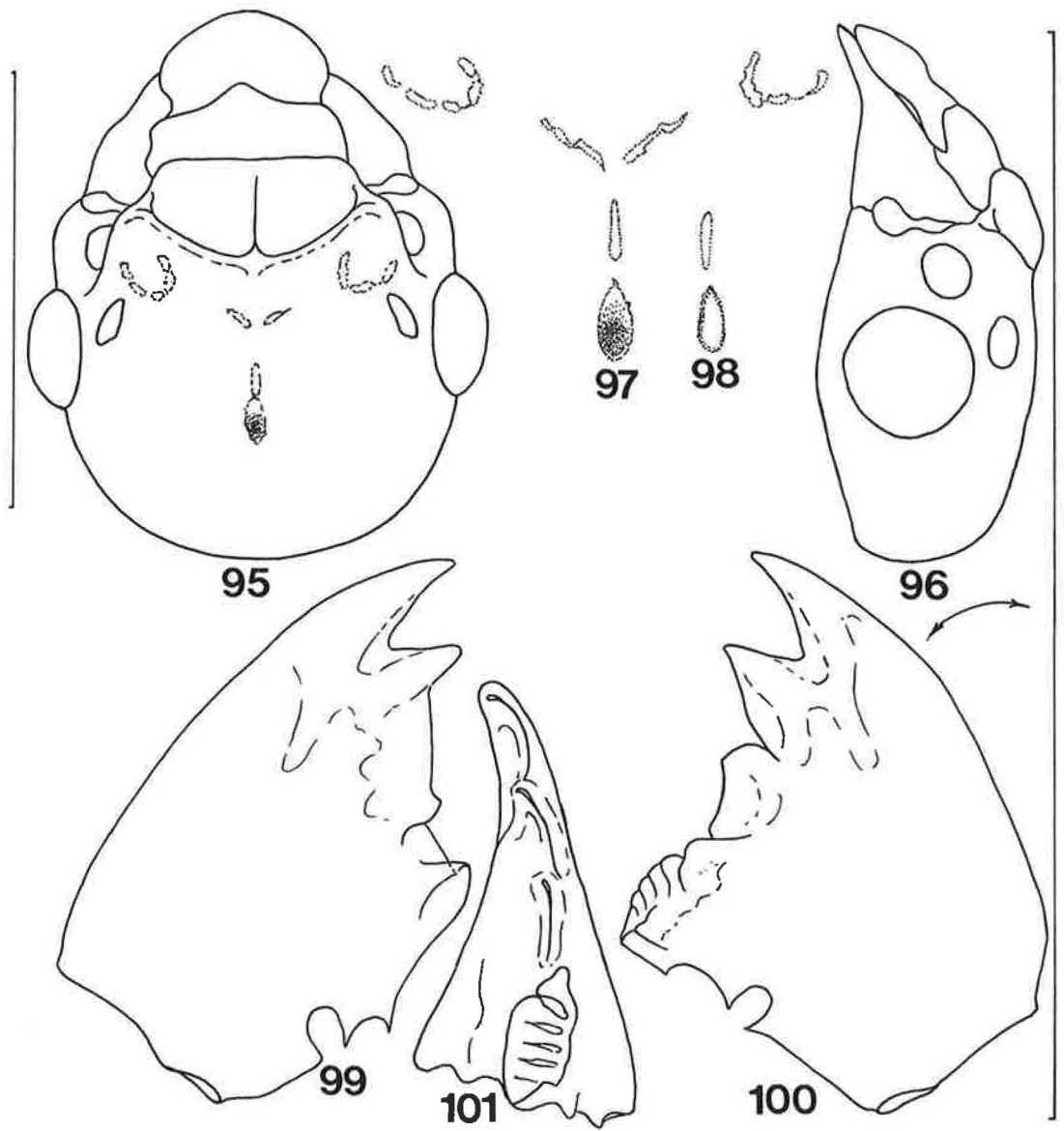
**Figures 82-87**

Worker castes of *A. desertorum*: 82-84, Mandibles of late, 85-87, Early instar, 84,87, Right molar plates in surface view. Bar (left) = 1 mm.



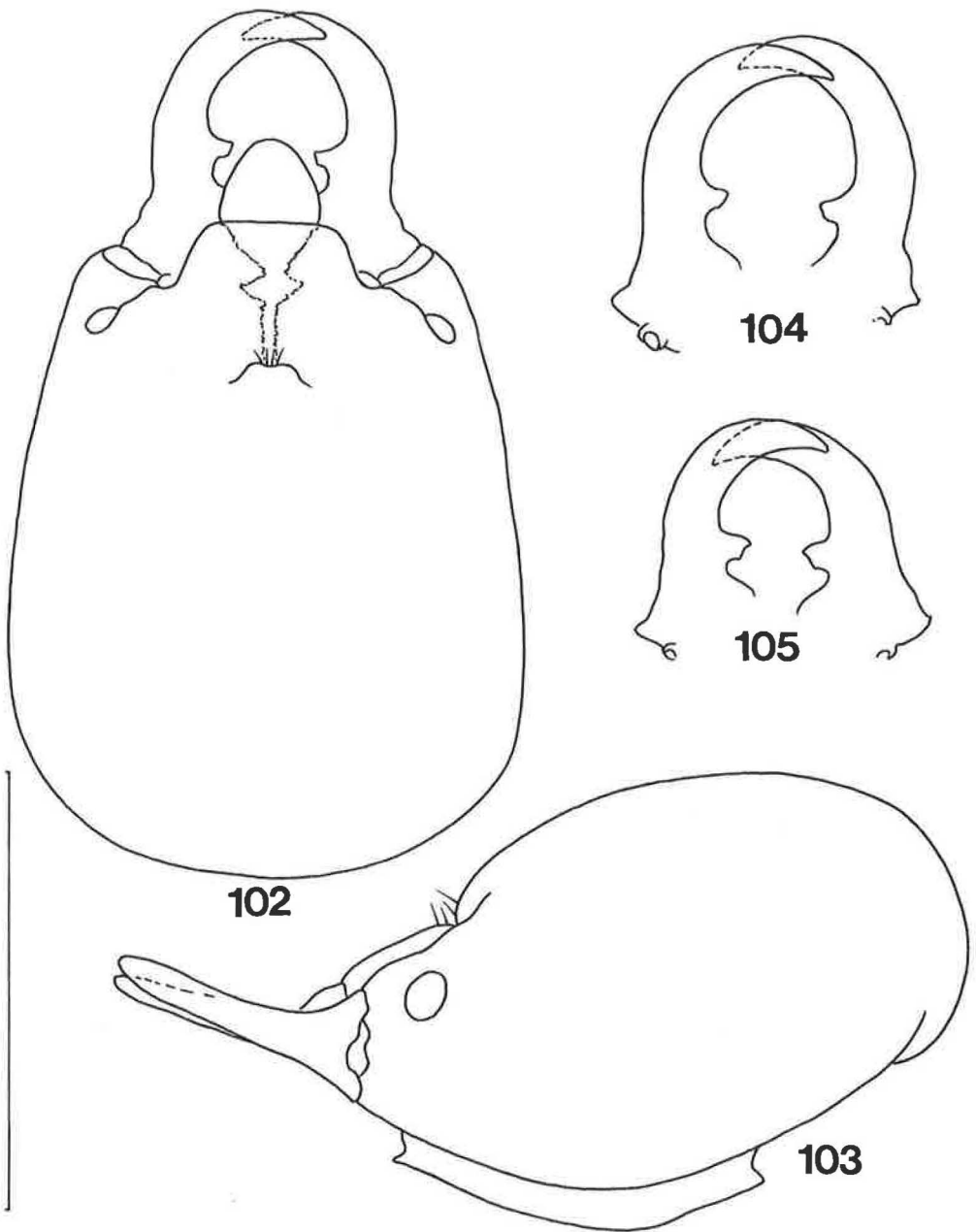
**Figures 88-94**

Worker caste of *A. desertorum*: 88, Fore coxa; 89, Gut entire; 90, Mixed segment enlarged to show attachment of Malpighian tubules and inflation of posterior termination of mesenteron; 91,92, Dorsal and 93,94, Ventral views of abdomens with guts *in situ*. Bars (left, gut entire, right, arrows indicate application) = 1 mm.



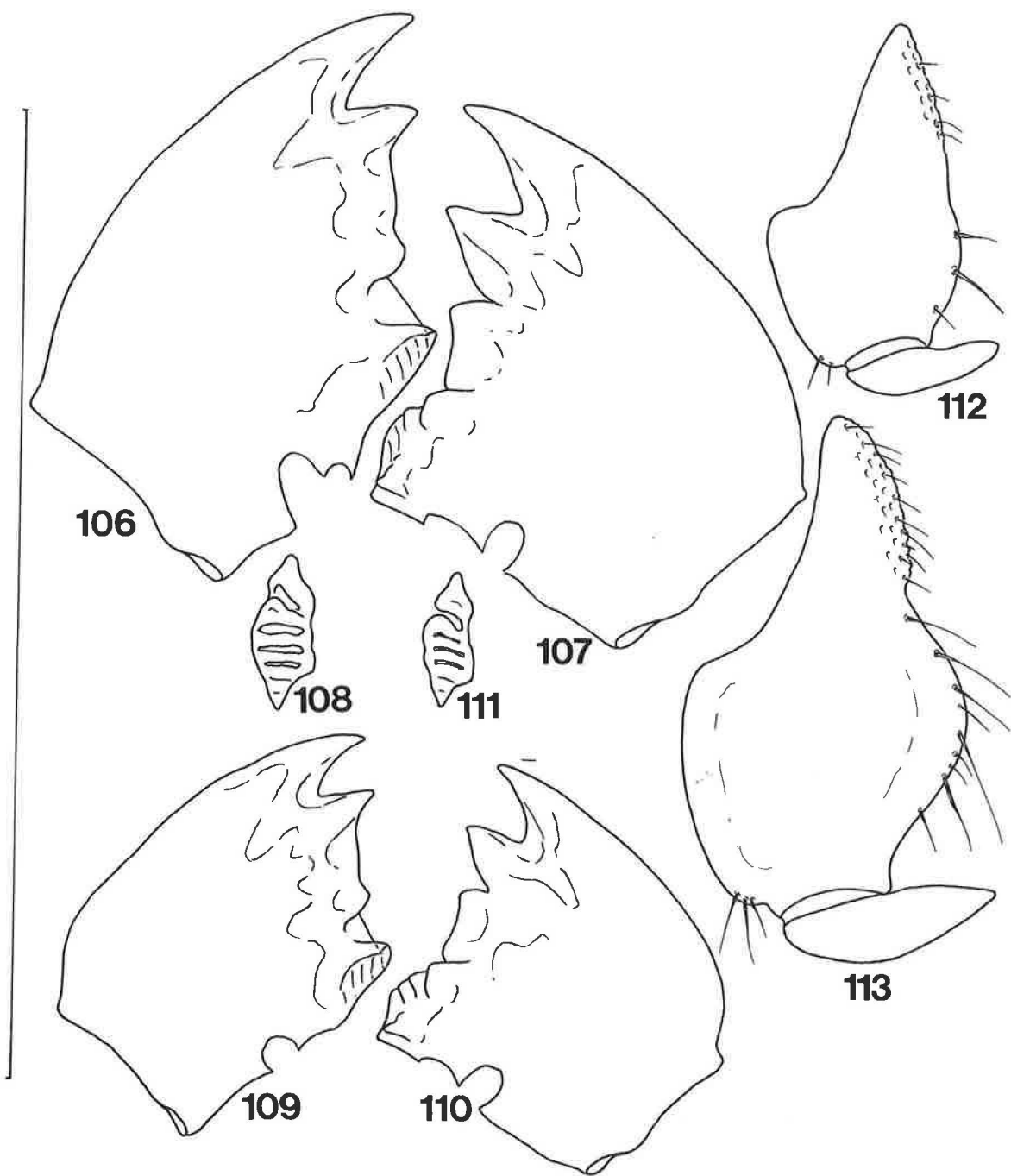
**Figures 95-101**

Imago of *A. evuncifer*: 95,96, Head capsule, front and side views; 97,98, Fontanelles enlarged to show variation; 99-101, Mandibles, 101, Molar view of right mandible. Bars (left, head, right, mandibles and fontanelles) = 1 mm.



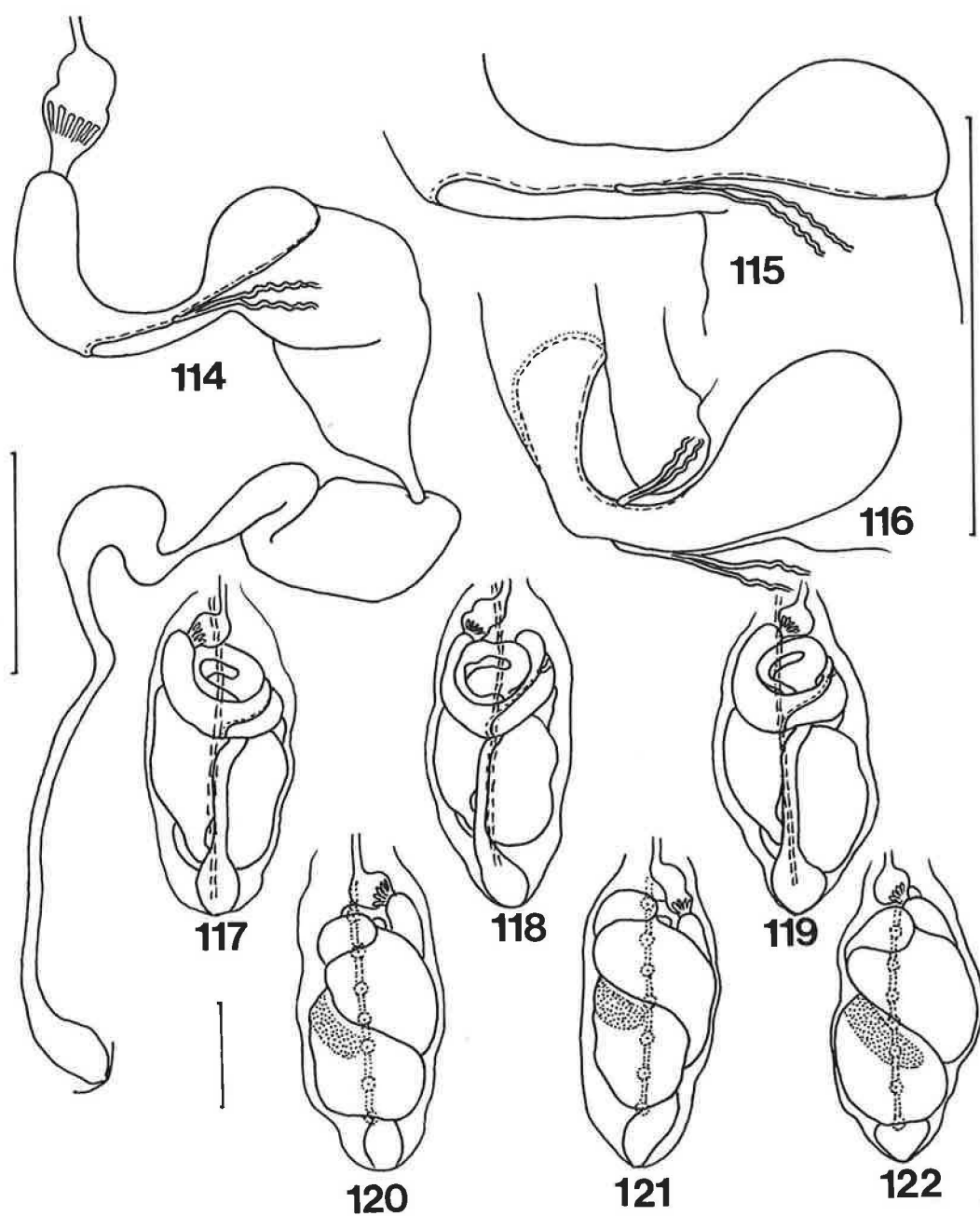
**Figures 102-105**

Soldier caste of *A. evuncifer*: 102,103, Head and mandibles in plan and profile; 104,105, Mandibles, variation. Bar (left) = 1 mm.



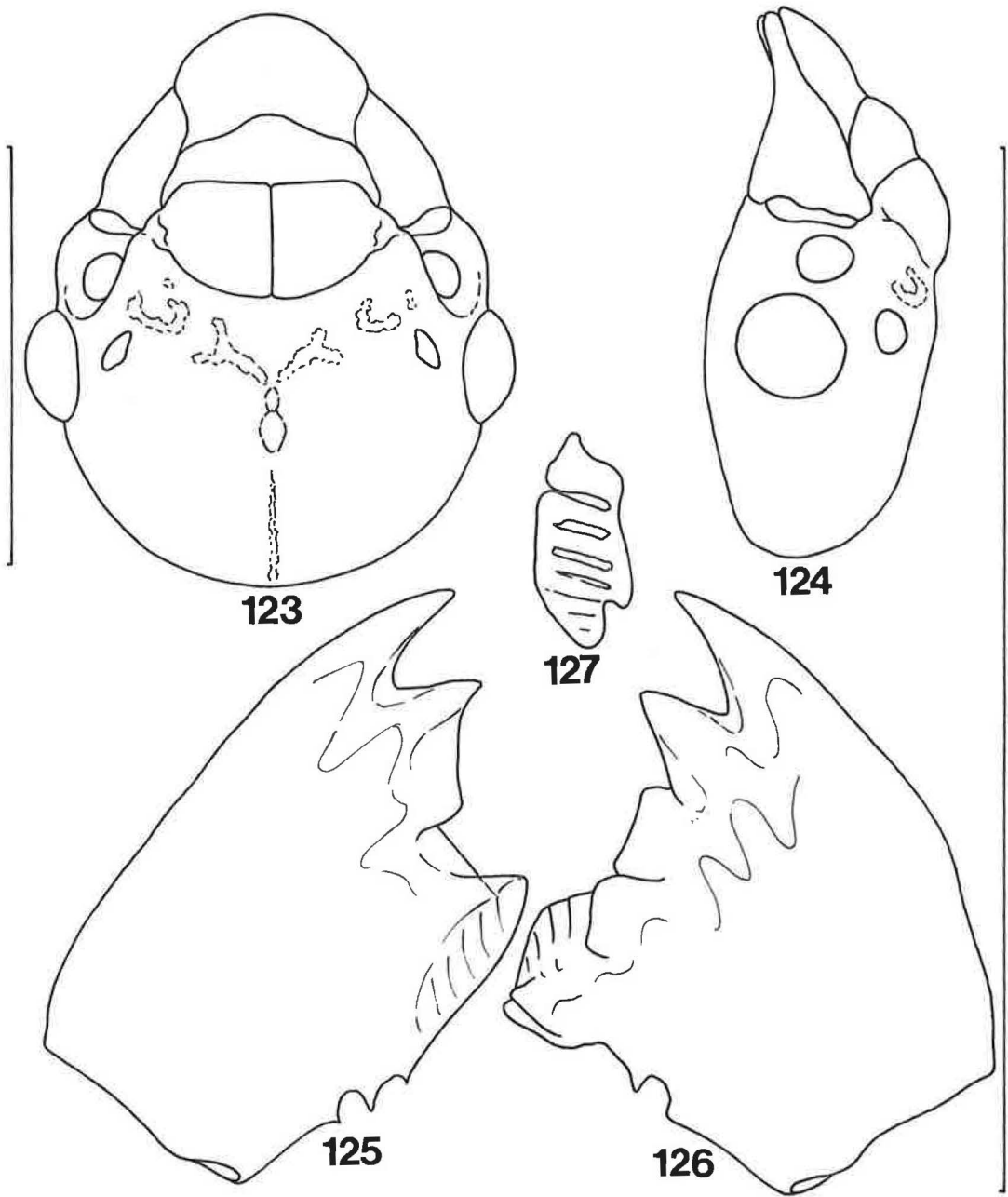
**Figures 106-113**

Worker castes of *A. evuncifer*: 106-108, Mandibles of late and 109-111, Early instars, 108,111, Right molar plates in surface view; 112, Fore coxa of early and 113, Late instars. Bar (left) = 1 mm.



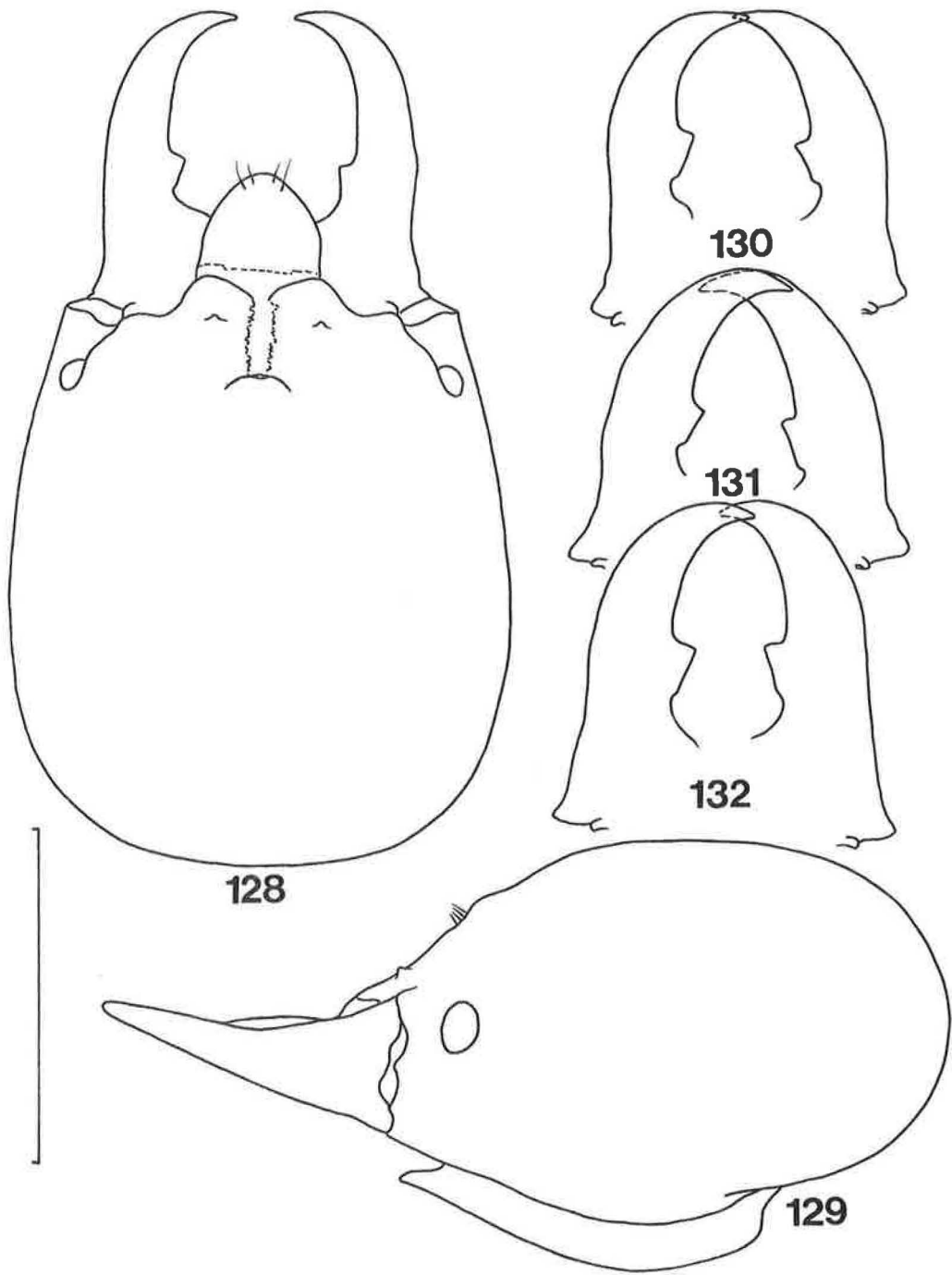
**Figures 114-122**

Worker caste of *A. evuncifer*: 114, Gut entire; 115,116, mixed segment enlarged to show least width, attachment of Malpighian tubules and inflation of posterior termination of mesenteron; 117-119, Dorsal and 120-122, Ventral views of abdomens with guts *in situ*. Bars (left, gut entire, right, mixed segments, bottom, abdomens) = 1 mm.



**Figures 123-127**

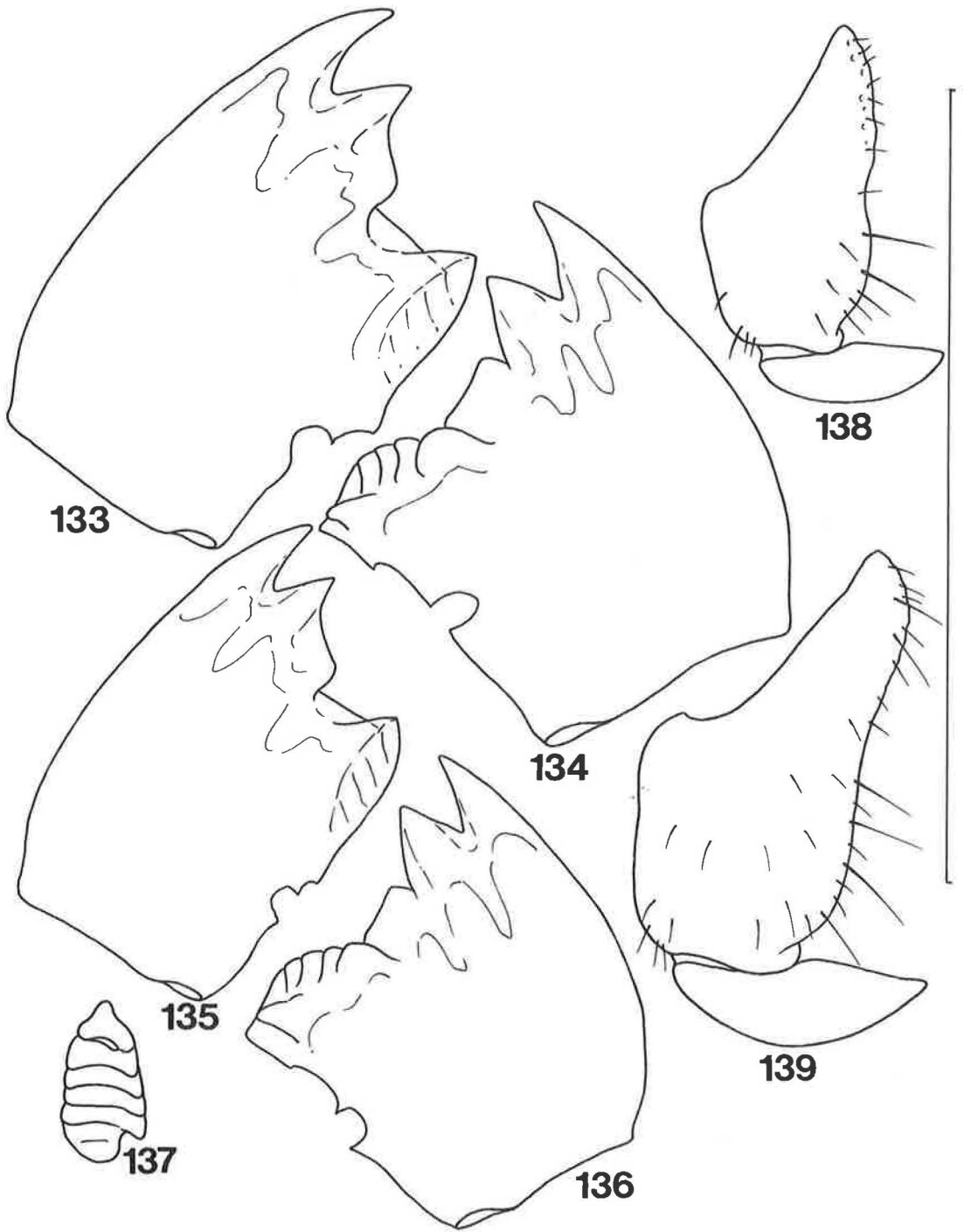
Imago of *A. gallagheri*: 123,124, Head capsule, front and side views; 125-127, Mandibles, 127, Right molar plate in surface view. Bars (right, mandibles and fontanelle, left, head) = 1 mm.



**Figures 128-132**

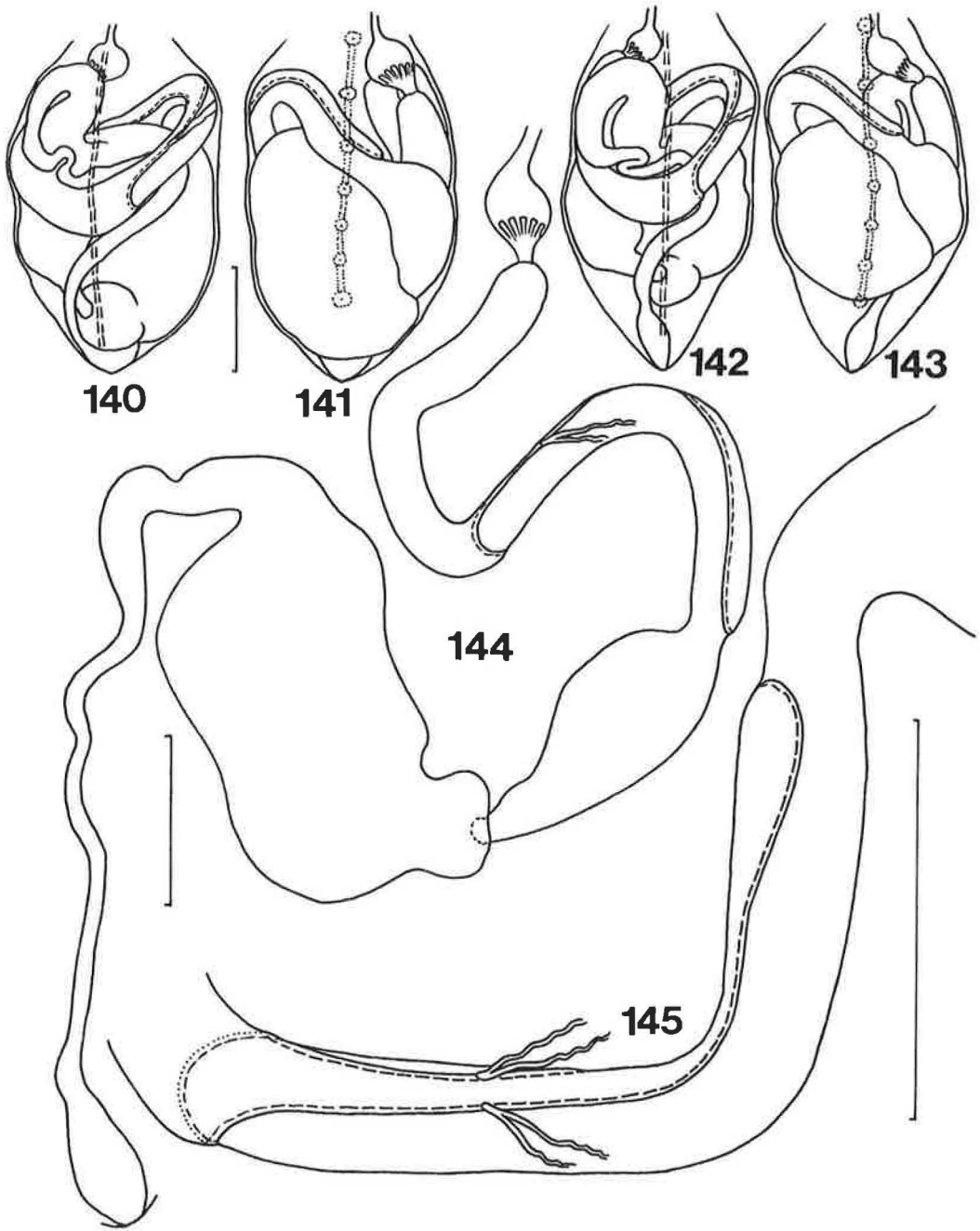
Soldier caste of *A. gallagheri*: 128,129, Head and mandibles, plan and profile; 130-132, Mandibles, variation. Bar (left) = 1 mm.



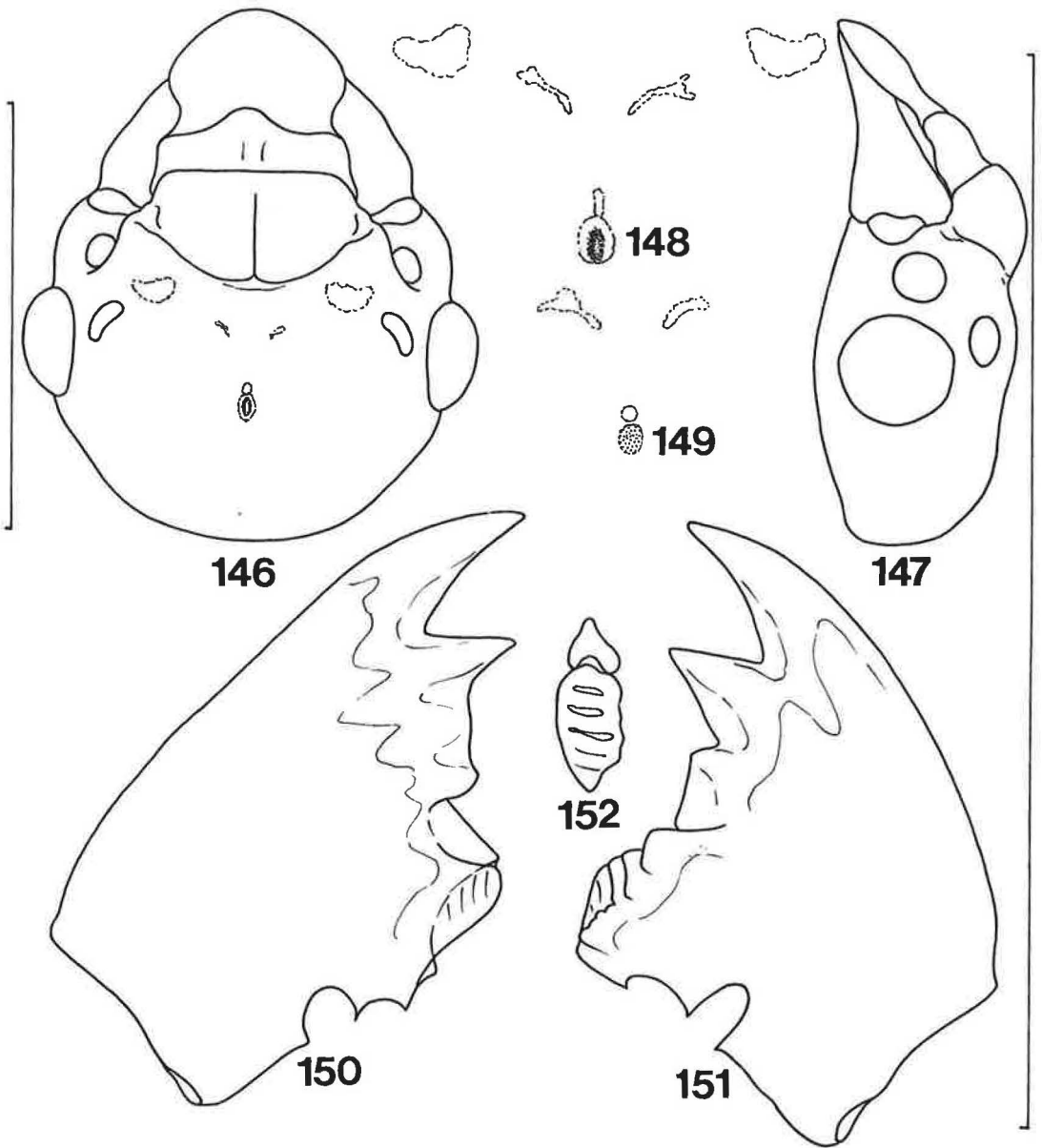


**Figures 133-139**

Worker castes of *A. gallagheri*: 133,134, Mandibles of late and 135-137, Early instars, 137, Right molar plate in surface view; 138, Fore coxa of early and, 139, Late instars. Bar (right) = 1 mm.

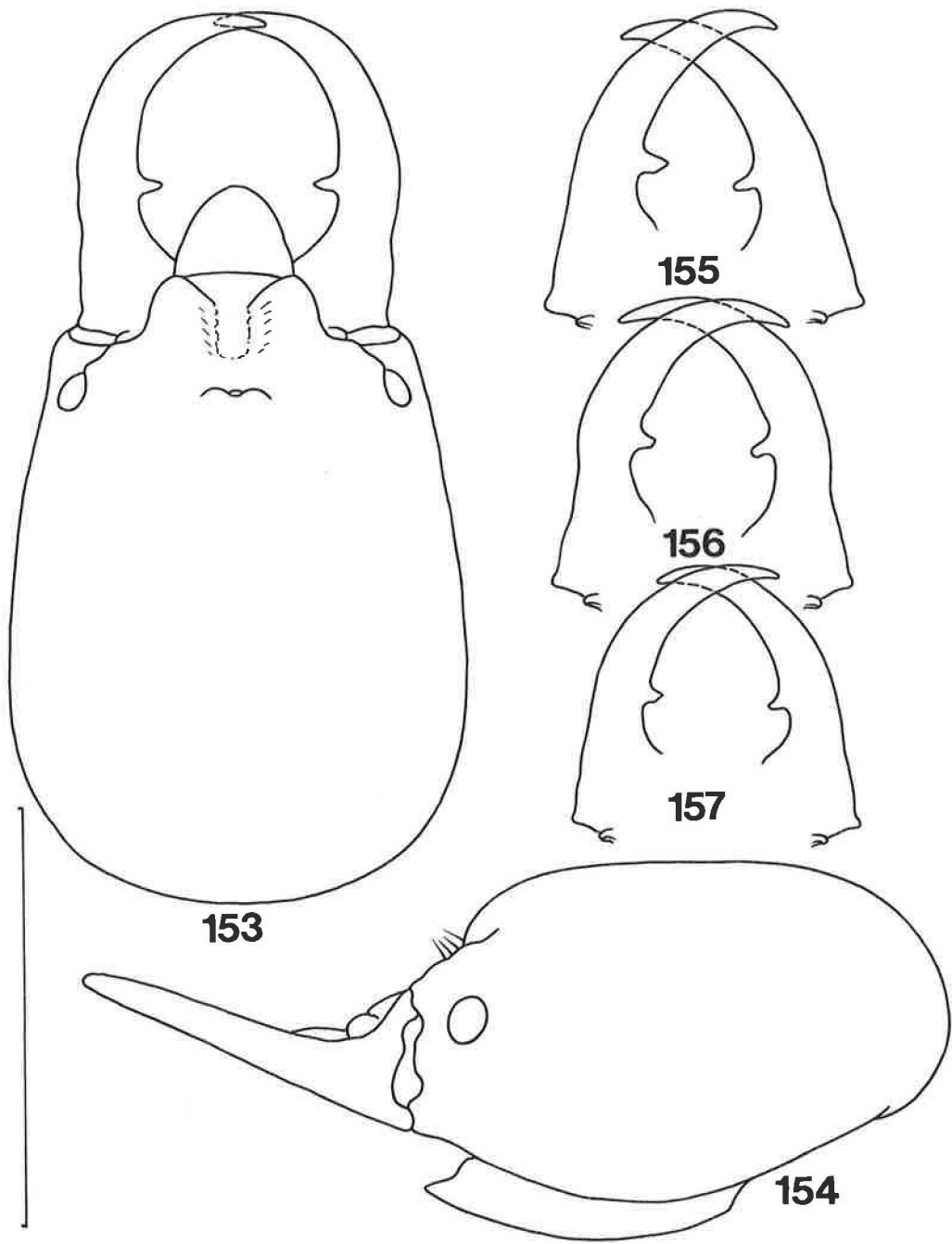


**Figures 140-145 Worker caste of *A. gallagheri*:** 140,142, Dorsal and 141,143, Ventral views of abdomens with guts *in situ*; 144, Gut entire; 145, Mixed segment enlarged to show least width of mesenteron and attachment of Malpighian tubules. Bars (top, abdomens, middle, gut entire, bottom right, mixed segment) = 1 mm.



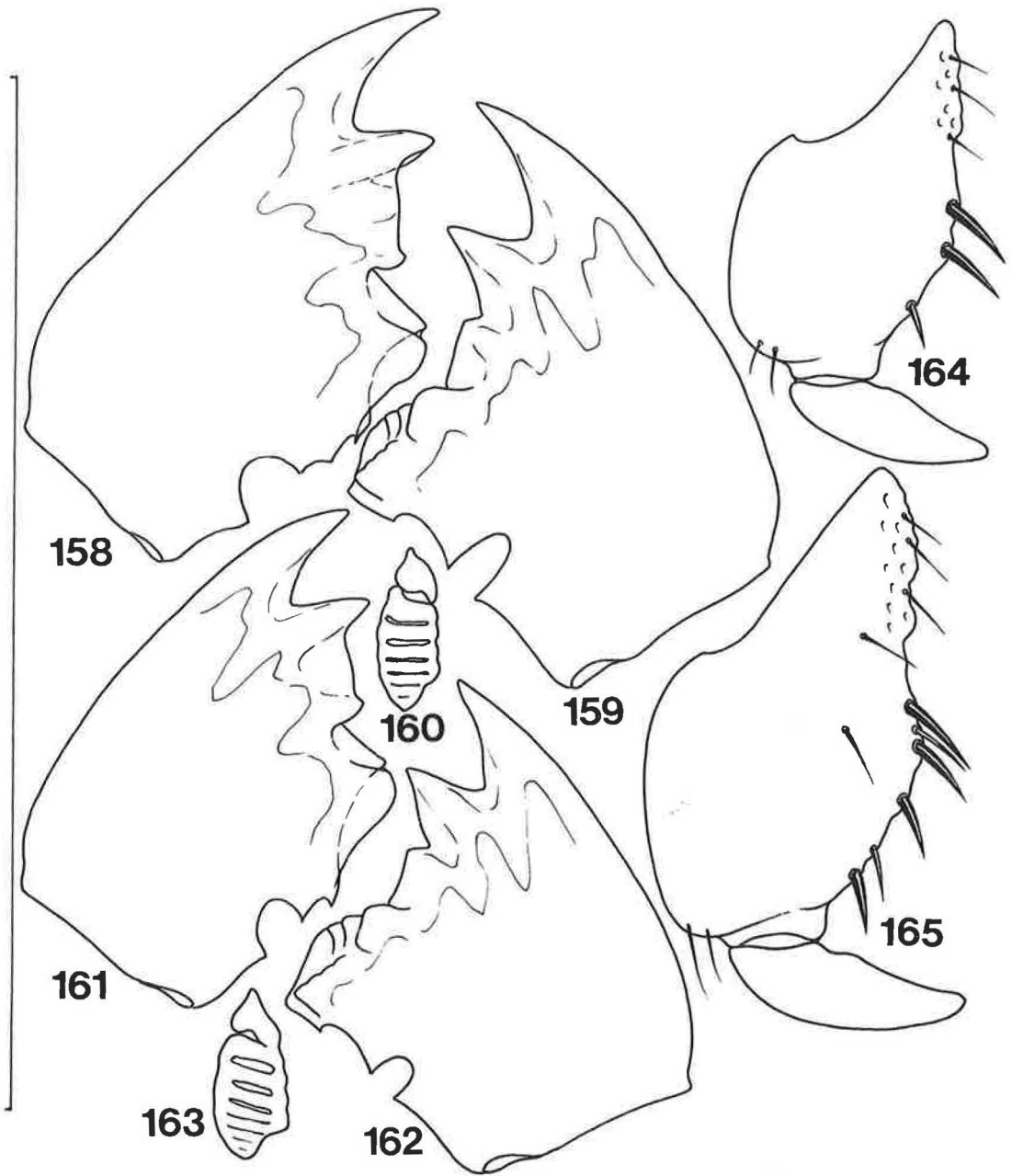
**Figures 146-151**

Imago of *A. guineensis*: 146,147, Head capsule, front and side views; 148,149, Fontanelles enlarged; 150-152, Mandibles, 152, Right molar plate, surface view. Bars (left, head, right, mandibles and fontanelle) = 1 mm.



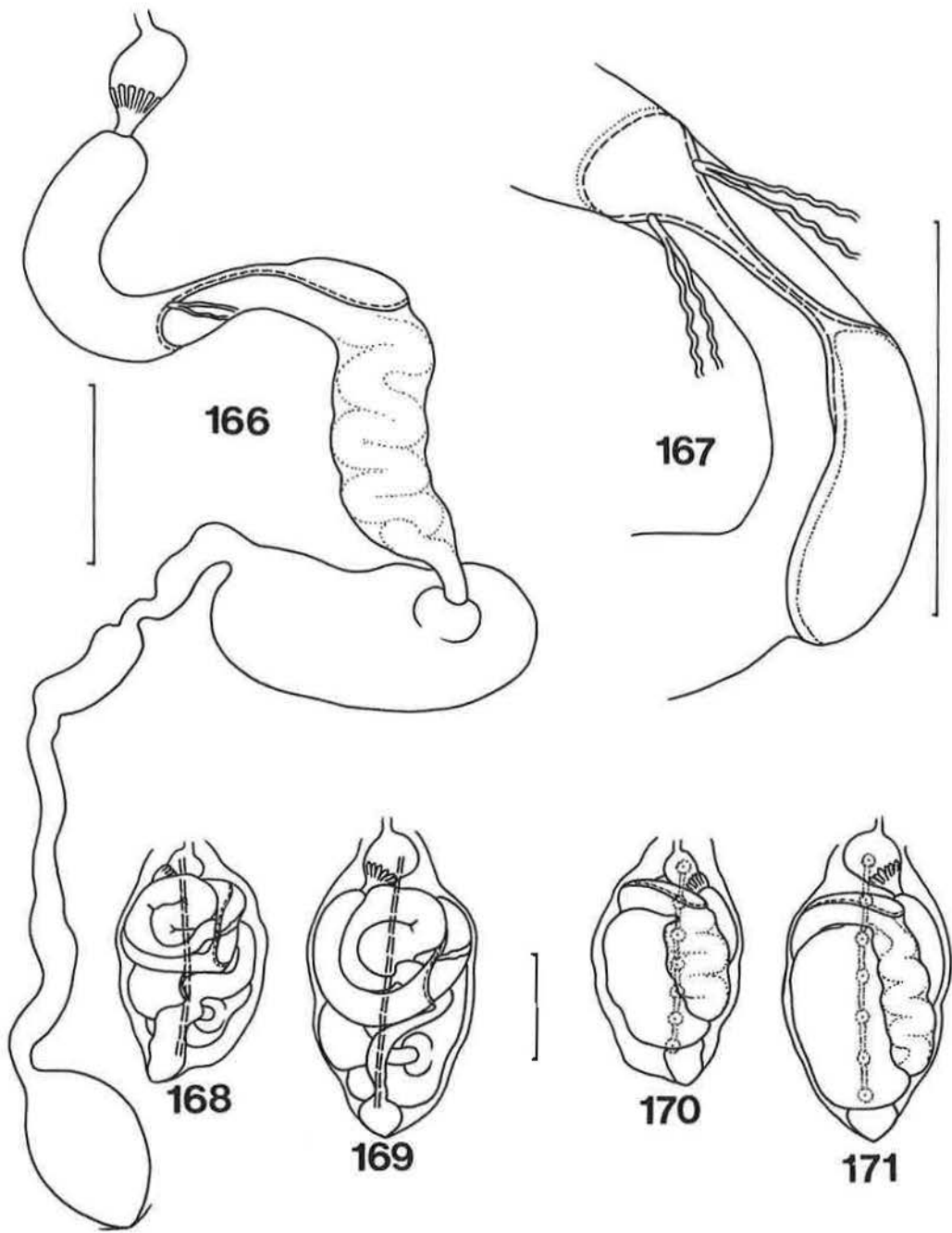
**Figures 153-157**

Soldier caste of *A. guineensis*: 153,154, Head and mandibles, plan and profile; 155-157, Mandibles, variation. Bar (left) = 1 mm.



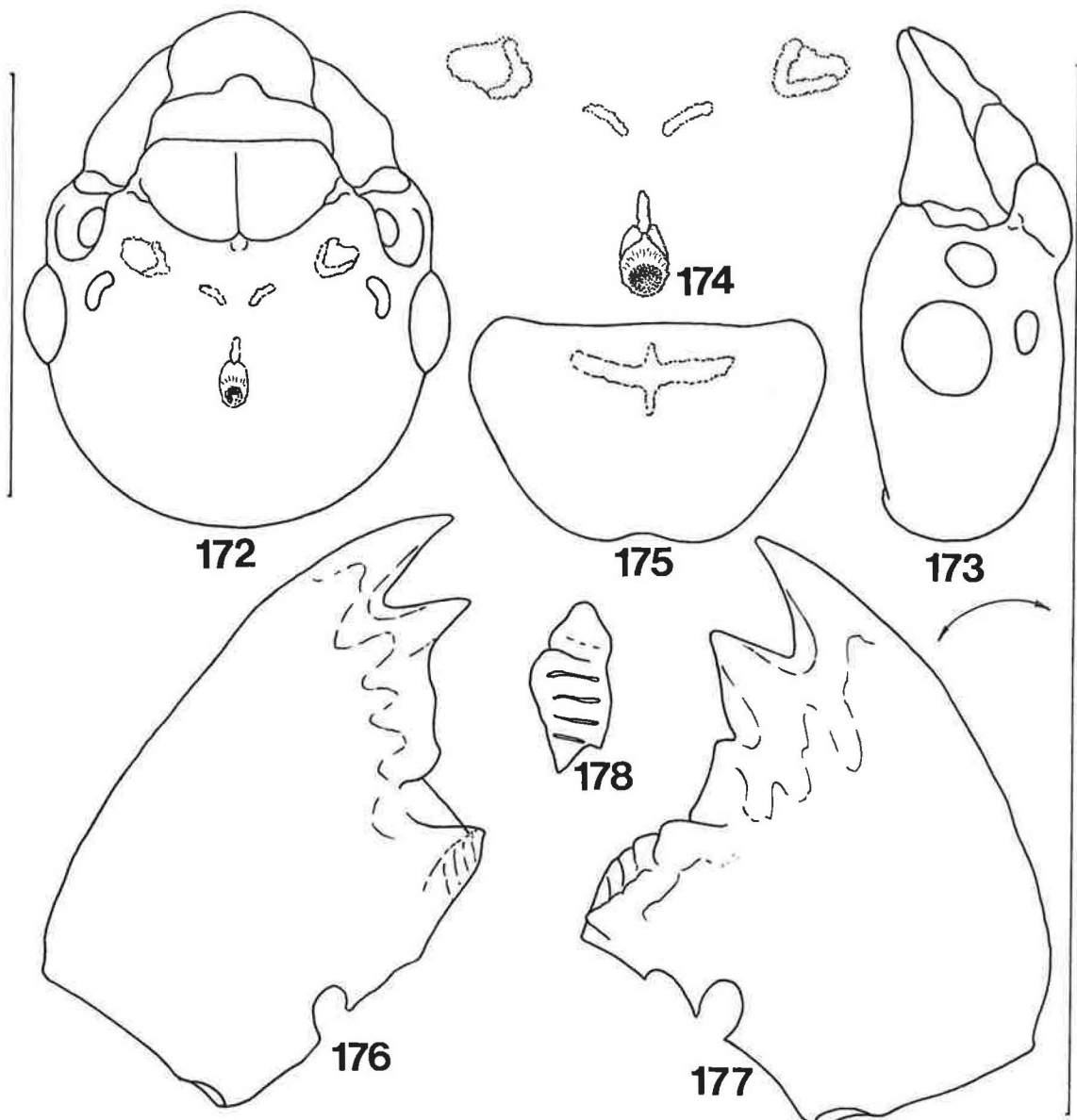
**Figures 158-165**

Worker castes of *A. guineensis*: 158-160, Mandibles of late and 161-163, Early instars, 160,163, Right molar plates in surface view; 164, Fore coxa of early and 165, Late instars. Bar (left) = 1 mm.



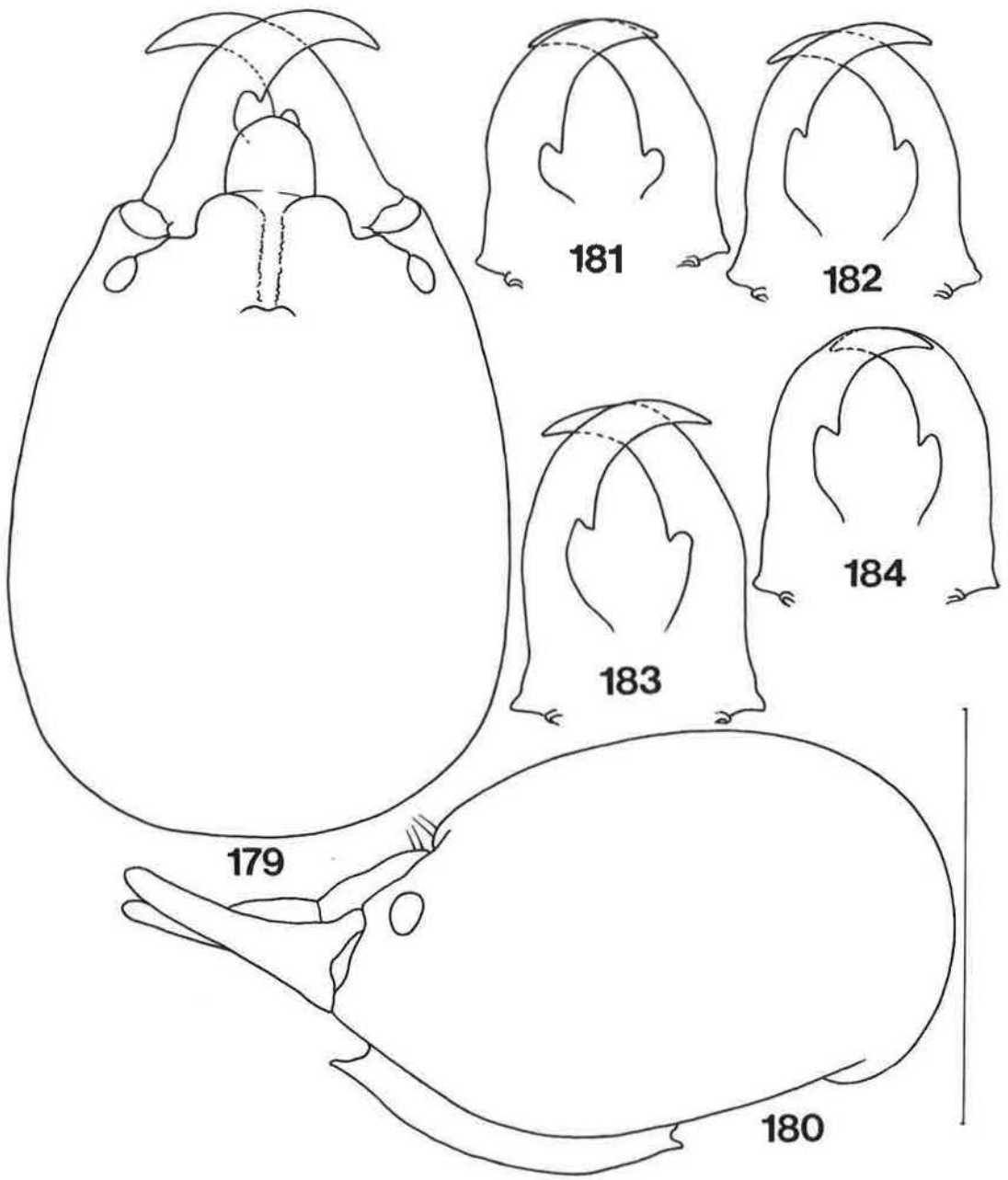
**Figures 166-171**

Worker caste of *A. guineensis*: 166, Gut entire; 167, Mixed segment enlarged to show least width of mesenteron and attachment of Malpighian tubules; 168, 169, Dorsal and 170, 171, Ventral views of abdomens with guts *in situ*. Bars (left, gut entire, right, mixed segments, bottom, abdomens) = 1 mm.



**Figures 172-178**

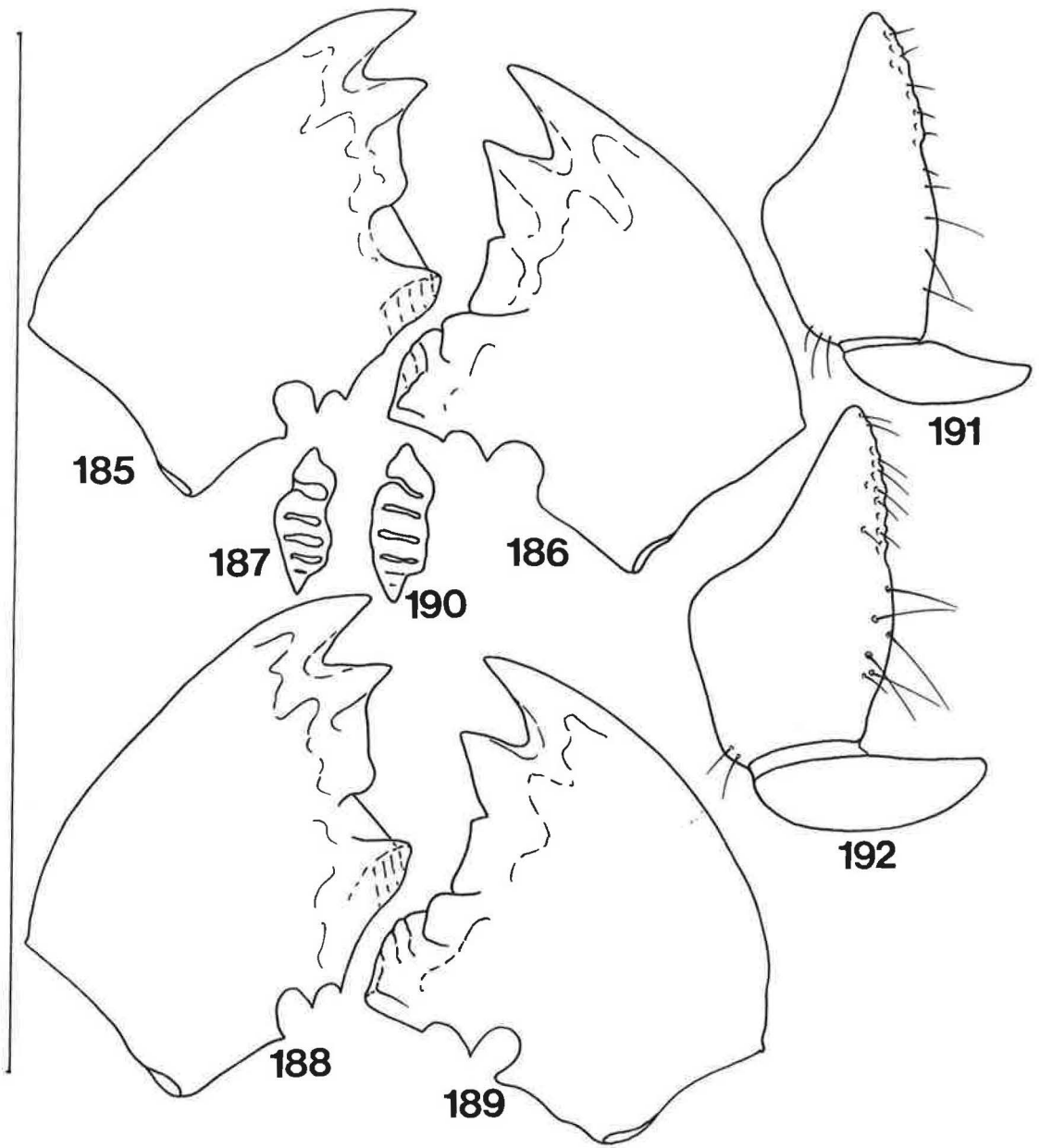
Imago of *A. hastatus*: 172,173, Head capsule, front and side views; 174, Fontanelle enlarged; 175, Pronotum, plan view; 176-178, Mandibles, 178, Right molar plate, surface view. Bars (left, head and pronotum, right, mandibles and fontanelle) = 1 mm.



**Figures 179-184**

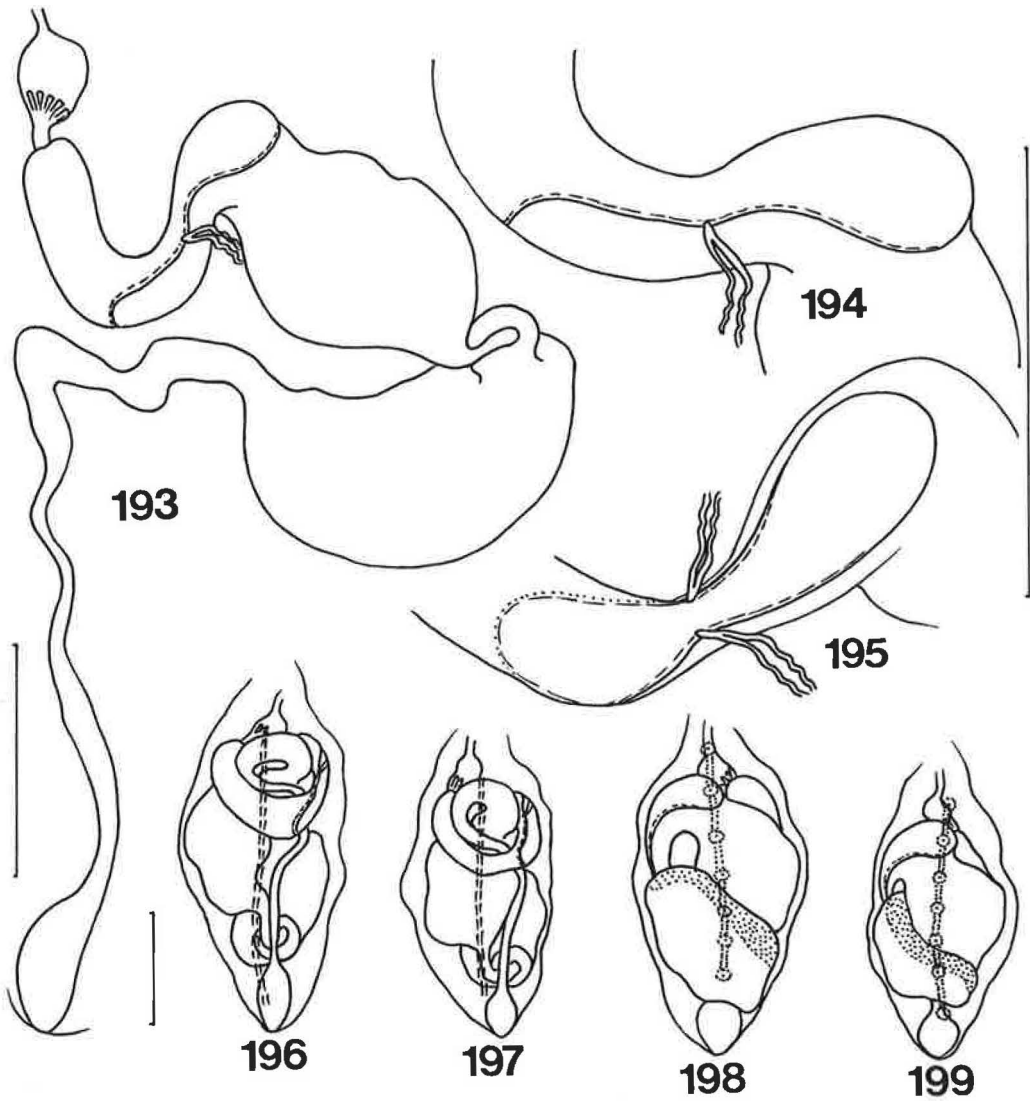
Soldier caste of *A. hastatus*: 179,180, Head and mandibles, plan and profile; 181-184, Mandibles, variation. Bar (right) = 1 mm.





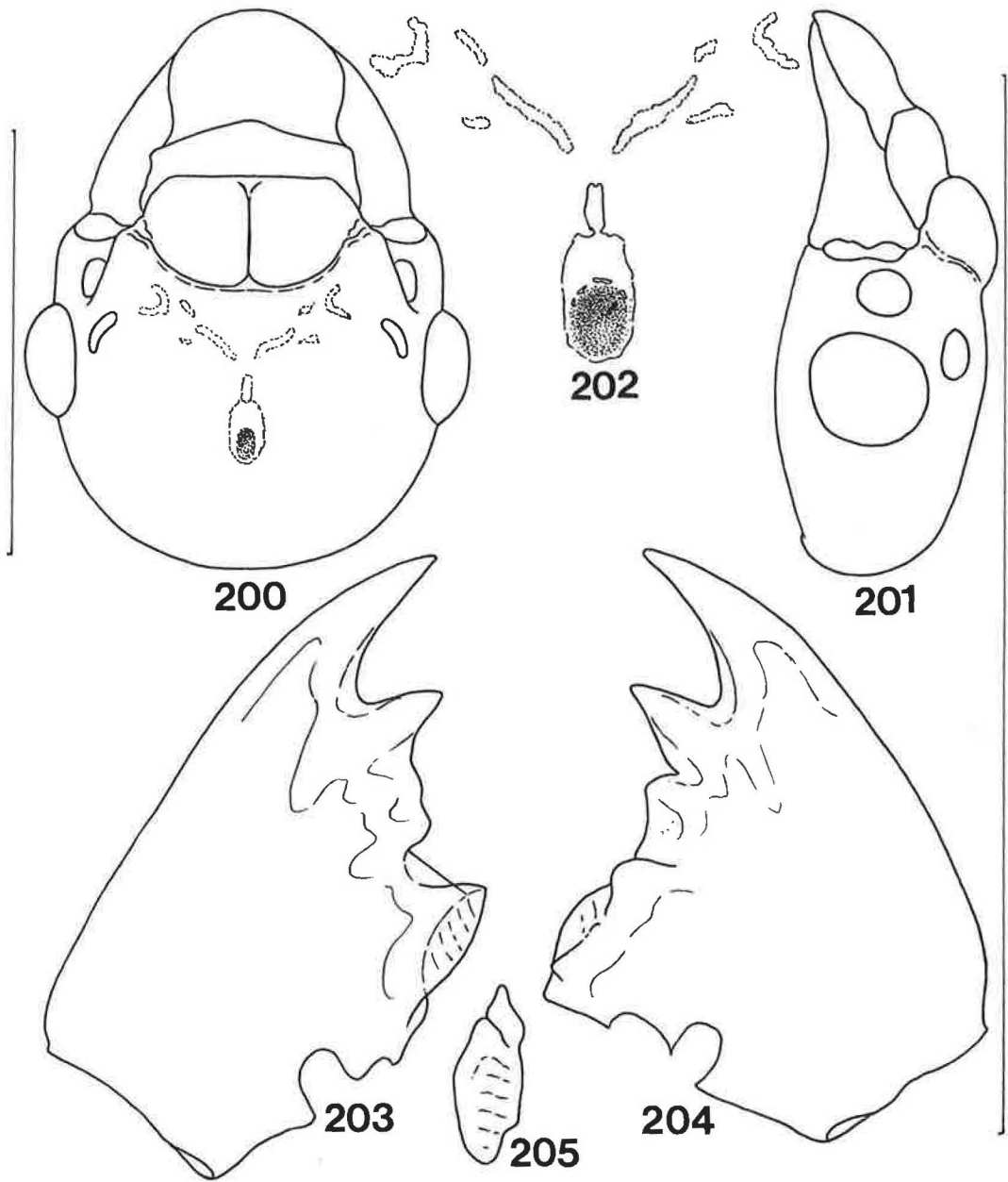
**Figures 185-192**

Worker castes of *A. hastatus*: 185-187, Mandibles of late and 188-190, Early instars, 187,190, Right molar plates in surface view; 191, Fore coxa of early and 192, Late instars. Bar (left) = 1 mm.



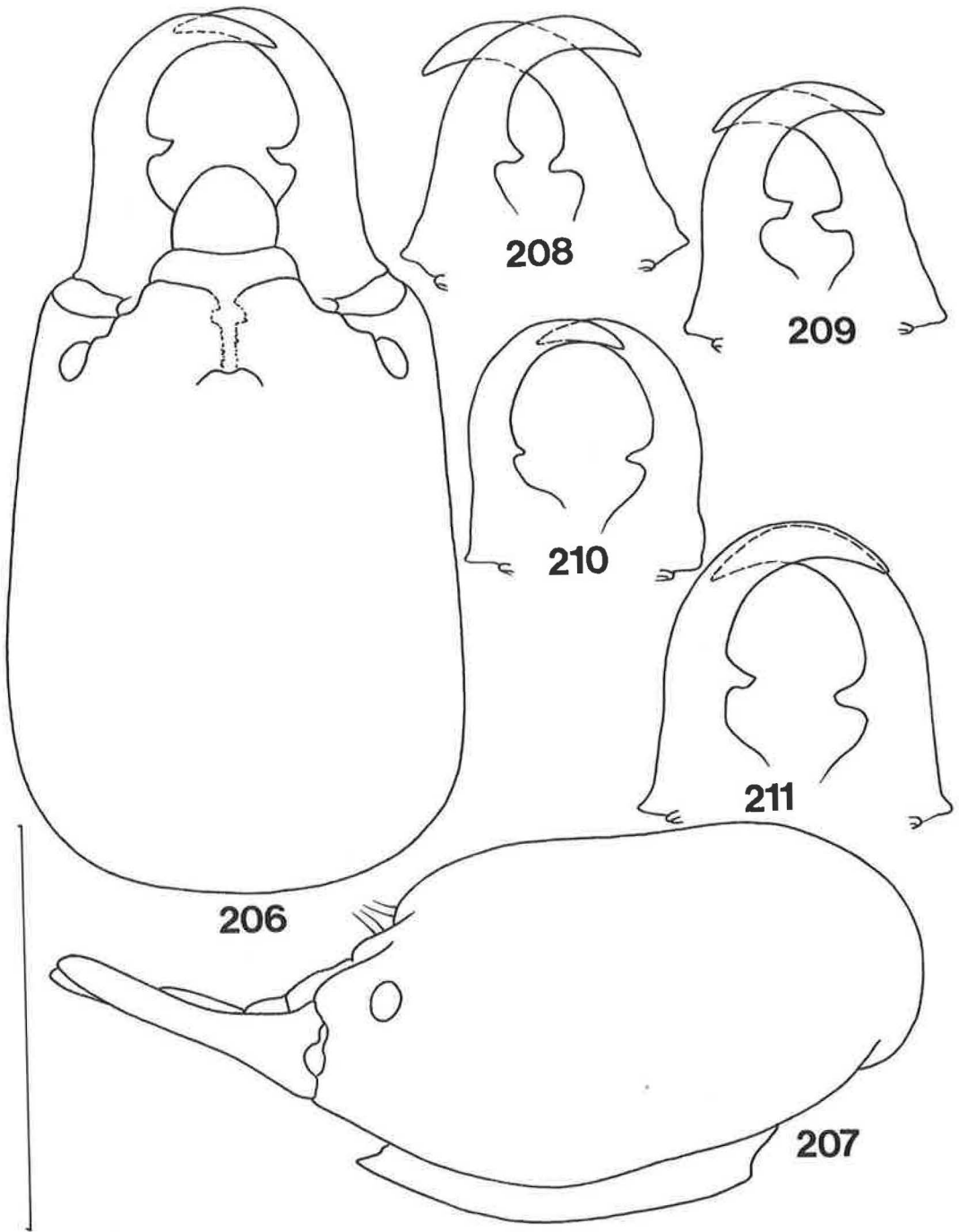
**Figures 193-199**

Worker caste of *A. hastatus*: 193, Gut entire; 194,195, Mixed segment enlarged to show least width of mesenteron and attachment of Malpighian tubules; 196,197, Dorsal and 198,199, Ventral views of abdomens with guts *in situ*. Bars (left, gut entire, right, mixed segments, bottom, abdomens) = 1 mm.



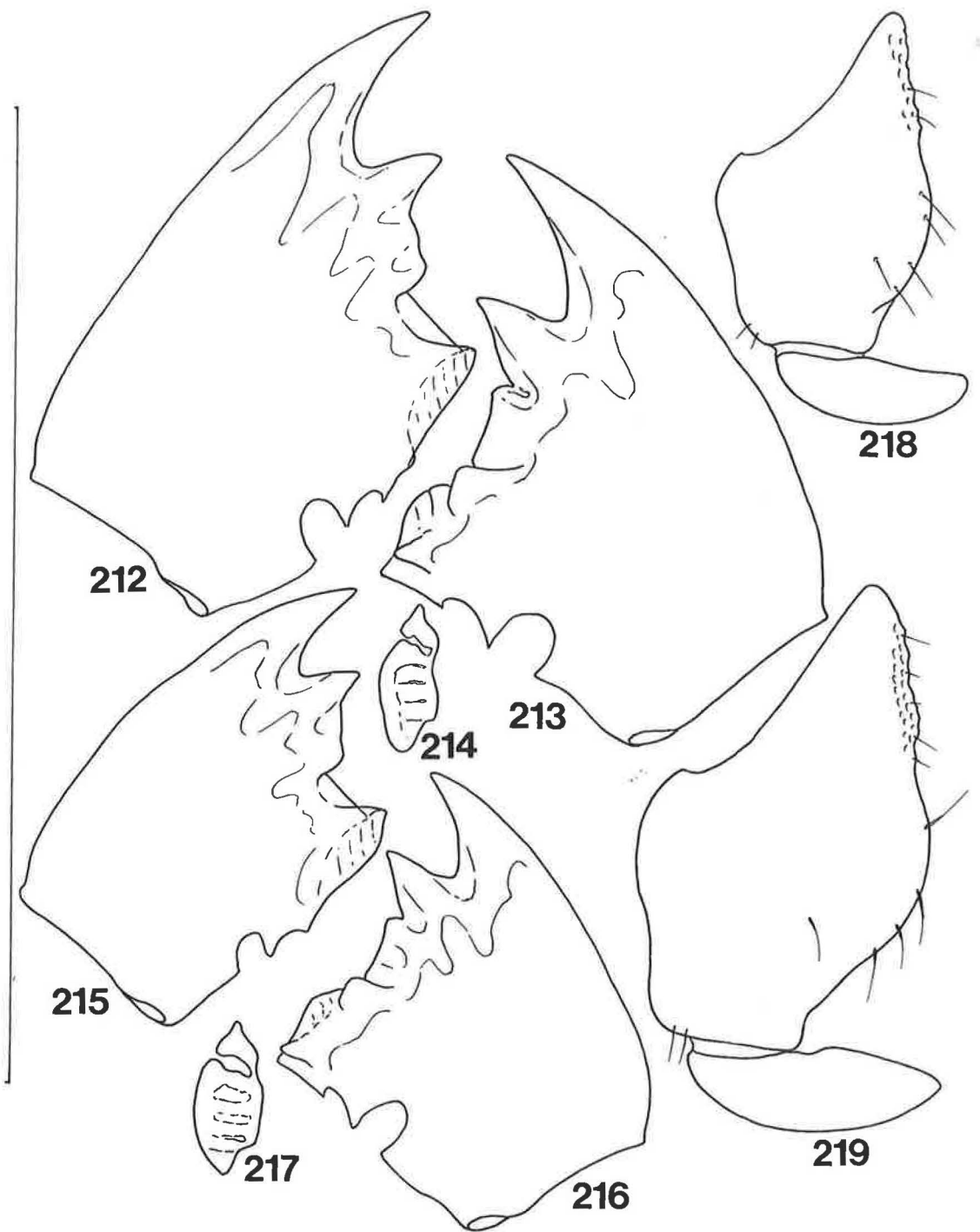
**Figures 200-205**

Imago of *A. importunus*: 200,201, Head capsule, front and side views; 202, Fontanelle, enlarged; 203-205, Mandibles, 205, Right molar plate, surface view. Bars (left, head, right, mandibles and fontanelle) = 1 mm.



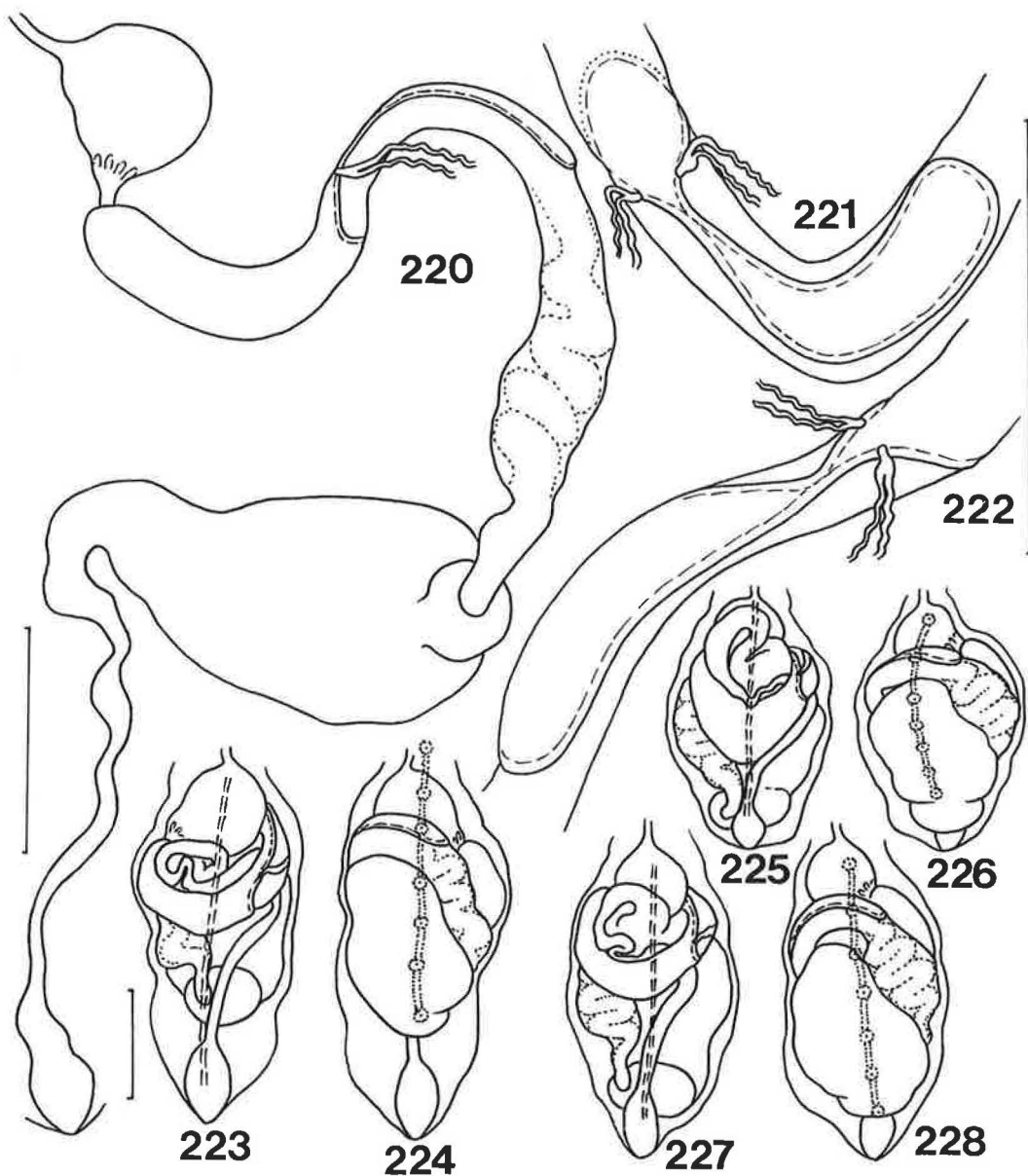
**Figures 206-211**

Soldier caste of *A. importunus*: 206,207, Head and mandibles in plan and profile; 208-211, Mandibles, variation. Bar (left) = 1 mm.



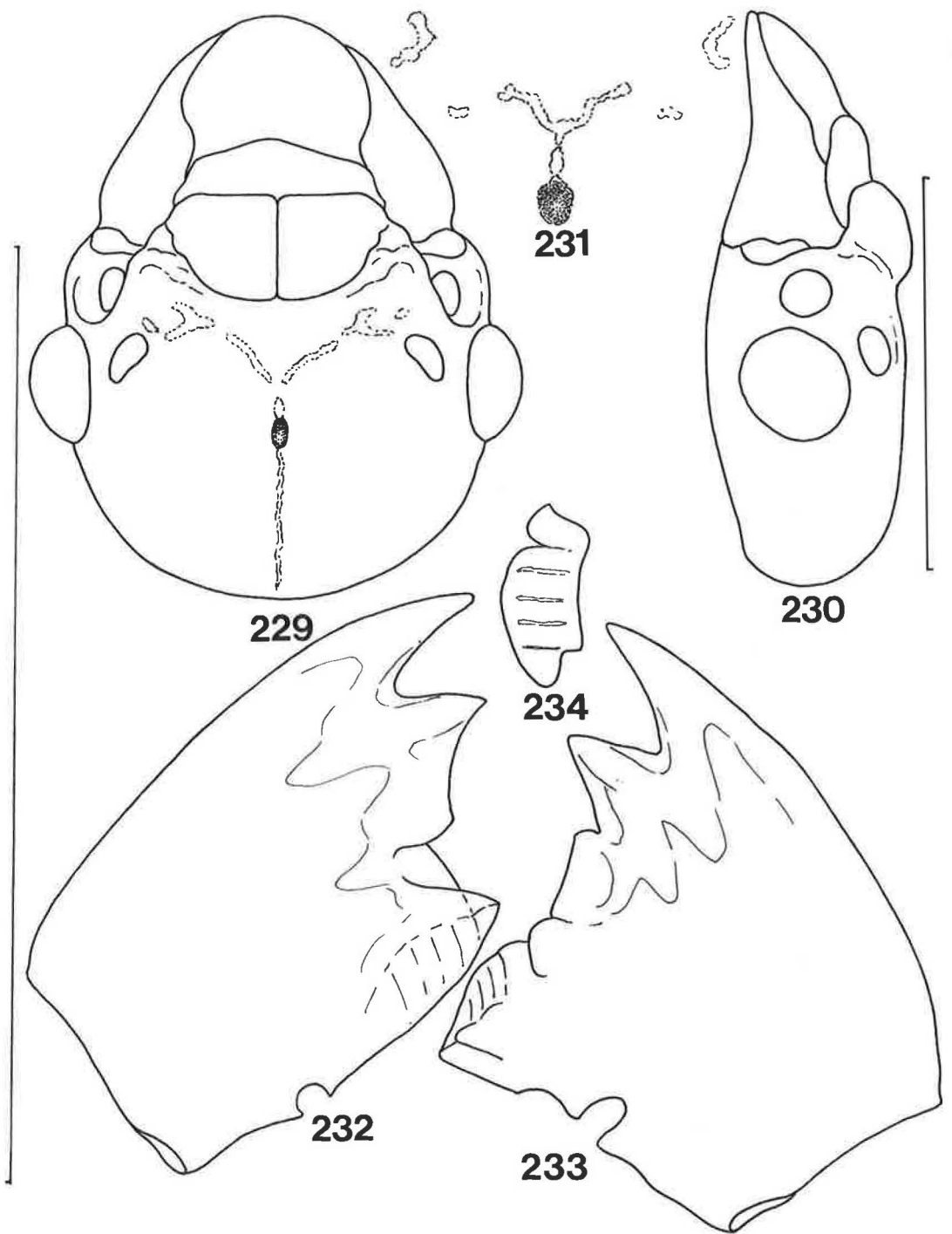
**Figures 212-219**

Worker castes of *A. importunus*: 212-214, Mandibles of late and 215-217, Early instars, 214, 217, Right molar plates in surface view; 218, Fore coxa of early and 219, Late instars. Bar (left) = 1 mm.



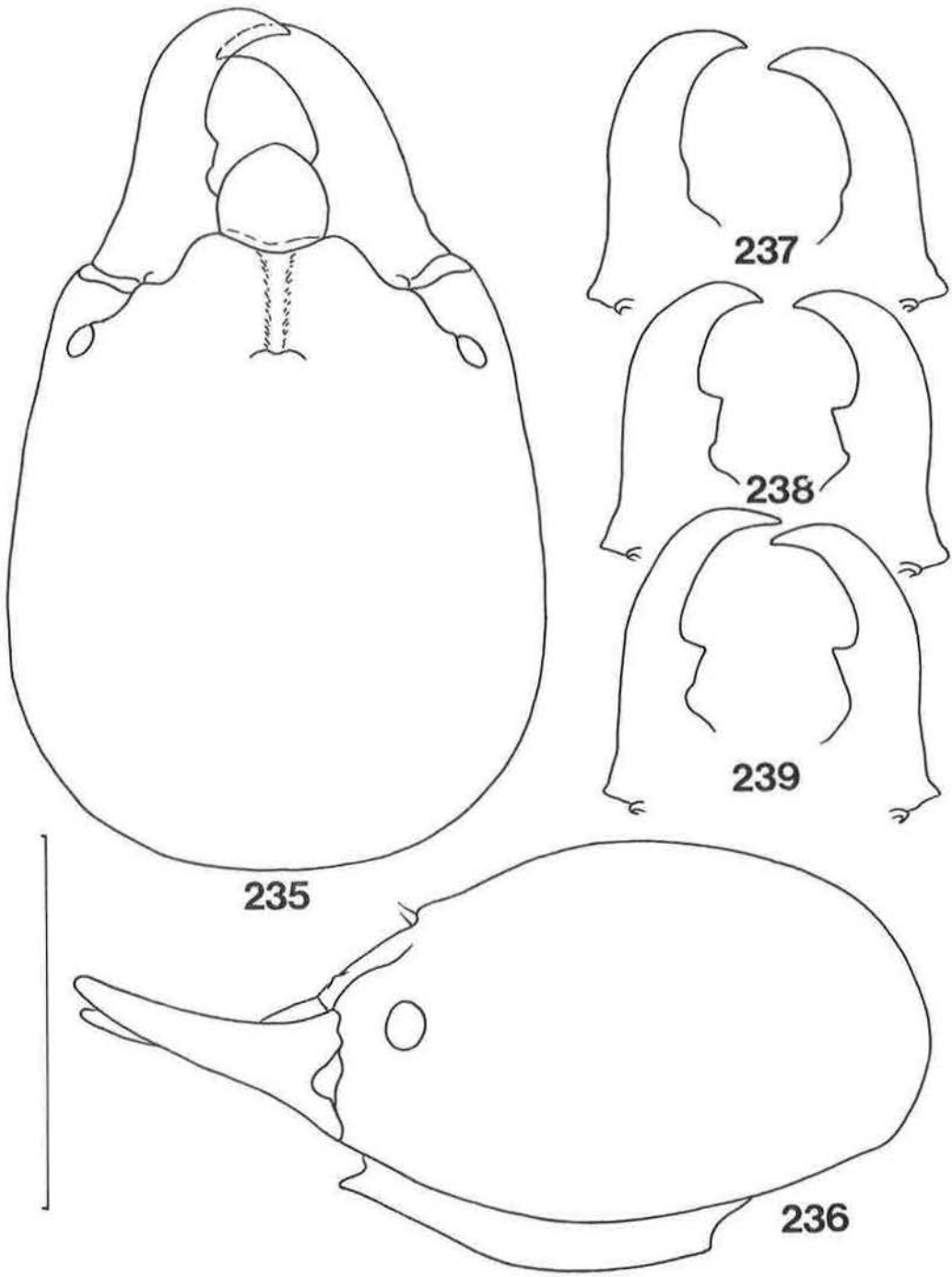
**Figures 220-228**

Worker caste of *A. importunus*: 220, Gut entire; 221,222, Mixed segment enlarged to show least width of mesenteron and attachment of Malpighian tubules; 223,225,227, Dorsal and 224,226,228, Ventral views of abdomens with guts *in situ*. Bars (left, gut entire, right, mixed segments, bottom, abdomens) = 1 mm.



**Figures 229-234**

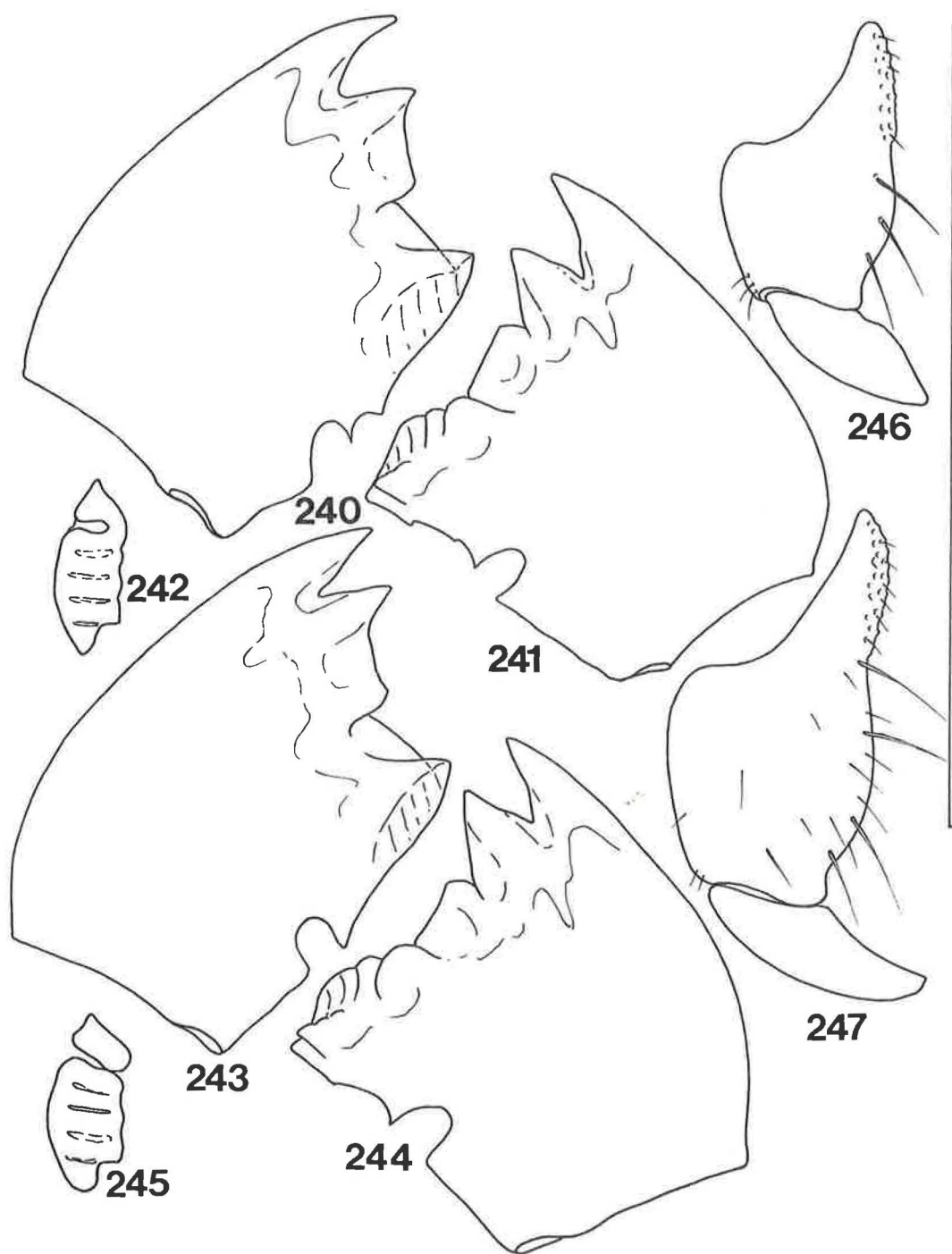
Imago of *A. loennbergianus*: 229,230, Head capsule, front and side views; 231, Fontanelle, enlarged; 232-234, Mandibles, 234, Right molar plate, surface view. Bars (left, mandibles and fontanelle, right, head) = 1 mm.



**Figures 235-239**

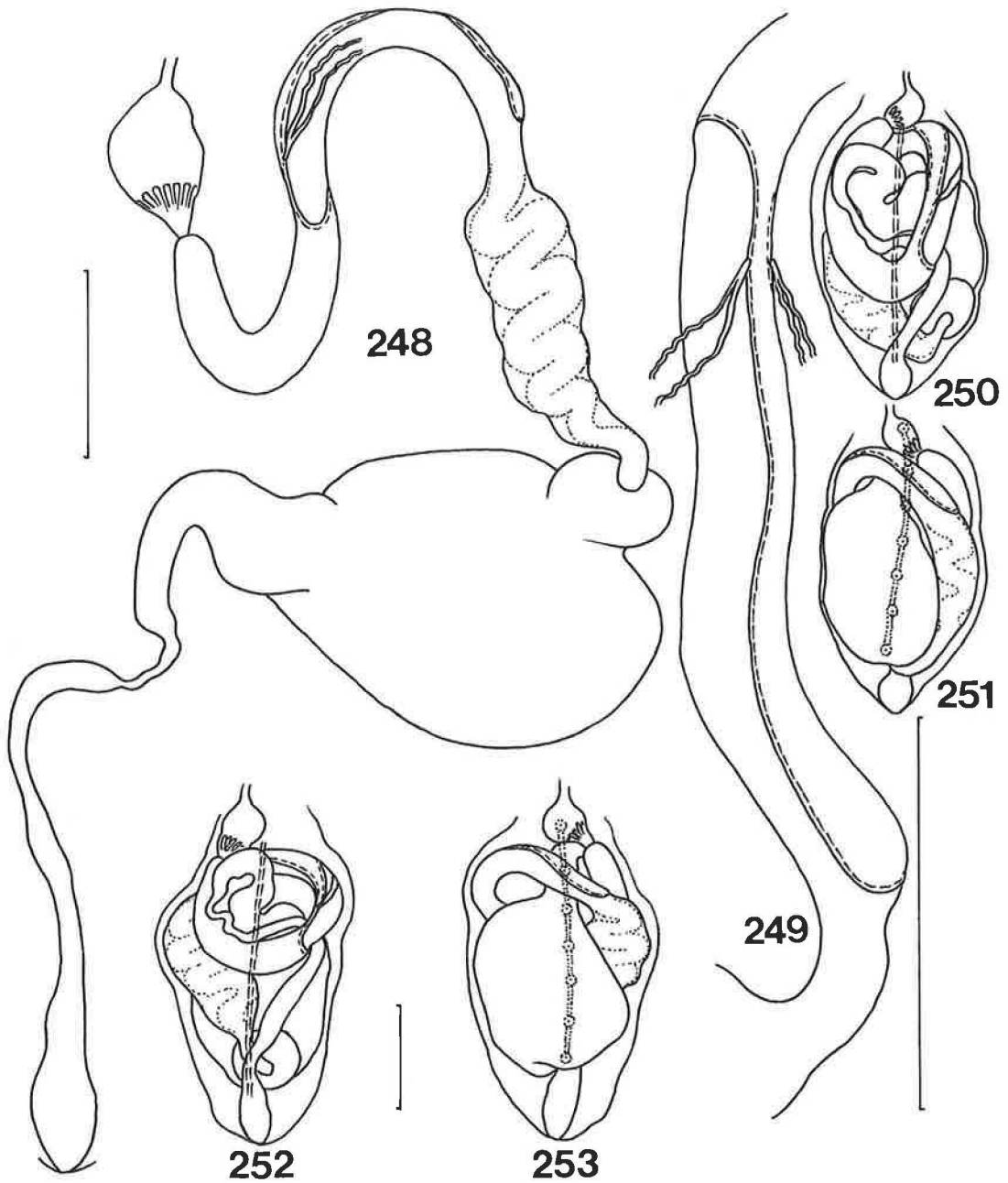
Soldier caste of *A. loennbergianus*: 235,236, Head and mandibles, plan and profile; 237-239, Mandibles, variation. Bar (left) = 1 mm.





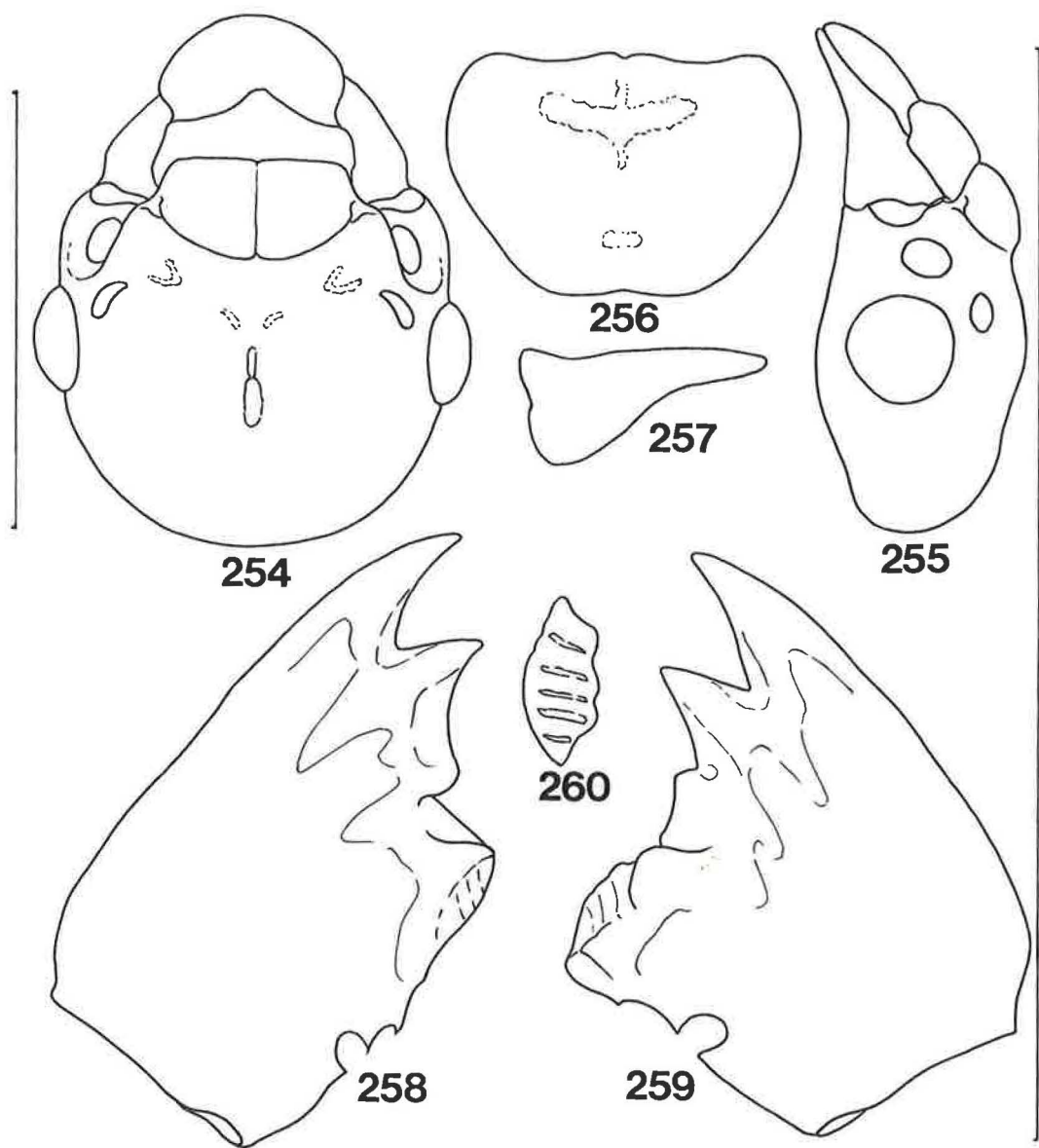
**Figures 240-247**

Worker castes of *A. loennbergianus*: 240-242, Mandibles of late and 243-245, Early instars, 242,245, Right molar plates in surface view; 246, Fore coxa of early and, 247, Late instars. Bar (right) = 1 mm.



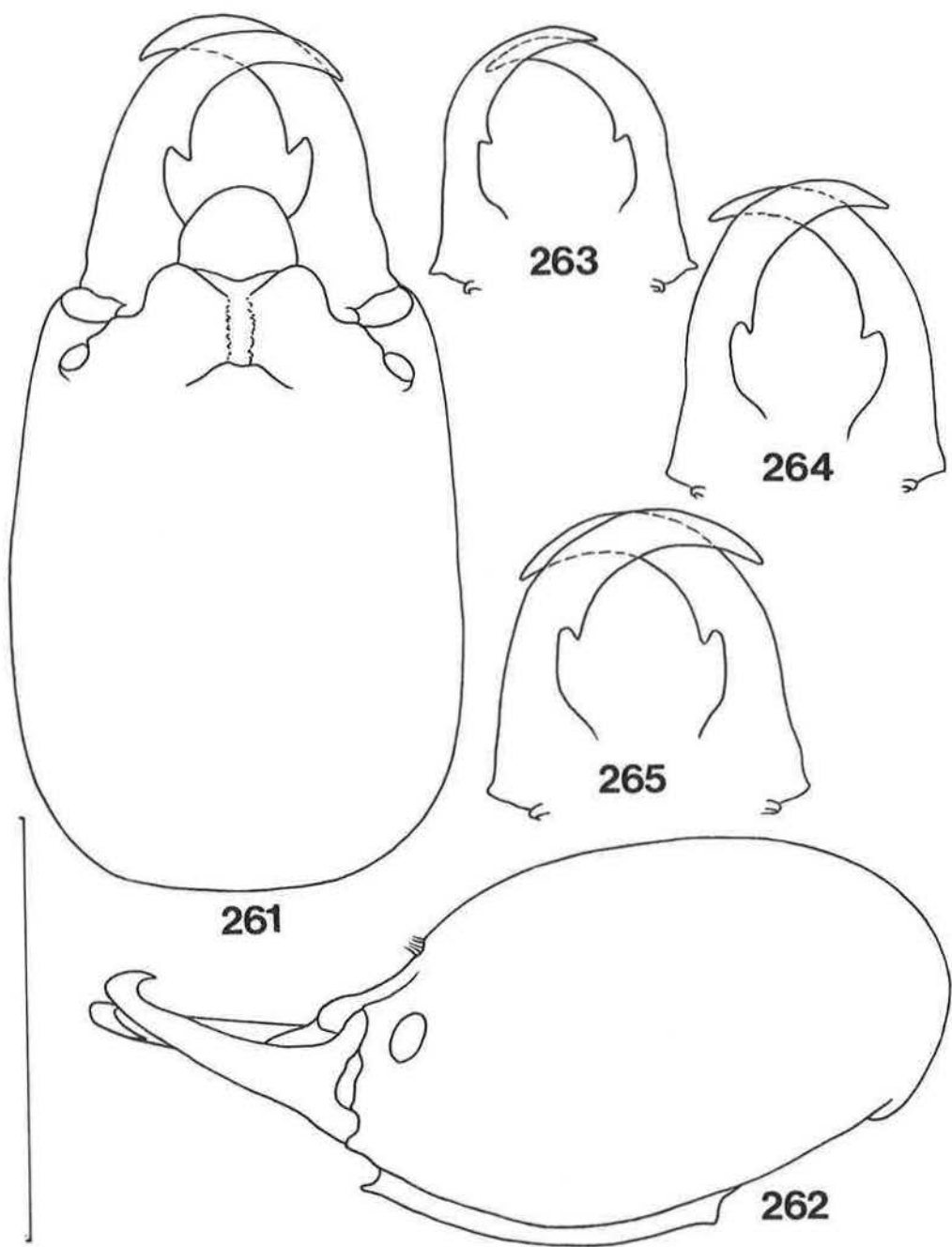
**Figures 248-253**

Worker caste of *A. loennbergianus*: 248, Gut entire; 249, Mixed segment enlarged to show least width of mesenteron and attachment of Malpighian tubules; 250,252, Dorsal and 251,253; Ventral views of abdomens with guts *in situ*. Bars (left, gut entire, bottom right, mixed segment, bottom middle, abdomens) = 1 mm.



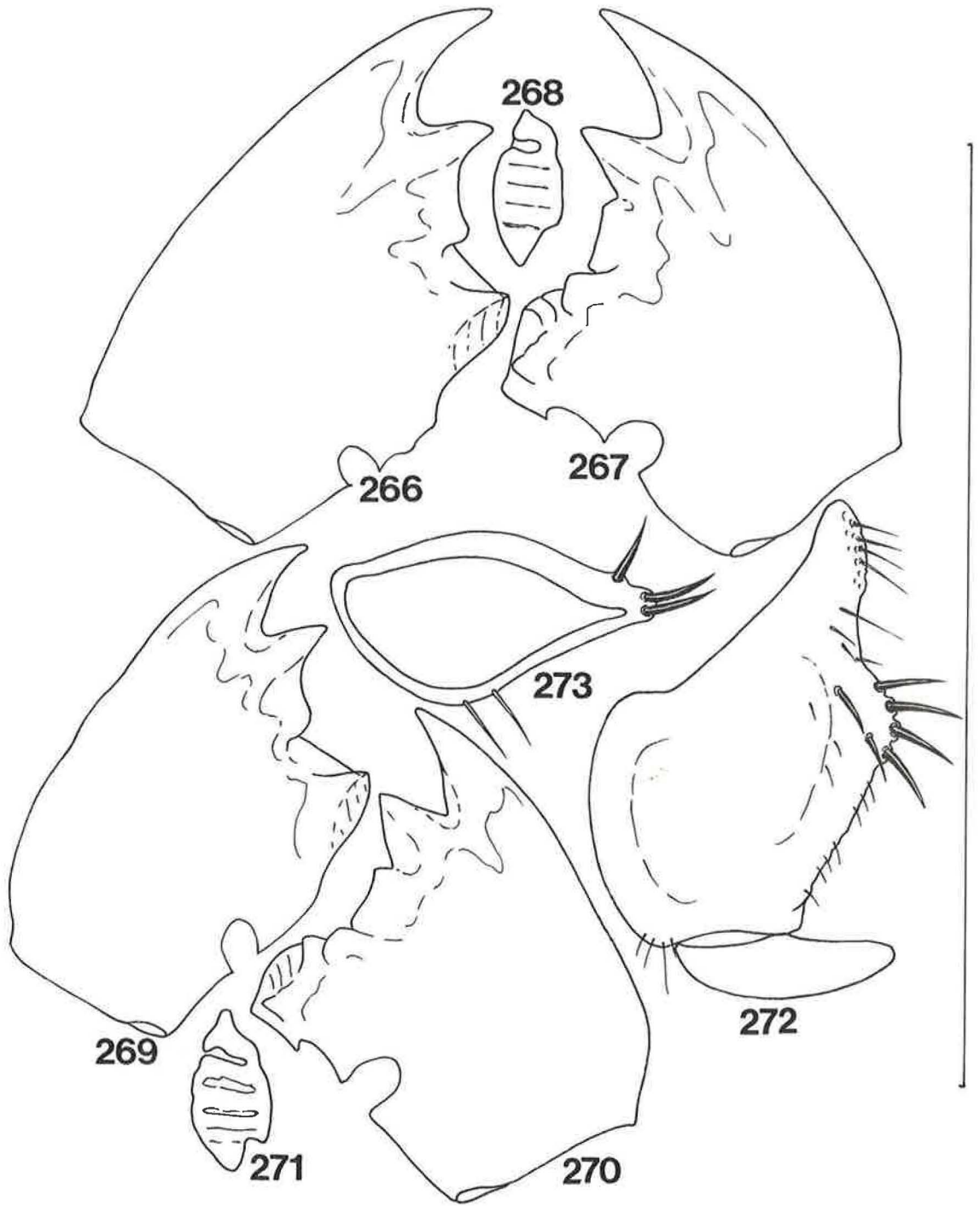
**Figures 254-260**

Imago of *A. messinae*: 254,255, Head capsule, front and side views; 256,257, Pronotum, plan and side view; 258-260, Mandibles, 260, Right molar plate, surface view. Bars (left, head and pronotum, right, mandibles) = 1 mm.



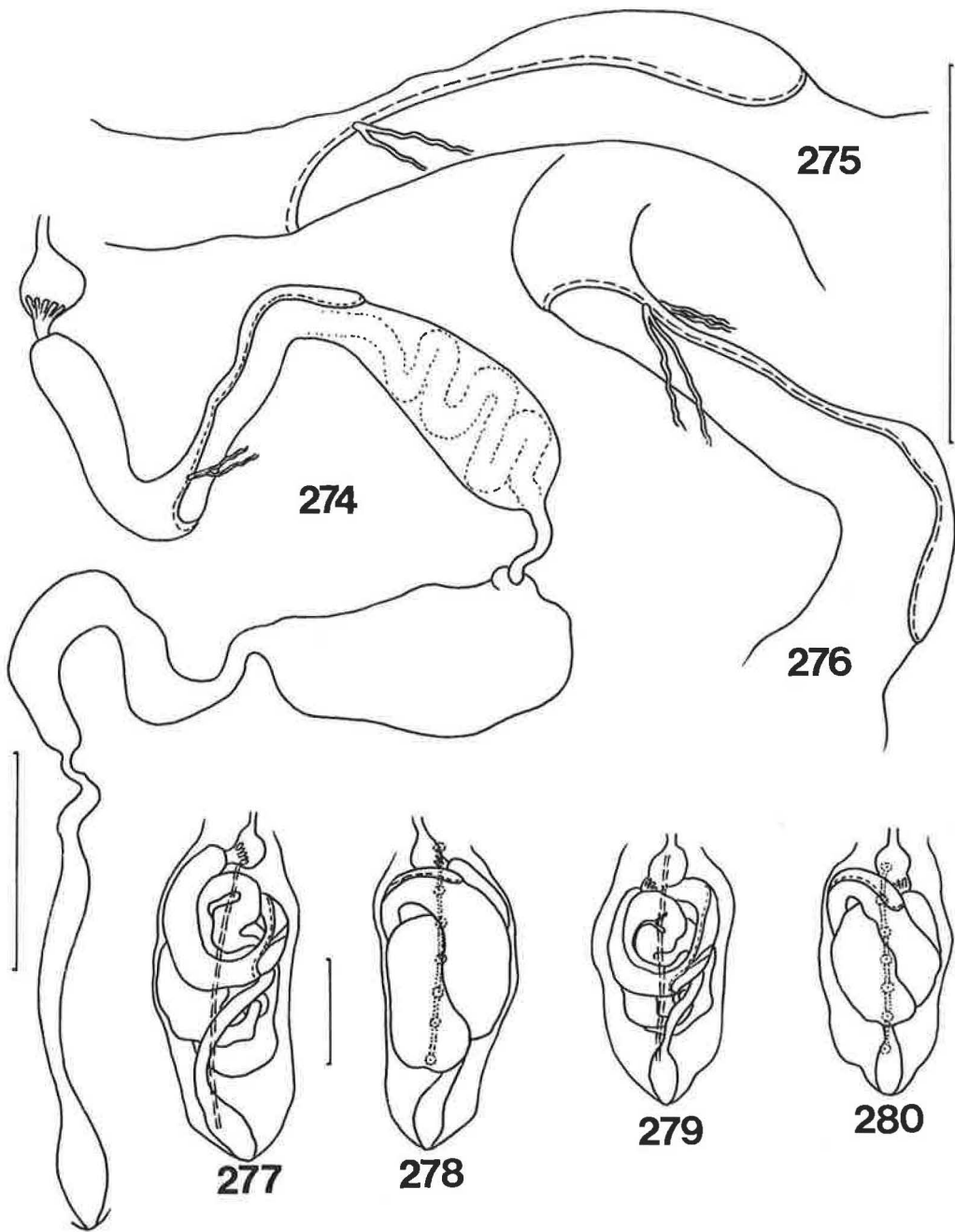
**Figures 261-265**

Soldier caste of *A. messinae*: 261,262, Head and mandibles, plan and profile; 263-265, Mandibles, variation. Bar (left) = 1 mm.



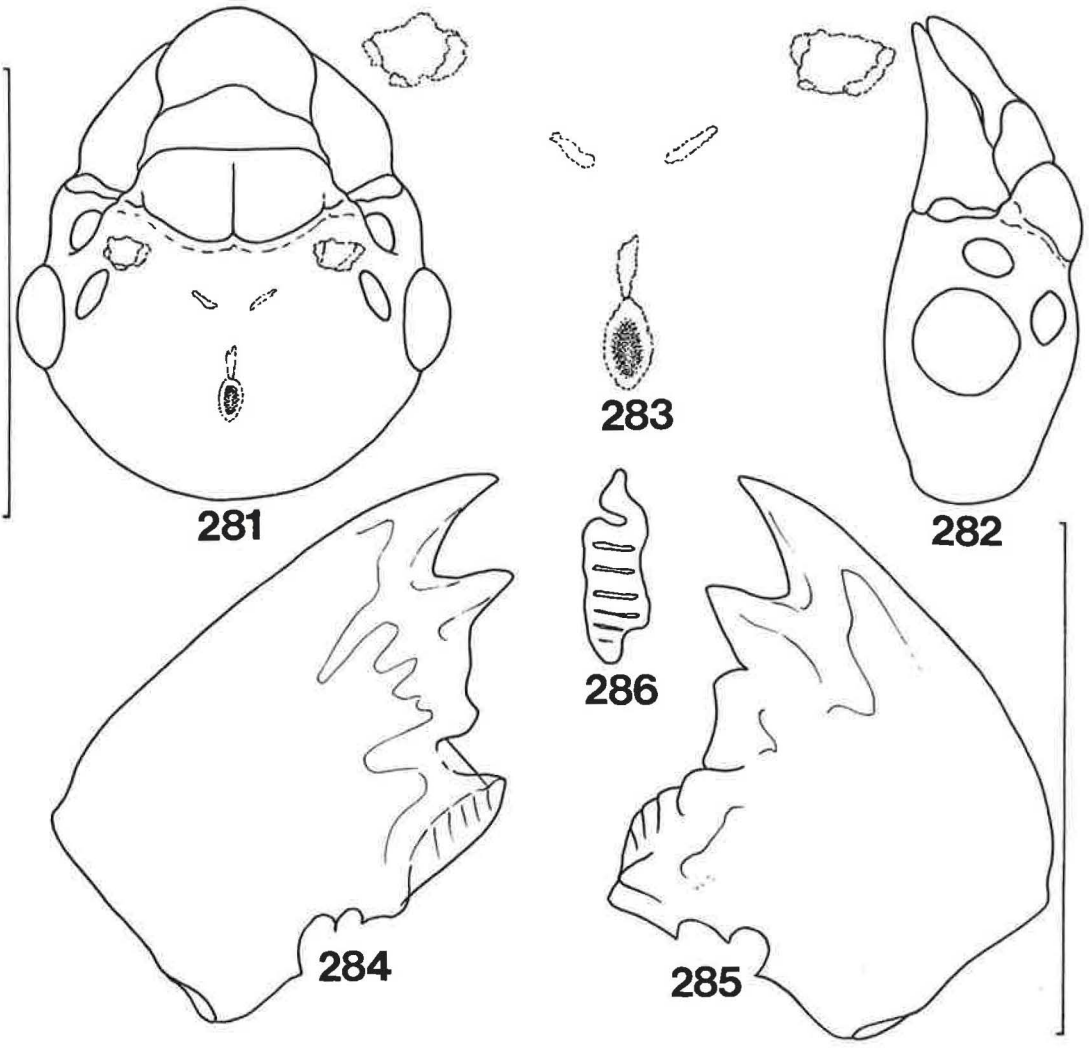
**Figures 266-273**

Worker castes of *A. messinae*: 266-268, Mandibles of late and 269-271, Early instars, 268,271, Right molar plates in surface view; 272, Fore coxa with 273, Transverse section. Bar (right) = 1 mm.



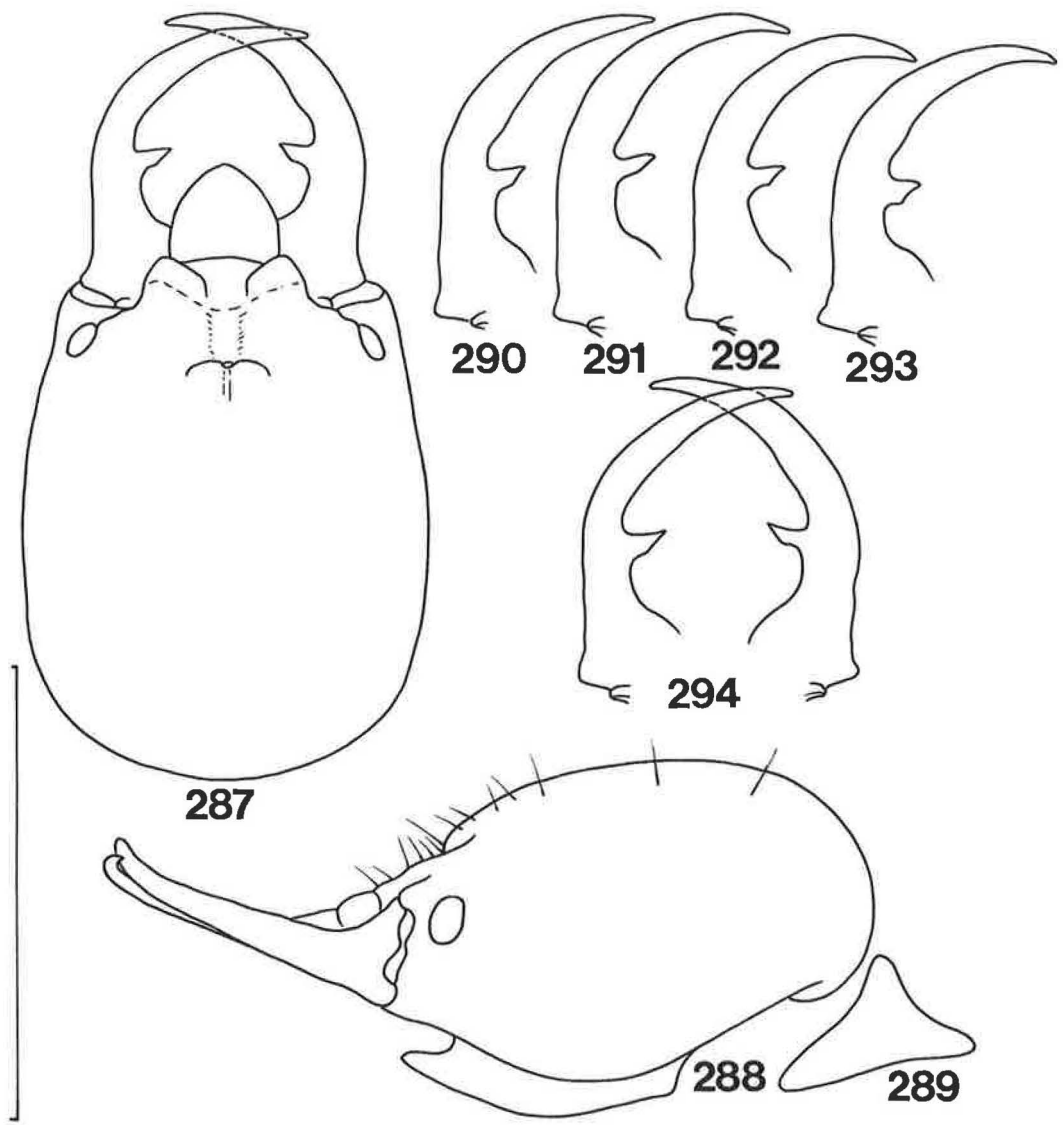
**Figures 274-280**

Worker caste of *A. messinae*: 274, Gut entire; 275,276, Mixed segments enlarged to show least width of mesenteron and attachment of Malpighian tubules; 277,279, Dorsal and 278,280, Ventral views of abdomens with guts *in situ*. Bars (left, gut entire, right, mixed segments, bottom, abdomens) = 1 mm.



**Figures 281-286**

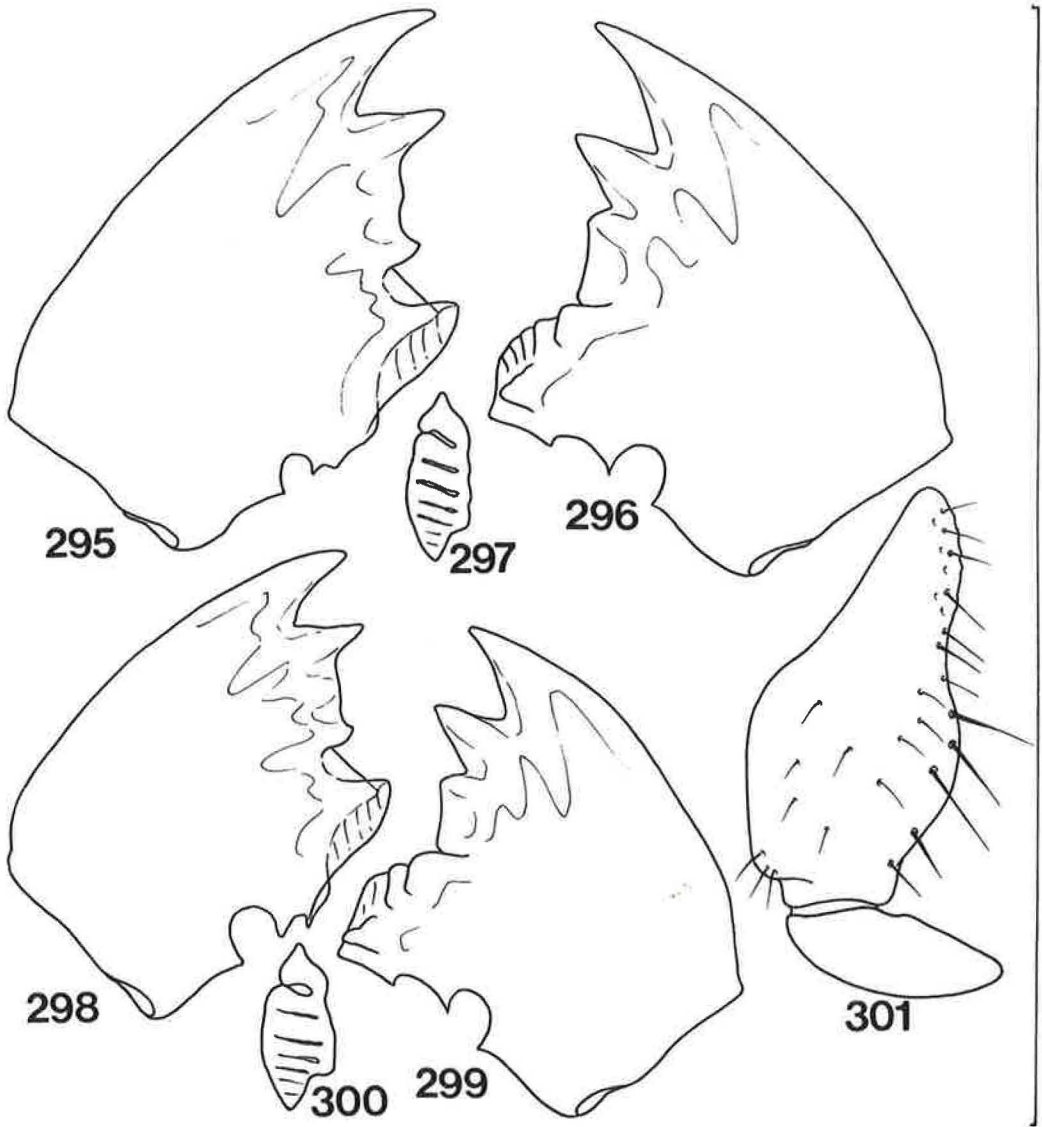
Imago of *A. mitchelli*: 281,282, Head capsule, front and side views; 283, Fontanelle enlarged; 284-286, Mandibles, 286, Right molar plate, surface view. Bars (left, head) = 1 mm, (right, mandibles and fontanelle) = 0.5 mm.



**Figures 287-294**

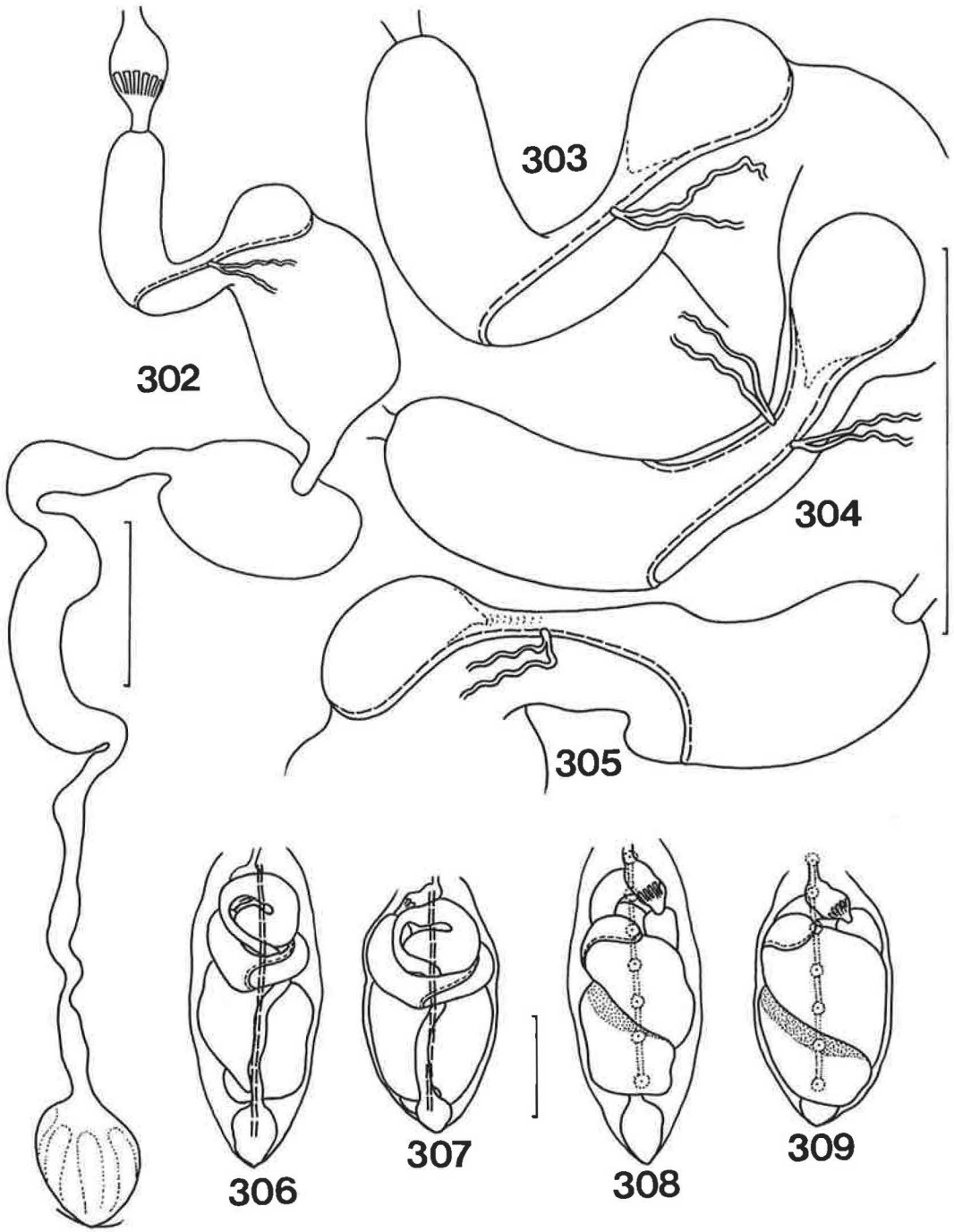
Soldier caste of *A. mitchelli*: 287,288, Head and mandibles, plan and profile, latter with 289, Pronotum; 290-294, Mandibles, variation. Bar (left) = 1 mm.





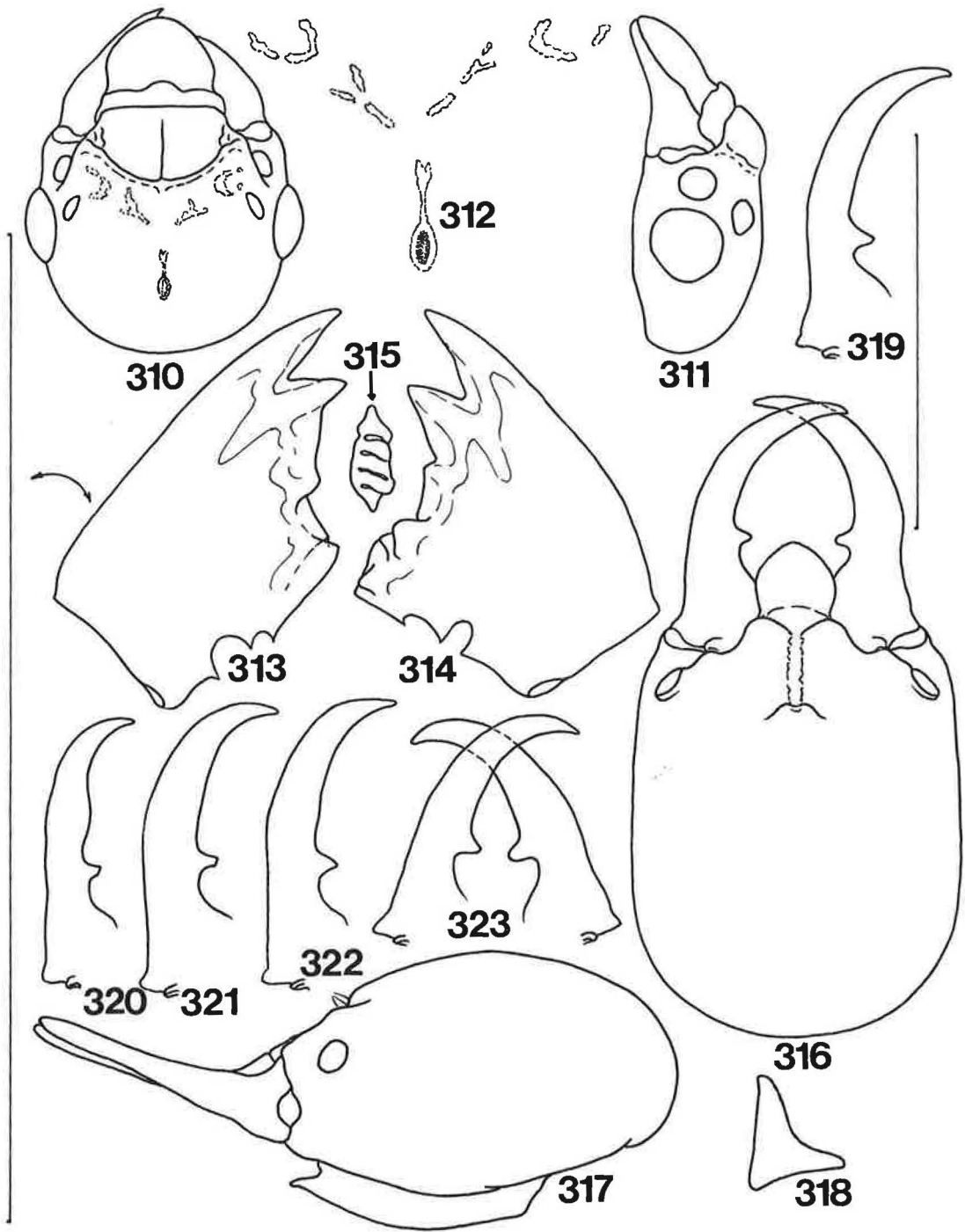
**Figures 295-301**

Worker castes of *A. mitchelli*: 295-297, Mandibles of late and 298-300, Early instars, 297,300, Right molar plates in surface view; 301, Fore coxa late instar (slightly reduced). Bar (right) = 1 mm.



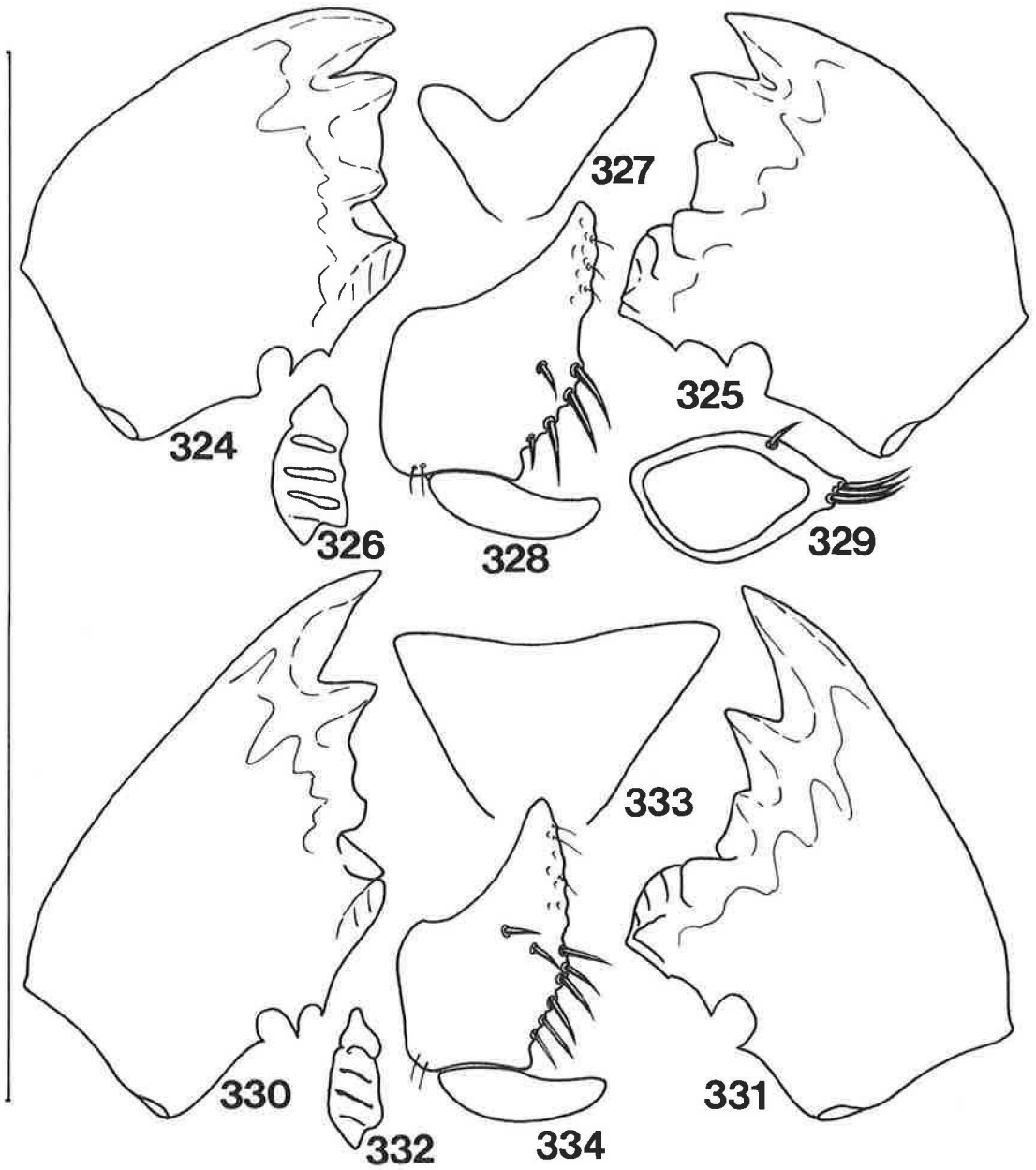
**Figures 302-309**

Worker caste of *A. mitchelli*: 302, Gut entire; 303-305, Mixed segments enlarged to show least width of mesenteron and attachment of Malpighian tubules; 306,307, Dorsal and 308,309, Ventral views of abdomens with guts *in situ*. Bars (left, gut entire, right, mixed segments, bottom, abdomens) = 1 mm.



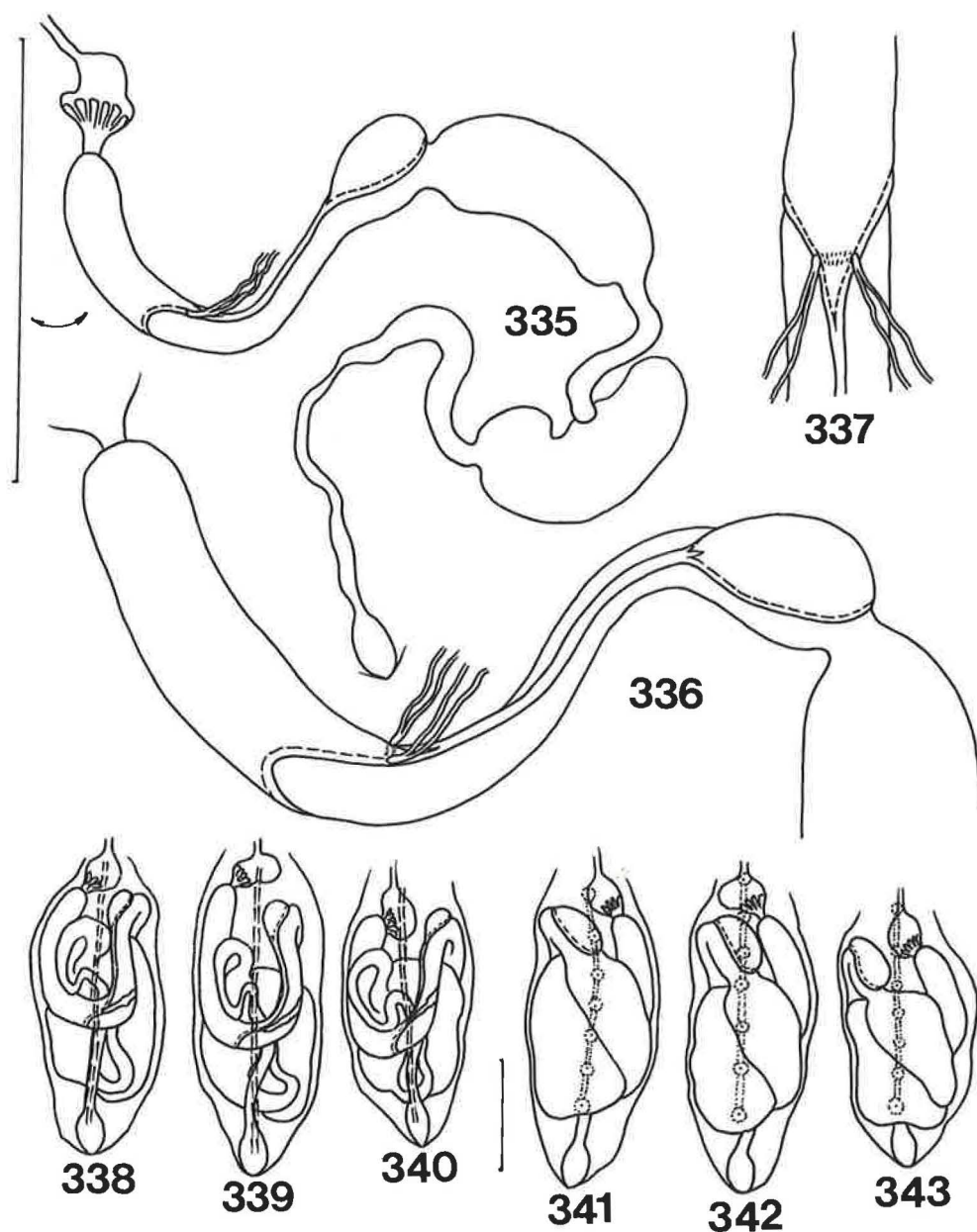
**Figures 310-323**

Imago and soldier of *A. sciangallorum*: 310,311, Imago head capsule, front and side views; 312, Fontanelle; 313-315, Mandibles, 315, Right molar plate, surface view. 316,317, Soldier head and mandibles, plan and profile, latter with, 318, Pronotum; 319-323, Mandibles, variation. Bars (left, imago mandibles and fontanelle, right, imago head, soldier head and mandibles) = 1 mm.



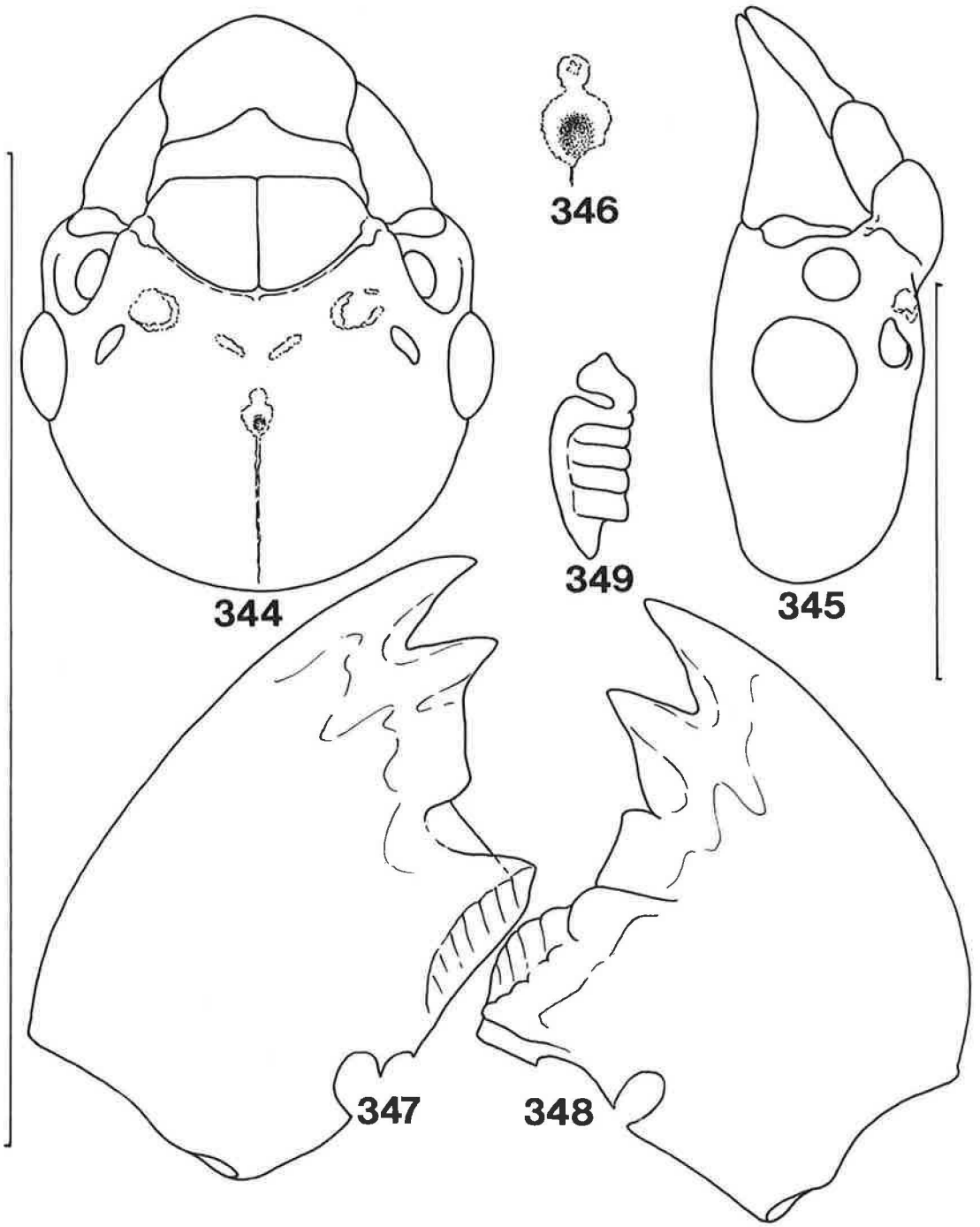
**Figures 324-334**

Worker castes of *A. sciangallorum*: 324-326, Mandibles of early and 330-332, Late instars, 326,332, Right molar plates in surface view; 327,333, profiles of pronota, early and late instars; 328, Fore coxae of early and 334, Late instars 329 Cross-section. Bar (left) = 1 mm.



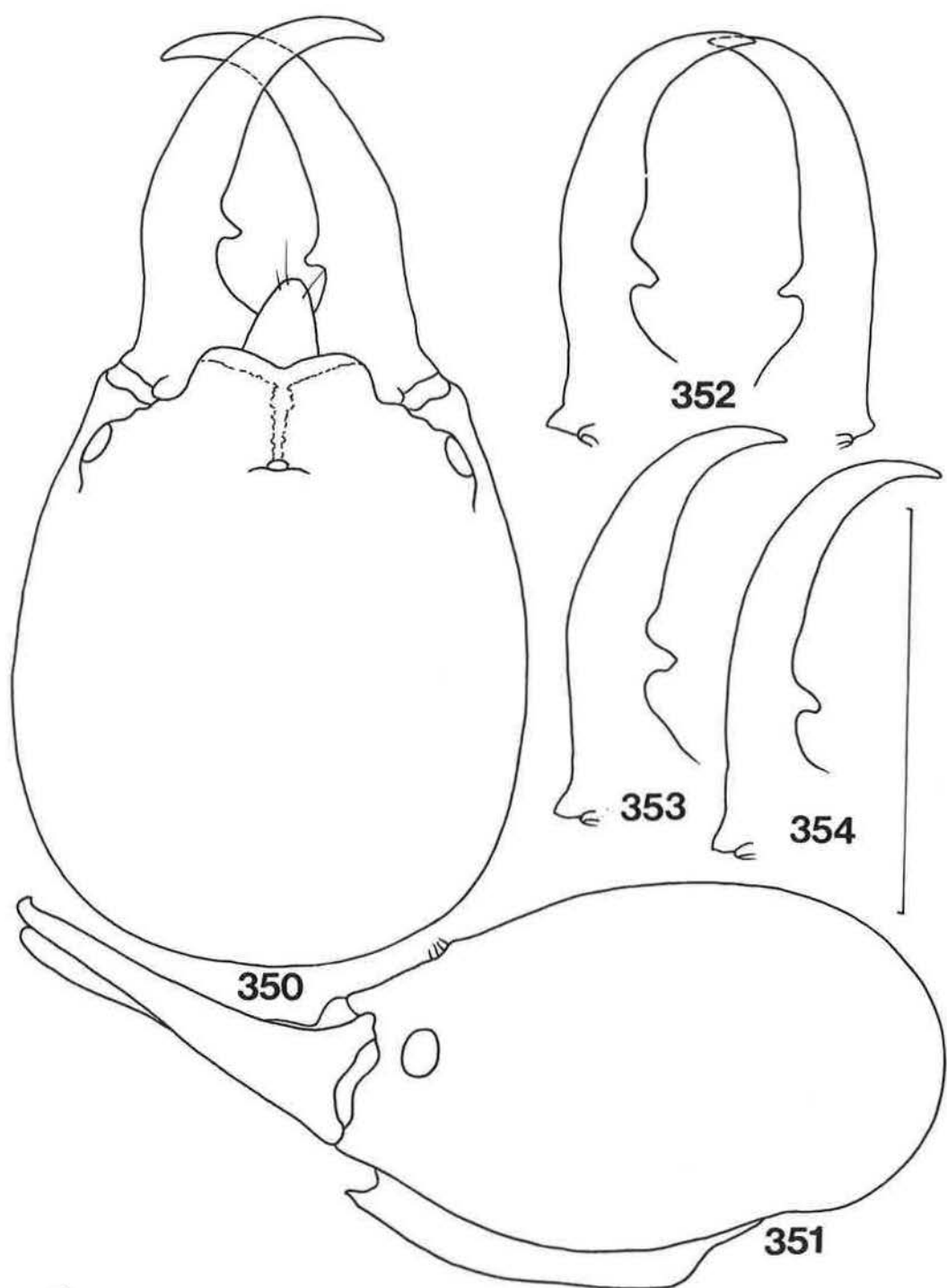
**Figures 335-343**

Worker caste of *A. sciangallorum*: 335, Gut entire; 336,337, Mixed segments enlarged to show least width of mesenteron and attachment of Malpighian tubules; 338-340, Dorsal and 341-343, Ventral views of abdomens with guts *in situ*. Bars (left, gut entire, bottom, abdomens) = 1 mm.



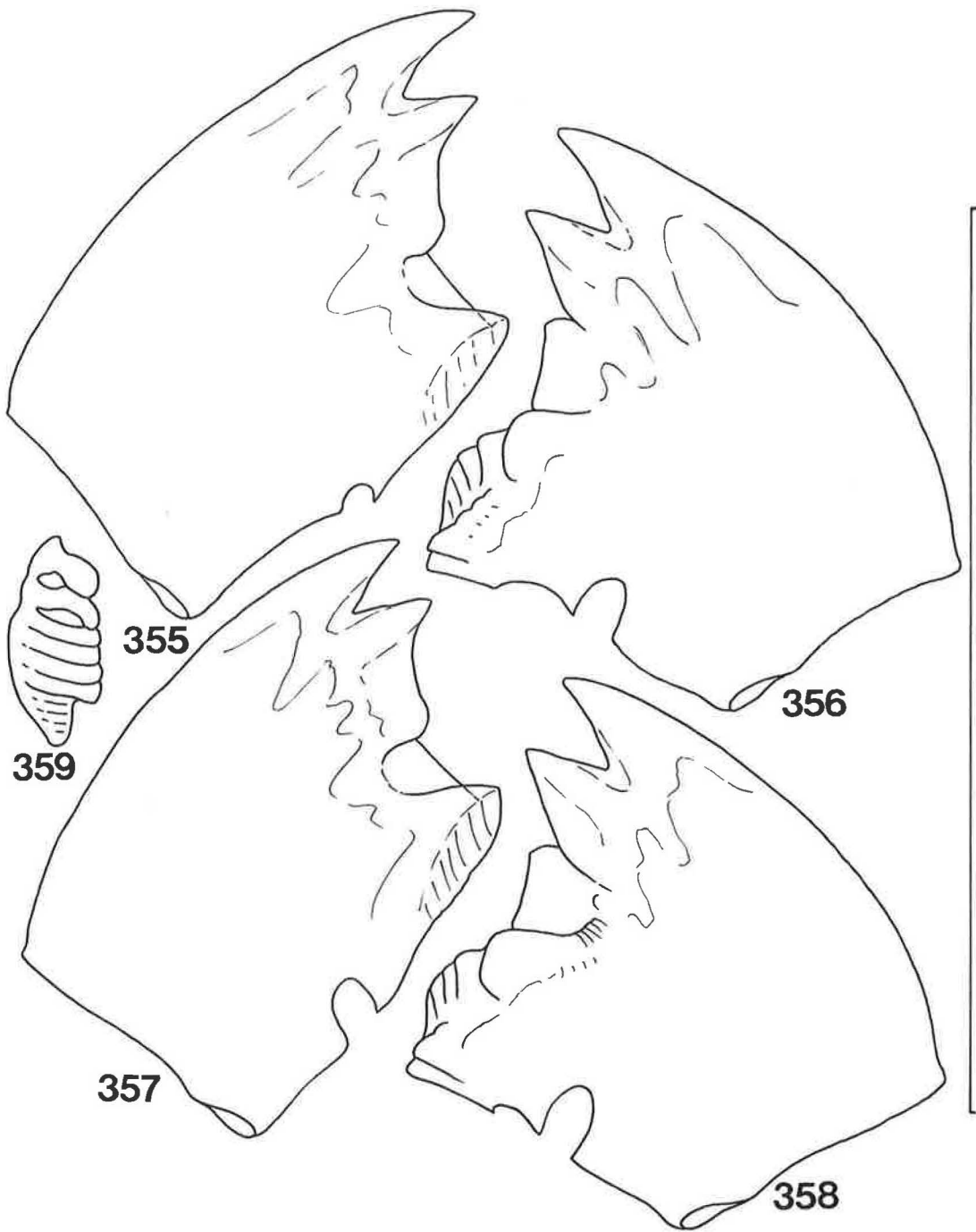
**Figures 344-349**

Imago of *A. socotrensis*: 344,345, Head capsule, front and side views; 346, Fontanelle; 347-349, Mandibles, 349, Right molar plate, surface view. Bars (left, mandibles and fontanelle, right, head) = 1 mm.



**Figures 350-354**

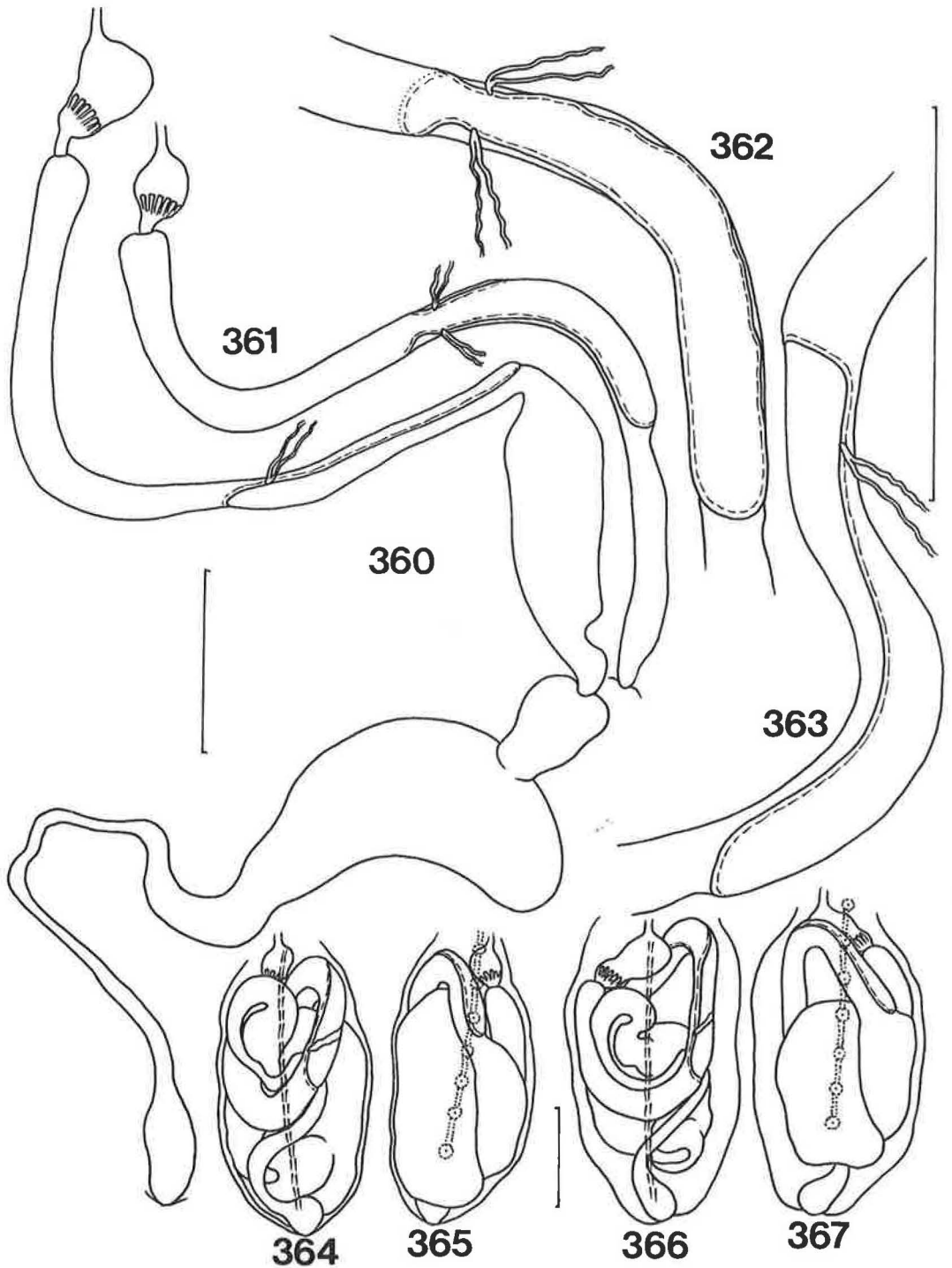
Soldier caste of *A. socotrensis*: 350,351, Head and mandibles, plan and profile; 352-354, Mandibles, variation. Bar (right) = 1 mm.



**Figures 355-359**

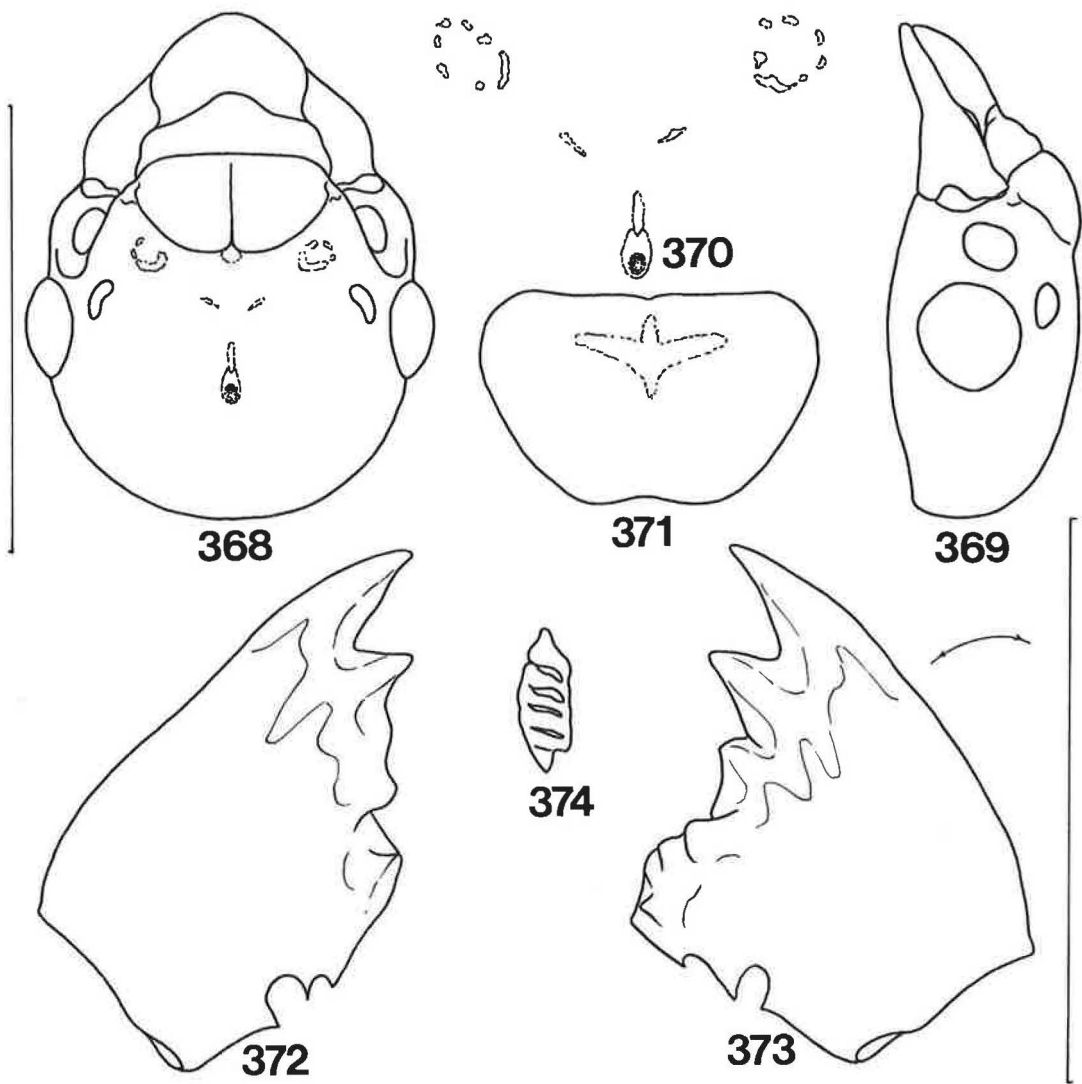
Worker castes of *A. socotrensis*: 355,356, Mandibles of late and 357,358, Early instars, 359, Right molar plate in surface view. Bar (right) = 1 mm.





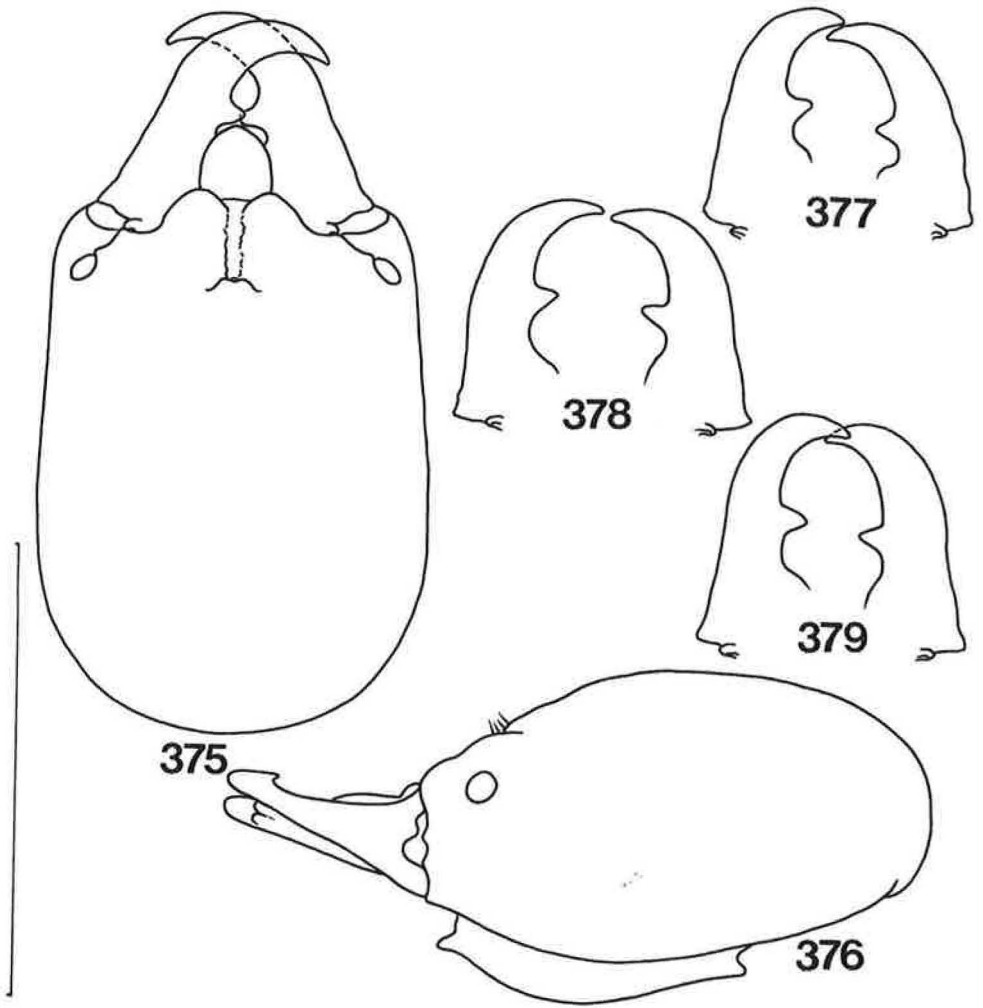
**Figures 360-367**

Worker caste of *A. socotrensis*: 360,361, Gut entire; 362,363, Mixed segments enlarged to show least width of mesenteron and attachment of Malpighian tubules; 364,366, Dorsal and 365,367, Ventral views of abdomens with guts *in situ*. Bars (left, gut entire, right, mixed segments, bottom, abdomens) = 1 mm.



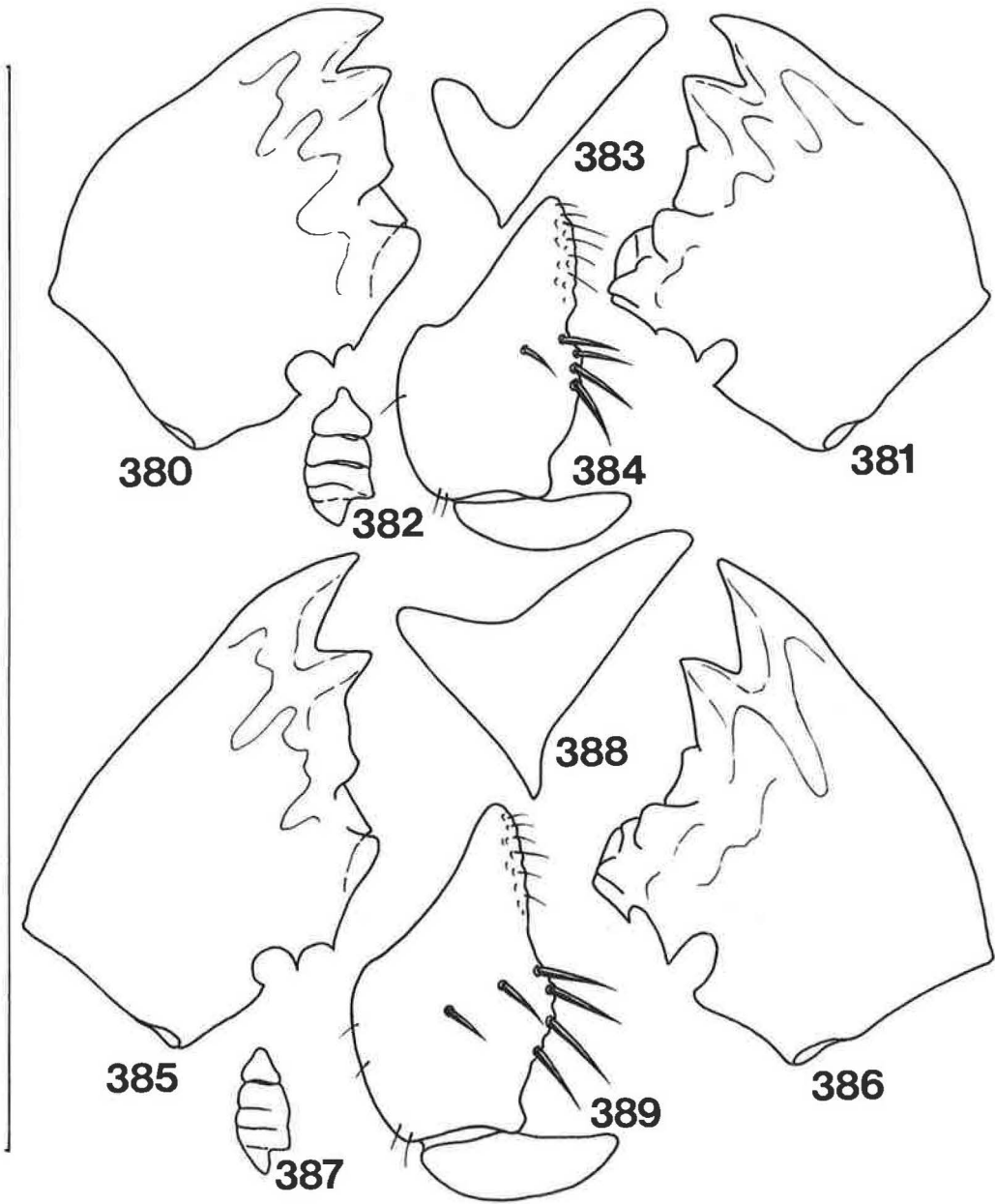
**Figures 368-374**

Imago of *A. somaliensis*: 368,369, Head capsule, front and side views; 370, Fontanelle enlarged; 371, Pronotum, plan view; 372-374, Mandibles, 374, Right molar plate, surface view. Bars (left, head and pronotum) = 1 mm, (right, mandibles) = 0.5 mm.



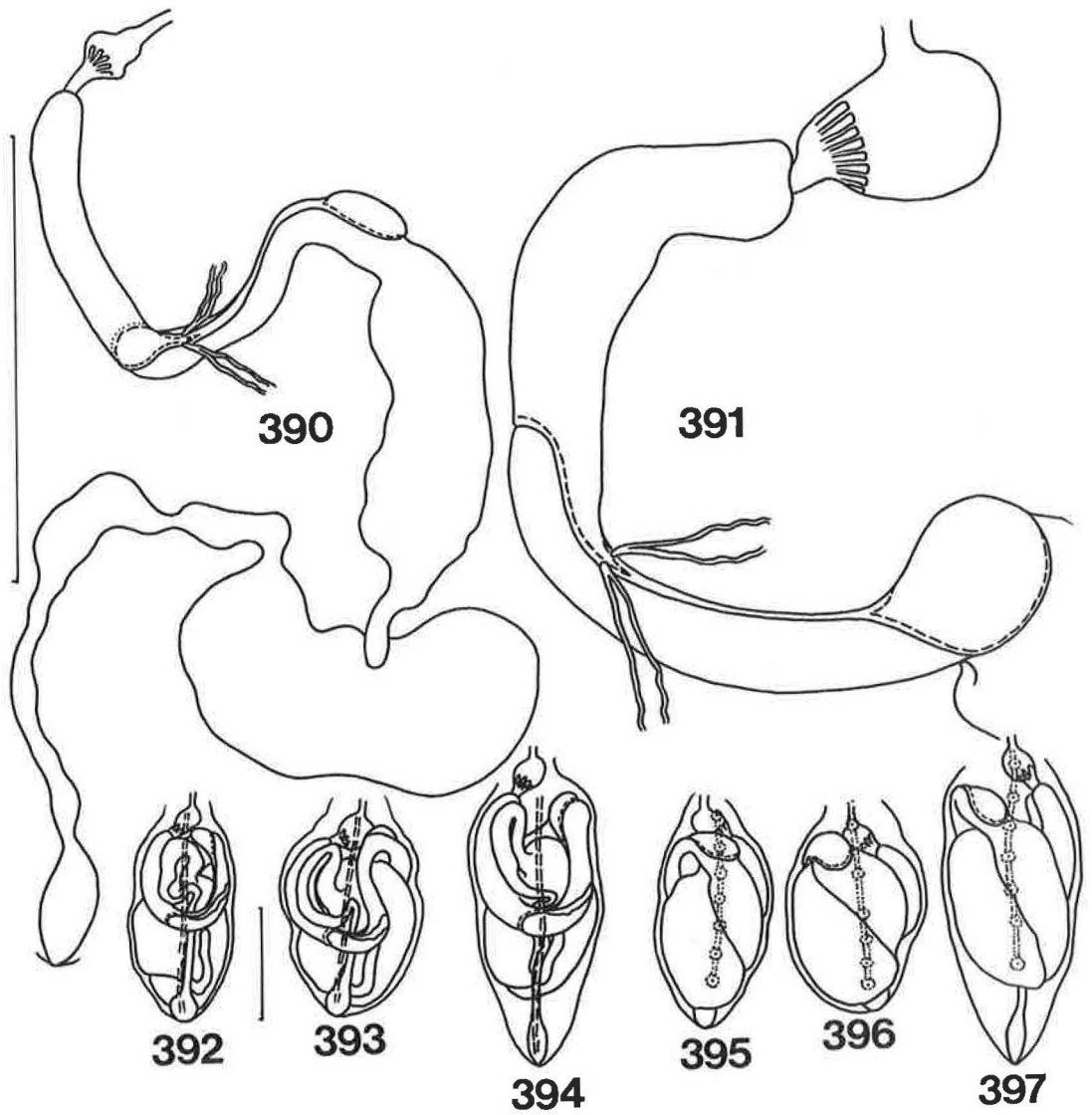
**Figures 375-379**

Soldier caste of *A. somaliensis*: 375,376, Head and mandibles, plan and profile; 377-379, Mandibles, variation. Bar (left) = 1 mm.



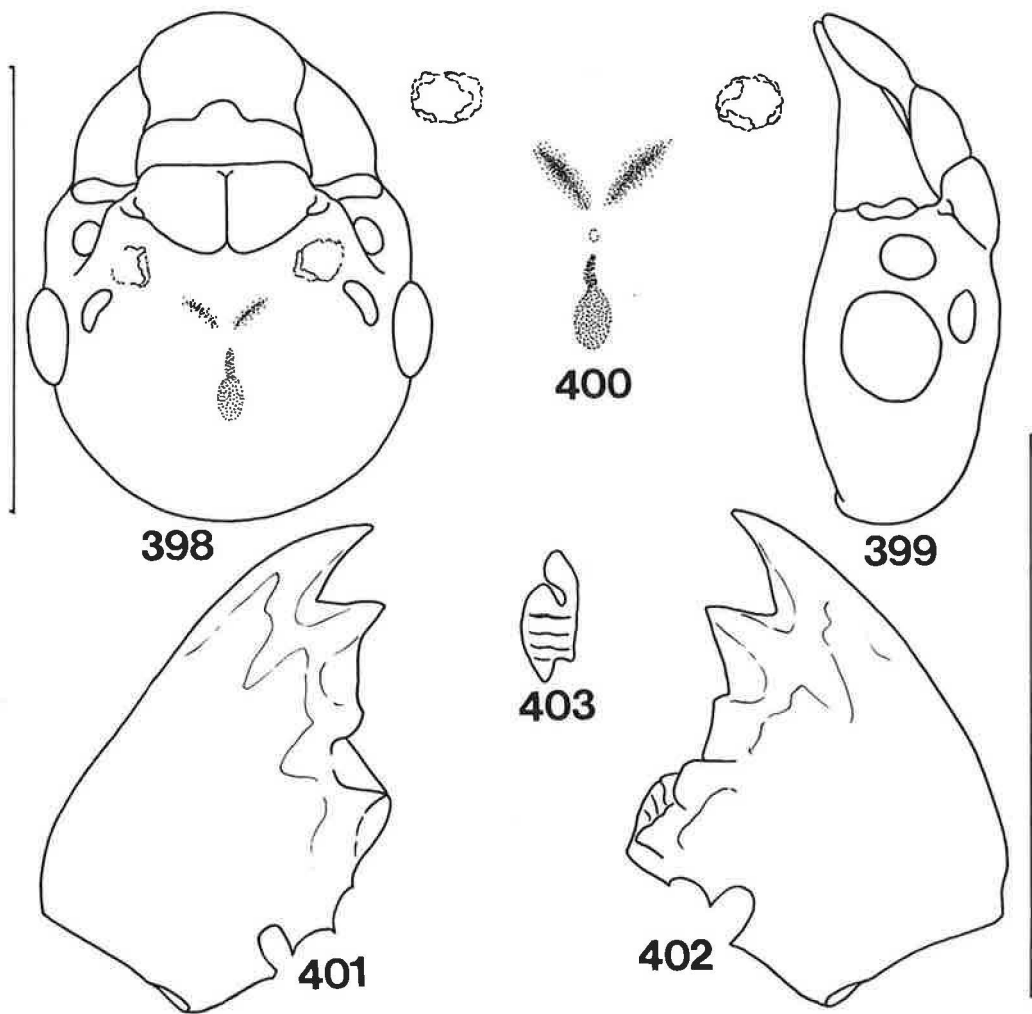
**Figures 380-389**

Worker castes of *A. somaliensis*: 380-382, Mandibles of early and 385-387, Late instars, 382,387, Right molar plates in surface view; 383,388, Profiles of pronota, early and late instars; 384, Fore coxa of early and 389, Late instars. Bar (left) = 1 mm.



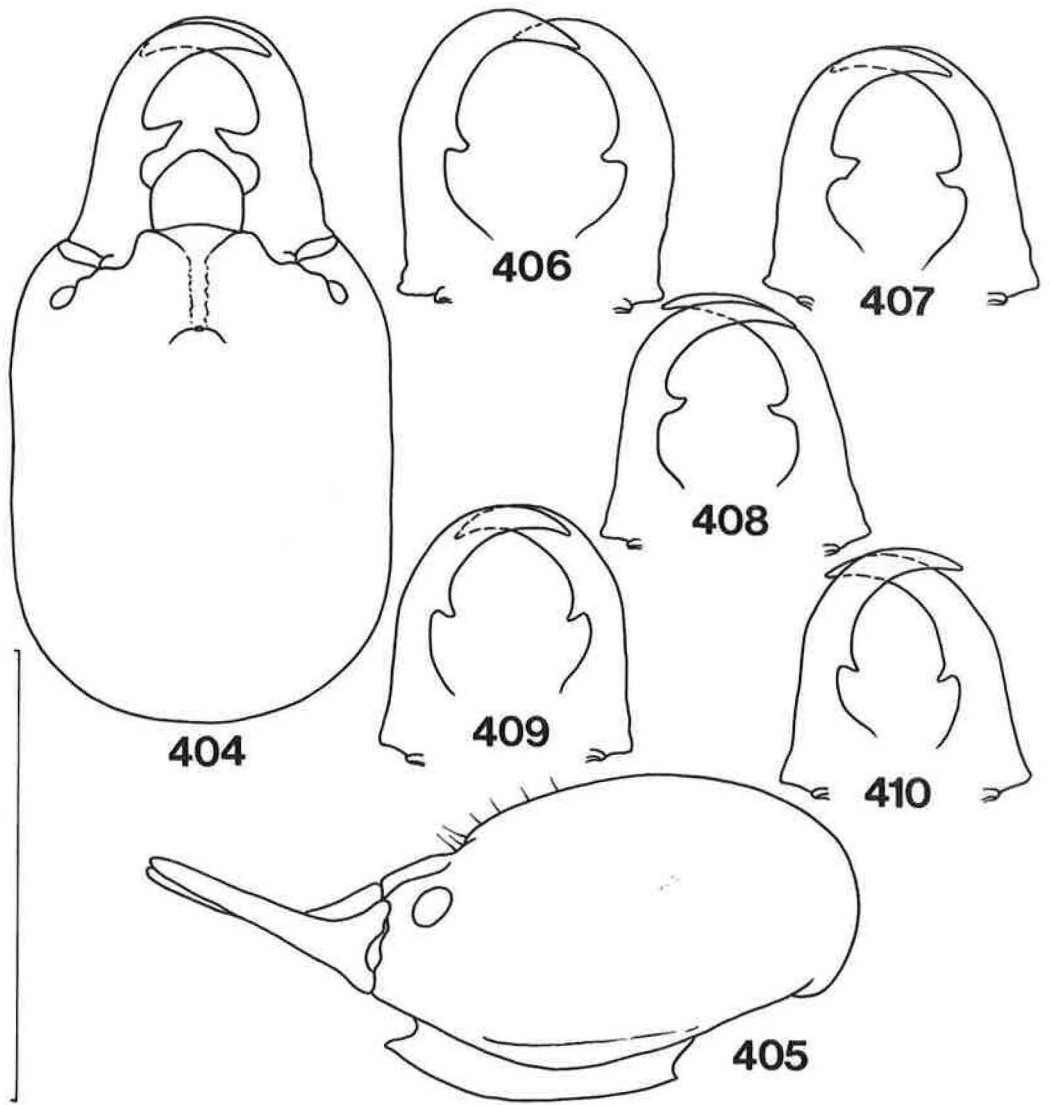
**Figures 390-397**

Worker caste of *A. somaliensis*: 390, Gut entire; 391, Mixed segment enlarged to show least width of mesenteron and attachment of Malpighian tubules; 392-394, Dorsal and 395-397, Ventral views of abdomens with guts *in situ*. Bars (left, gut entire, bottom, abdomens) = 1 mm.



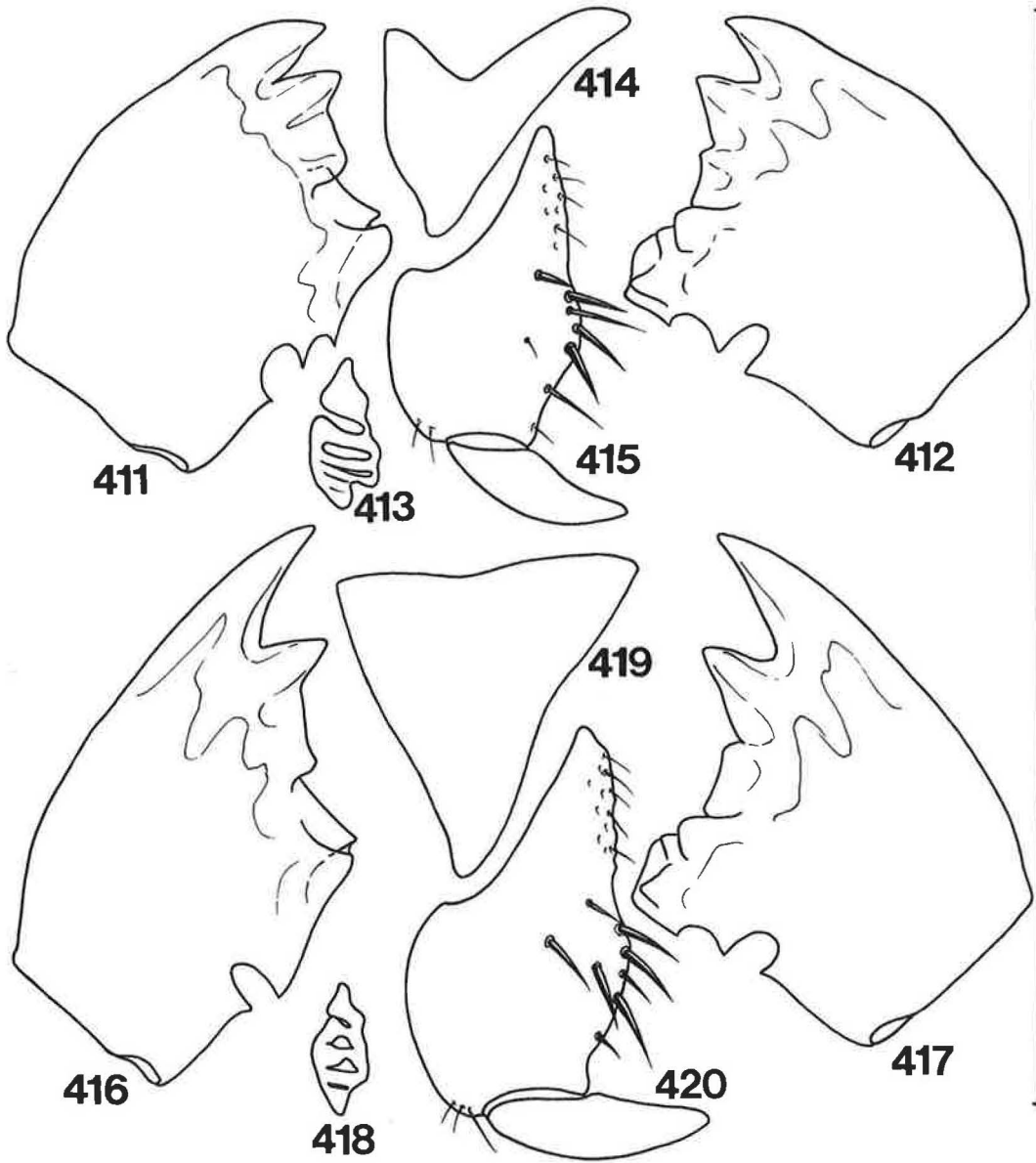
**Figures 398-403**

Imago of *A. spinifer*: 398,399, Head capsule, front and side views; 400, Fontanelle enlarged; 401-403, Mandibles, 403, Right molar plate, surface view. Bars (left, head, and pronotum) = 1 mm, (right, mandibles) = 0.5 mm.



**Figures 404-410**

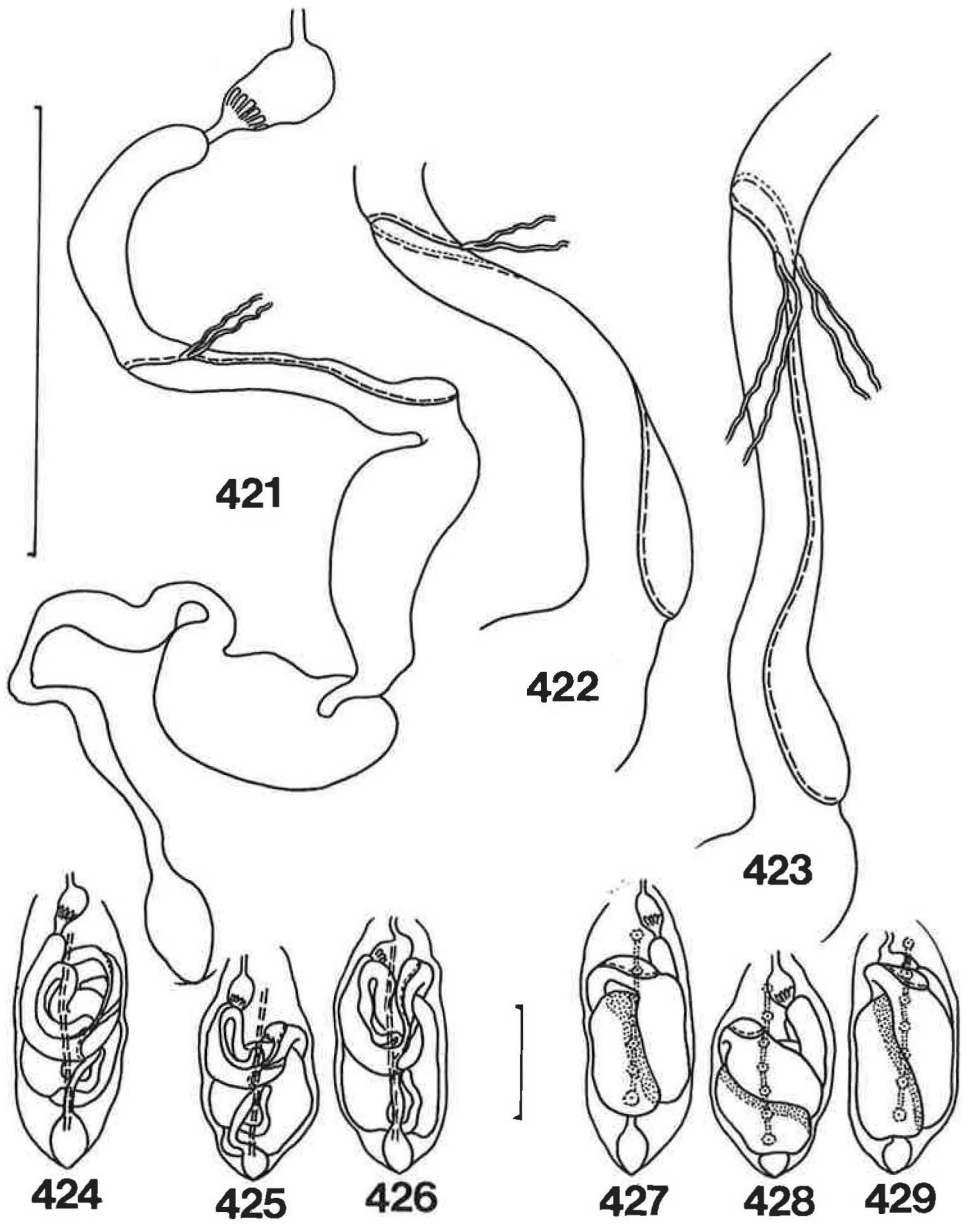
Soldier caste of *A. spinifer*: 404,405, Head and mandibles, plan and profile; 406-410, Mandibles, variation. Bar (left) = 1 mm.



**Figures 411-420**

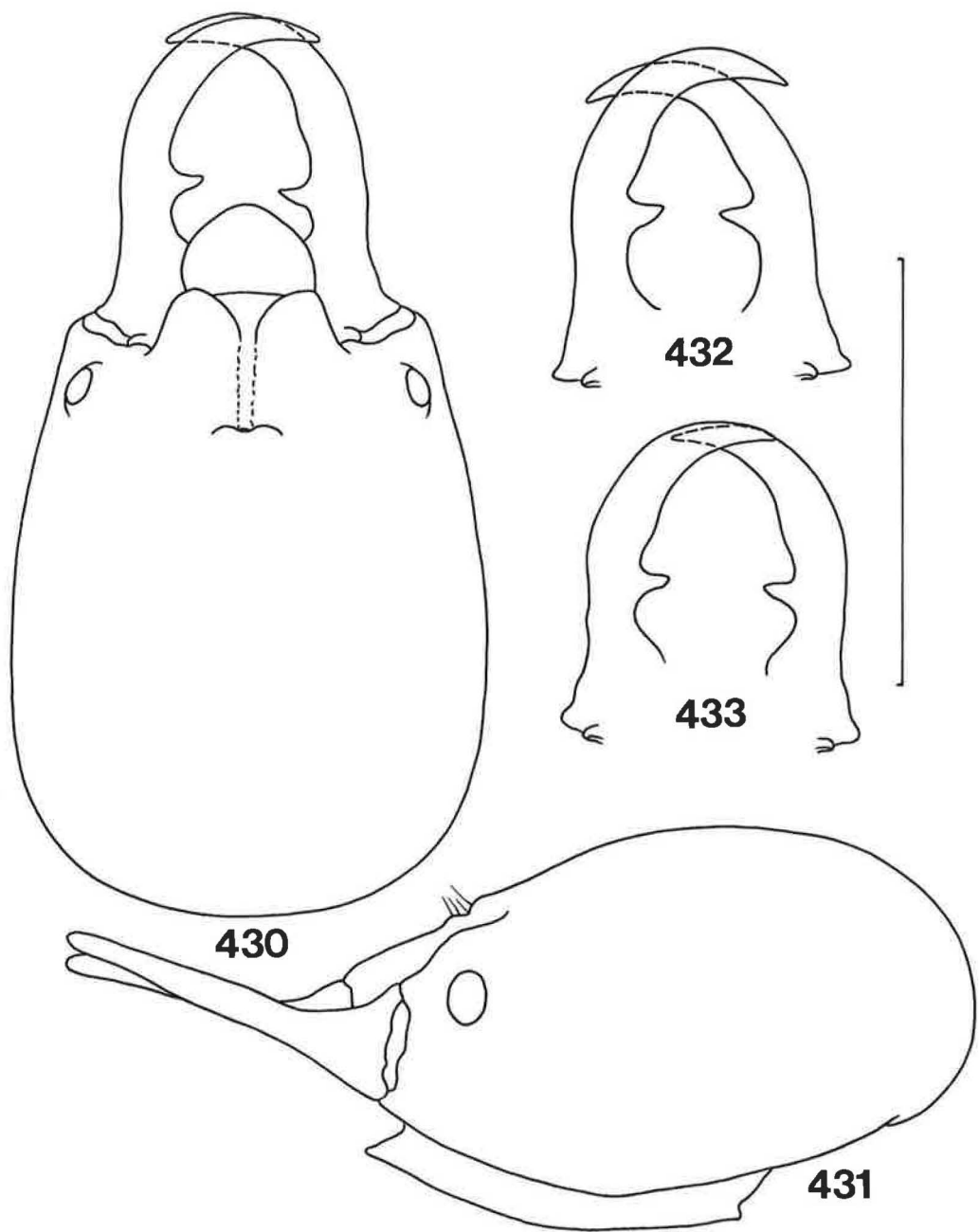
Worker castes of *A. spinifer*: 411-413, Mandibles of early and 416-418, Late instars, 413,418, Right molar plates in surface view; 414,419, Pronota, profiles, early and late instars; 415, Fore coxa of early and 420, Late instars. Bar (right) = 1 mm.





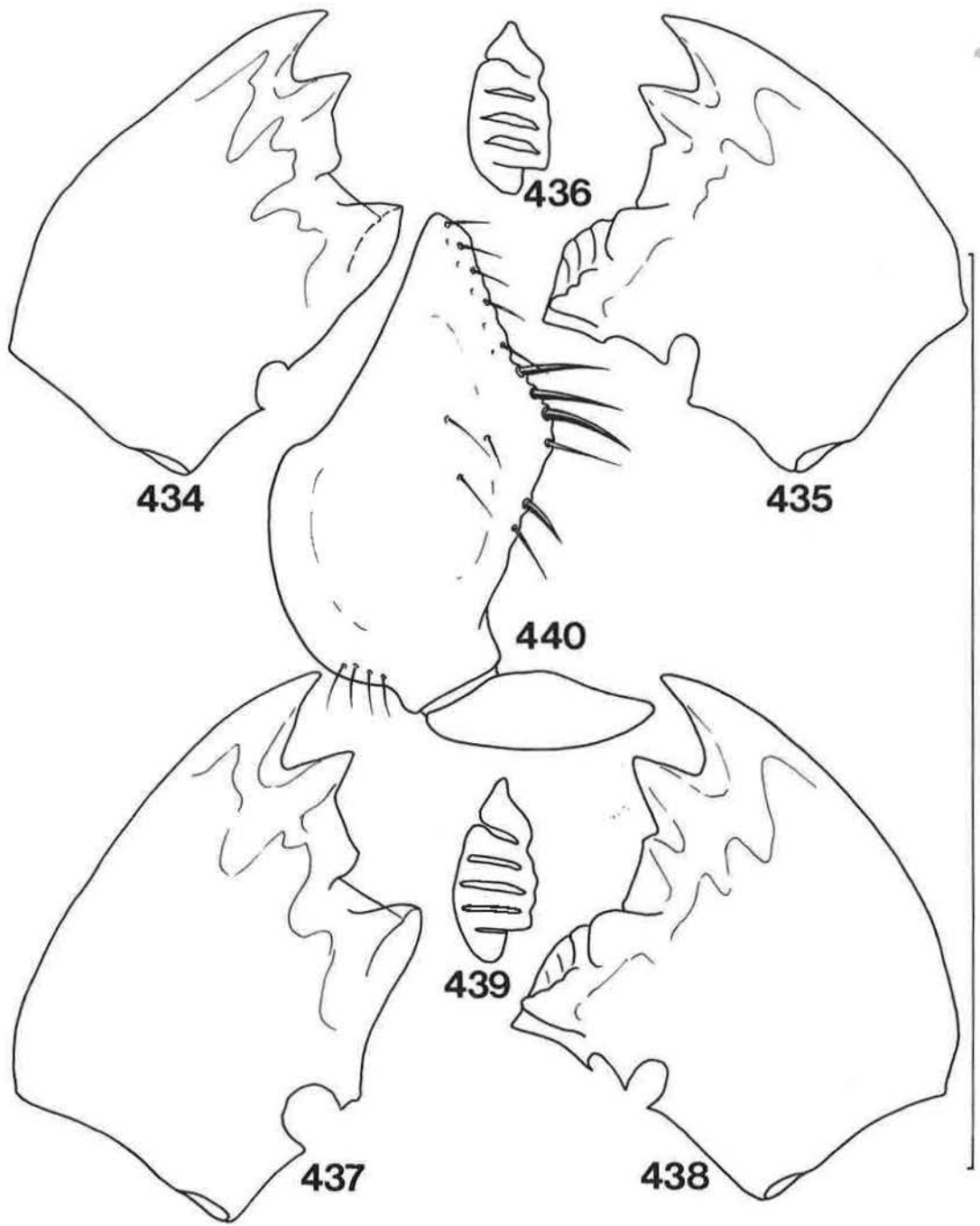
**Figures 421-429**

Worker caste of *A. spinifer*: 421, Gut entire; 422,423, Mixed segments enlarged to show least width of mesenteron and attachment of Malpighian tubules; 424-426, Dorsal and 427-429, Ventral views of abdomens with guts *in situ*. Bars (left, gut entire, bottom, abdomens) = 1 mm.



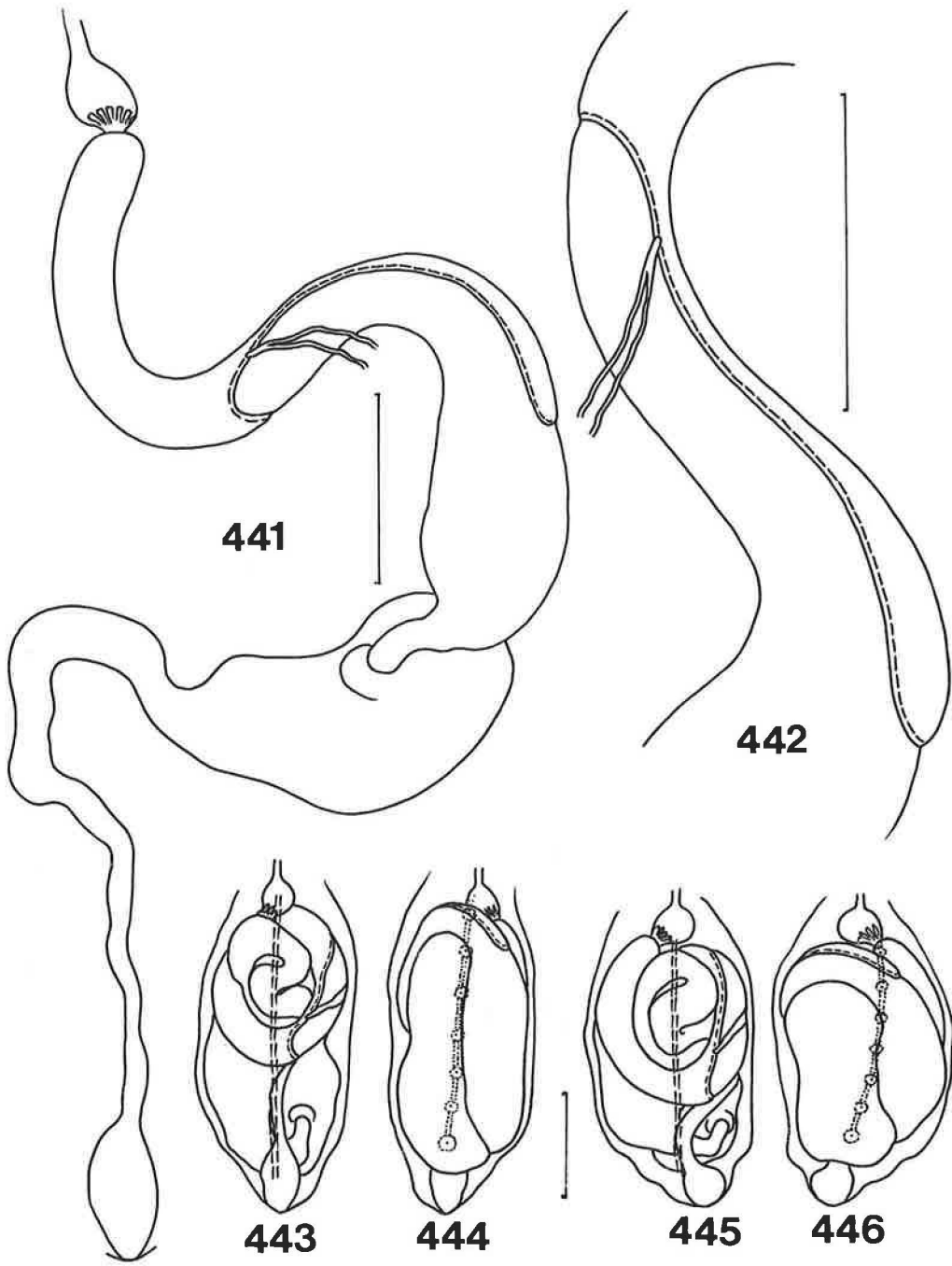
**Figures 430-433**

Soldier caste of *A. stephensoni*: 430,431, Head and mandibles, plan and profile; 432,433, Mandibles, variation. Bar (right) = 1 mm.



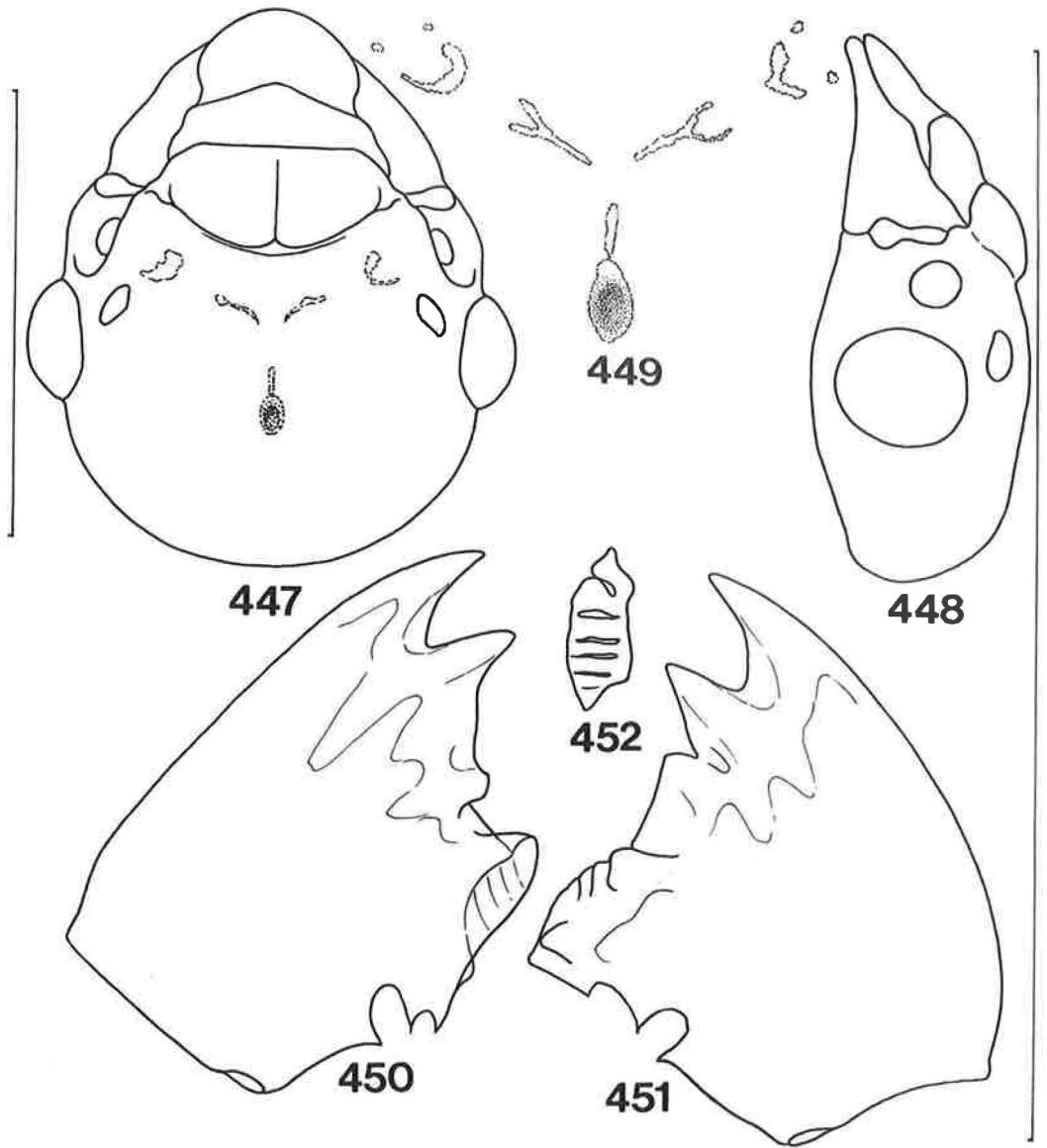
**Figures 434-440**

Worker castes of *A. stephensoni*: 434-436, Mandibles of early and 437-439, Late instars, 436,439, Right molar plates in surface view; 440, Fore coxa late instar. Bar (right) = 1 mm.



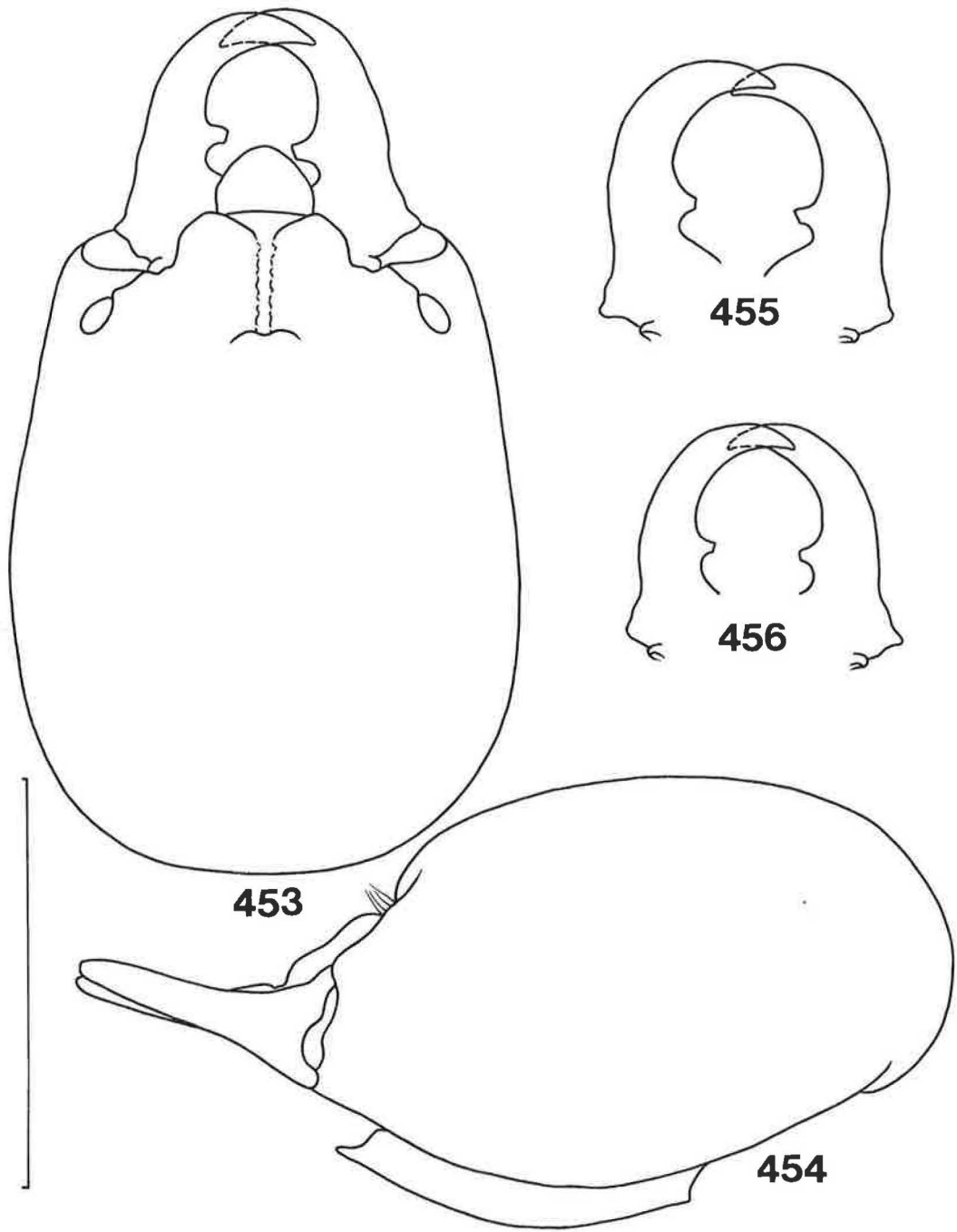
**Figures 441-446**

Worker caste of *A. stephensoni*: 441, Gut entire; 442, Mixed segment enlarged to show least width of mesenteron and attachment of Malpighian tubules; 443,445, Dorsal and 444,446, Ventral views of abdomens with guts *in situ*. Bars (left, gut entire, right, mixed segment, bottom, abdomens) = 1 mm.



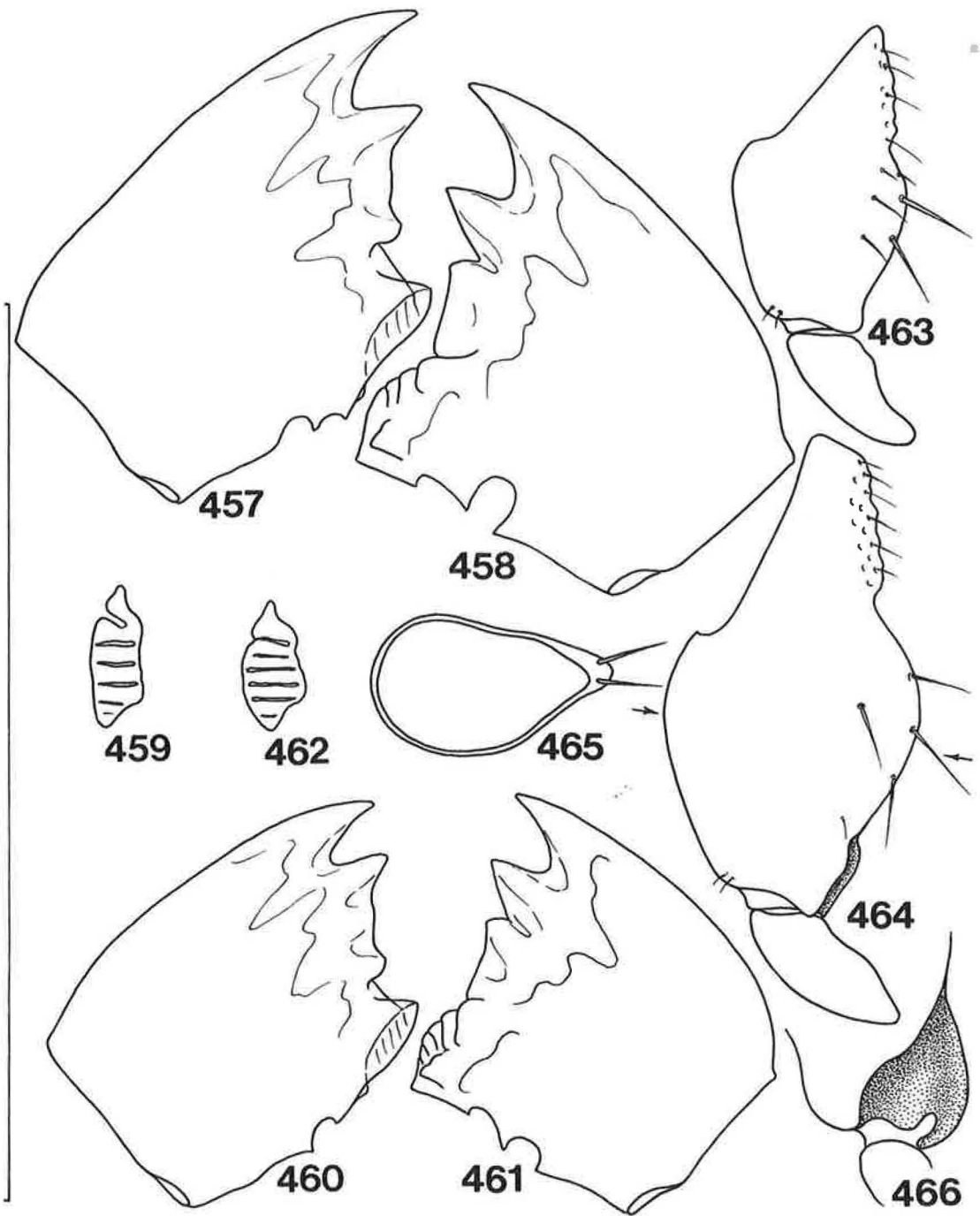
**Figures 447-452**

Imago of *A. truncatidens*: 447,448, Head capsule, front and side views; 449, Fontanelle enlarged; 450-452, Mandibles, 452, Right molar plate, surface view. Bars (left, head, right, mandibles) = 1 mm.



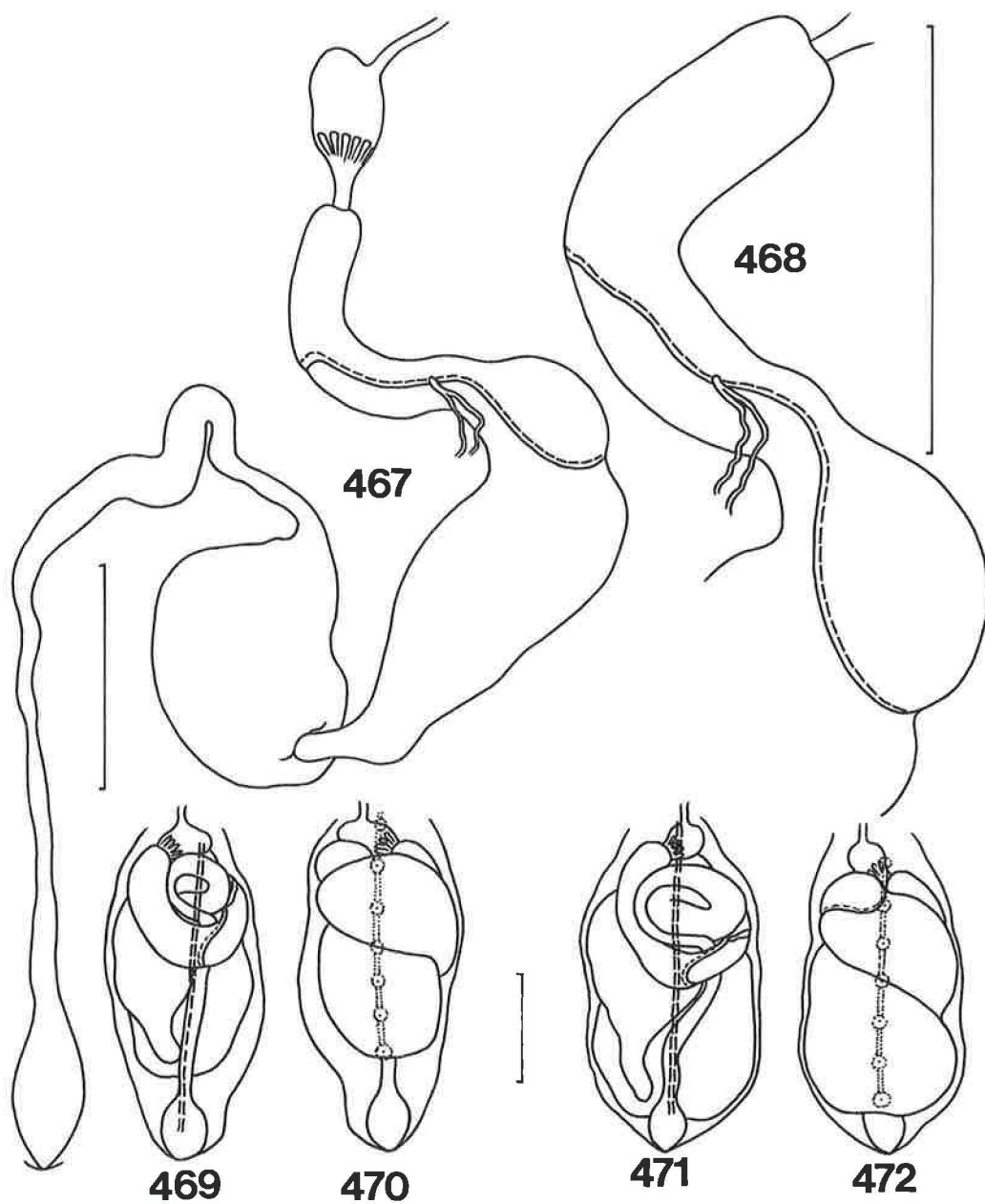
**Figures 453-456**

Soldier caste of *A. truncatidens*: 453,454 Head and mandibles, plan and profile; 455,456, Mandibles, variation. Bar (left) = 1 mm.



**Figures 457-466**

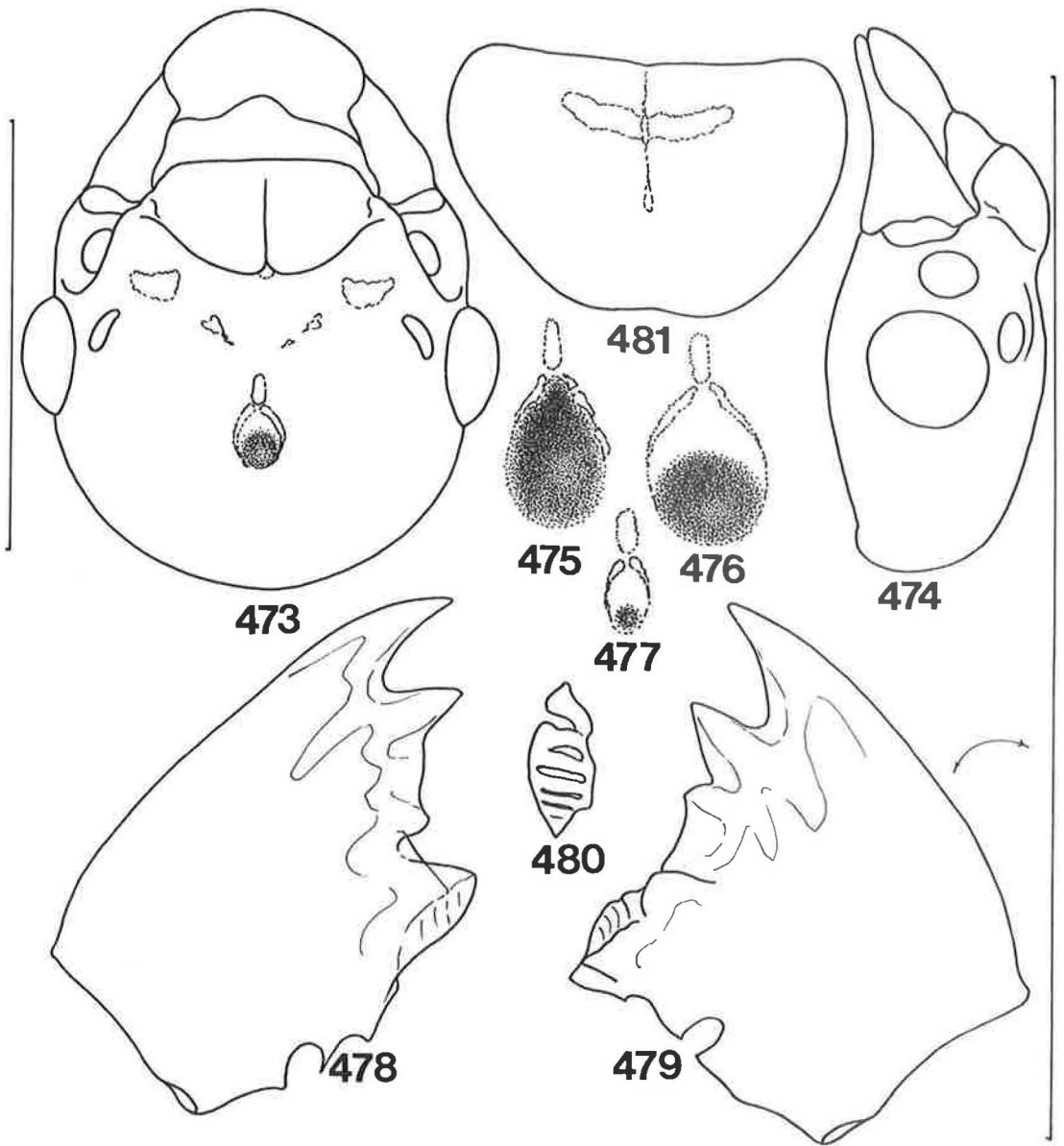
Worker castes of *A. truncatidens*: 457-459, Mandibles of late and 460-462, Early instars, 459,462, Right molar plates in surface view; 463, Fore coxa of early and 464-466, Late instars latter with 465, Cross section and 466, Articulation. Bar (left) = 1 mm.



**Figures 467-472**

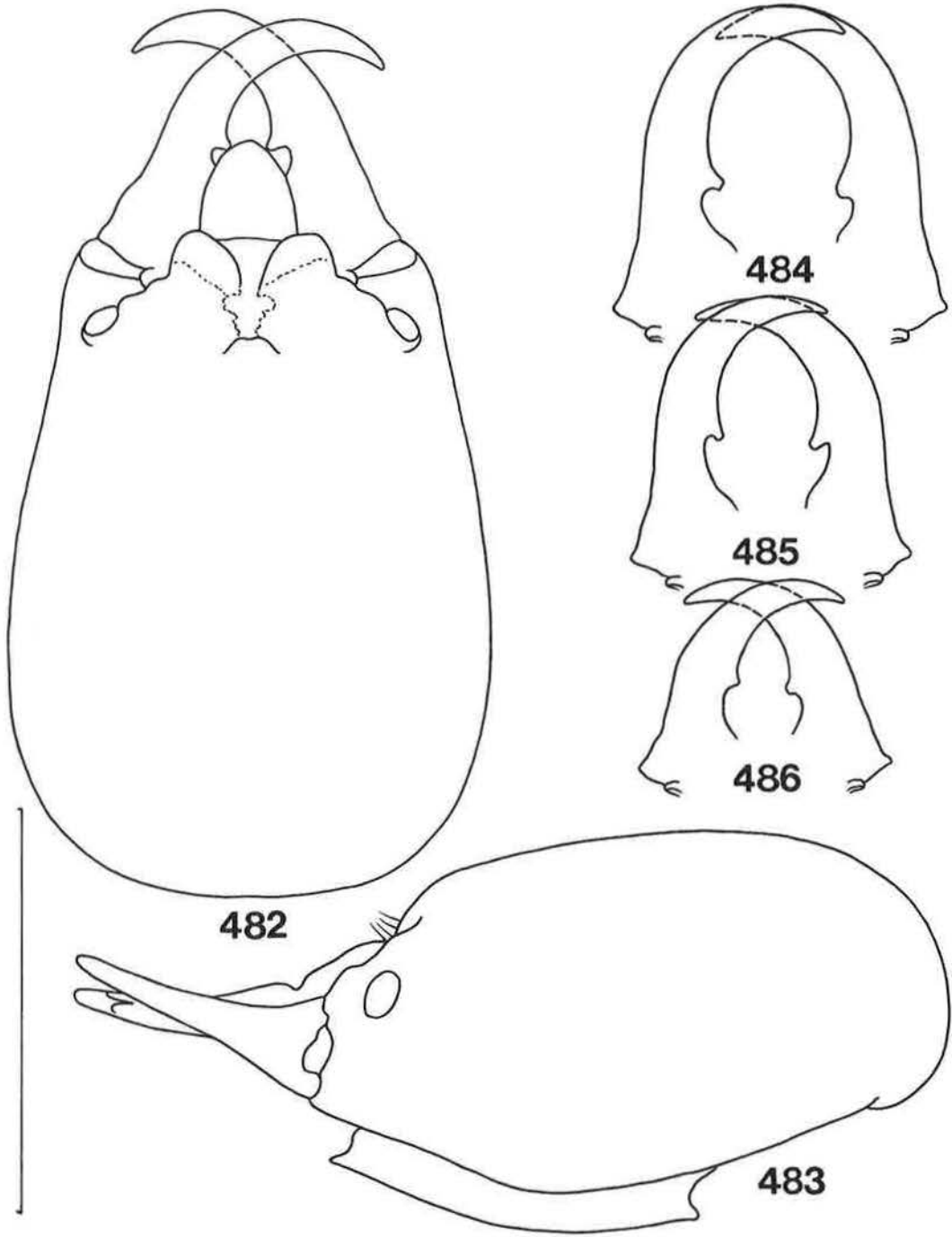
Worker caste of *A. truncatidens*: 467, Gut entire; 468, Mixed segment enlarged to show least width of mesenteron and attachment of Malpighian tubules; 469,471, Dorsal and 470,472, Ventral views of abdomens with guts *in situ*. Bars (left, gut entire, right, mixed segment, bottom, abdomens) = 1 mm.





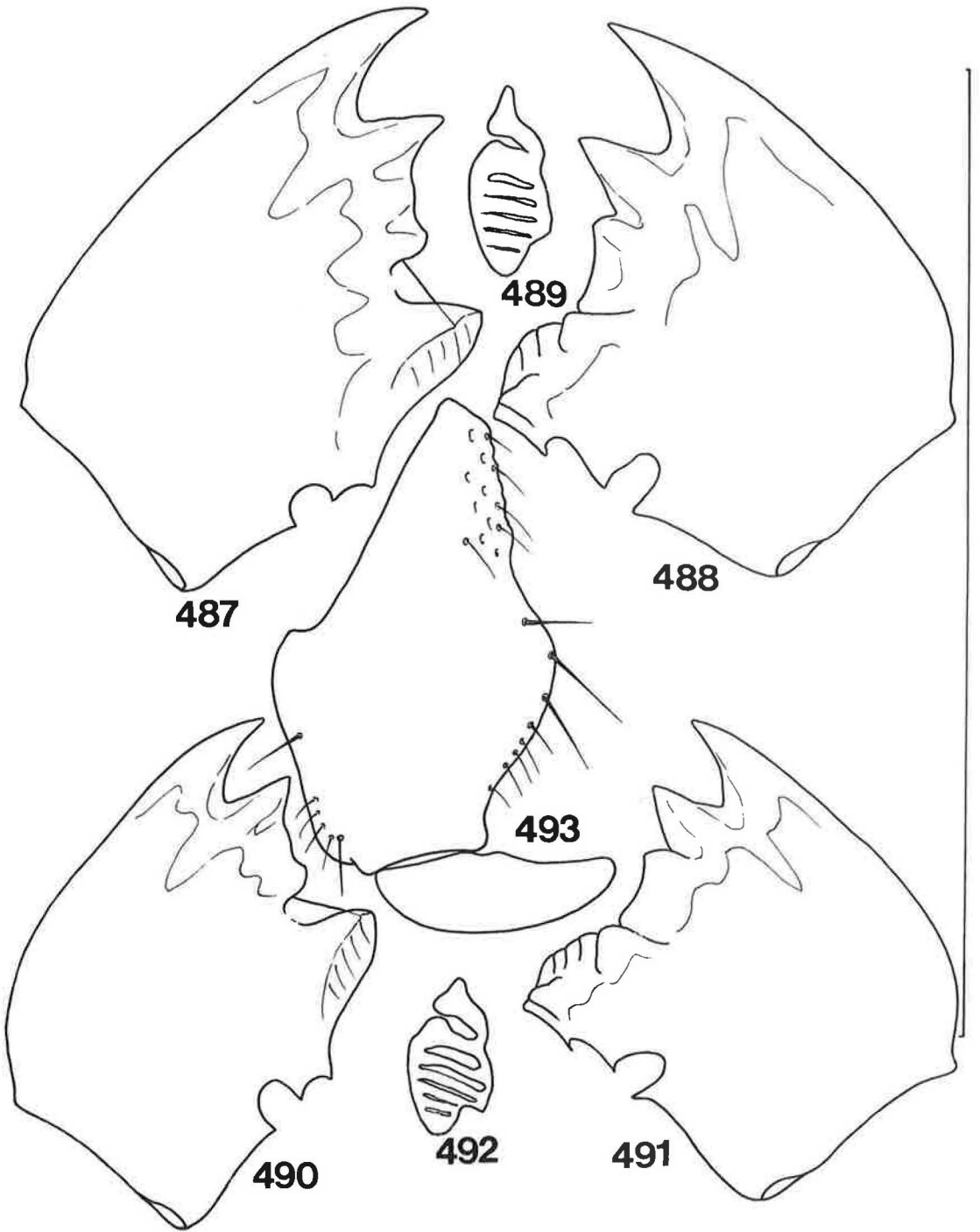
**Figures 473-481**

Imago of *A. unidentatus*: 473,474, Head capsule, front and side views; 475-477, Fontanelles enlarged; 478-480, Mandibles, 480, Right molar plate, surface view; 481, Pronotum, plan view. Bars (left, head and pronotum, right, mandibles and fontanelles) = 1 mm.



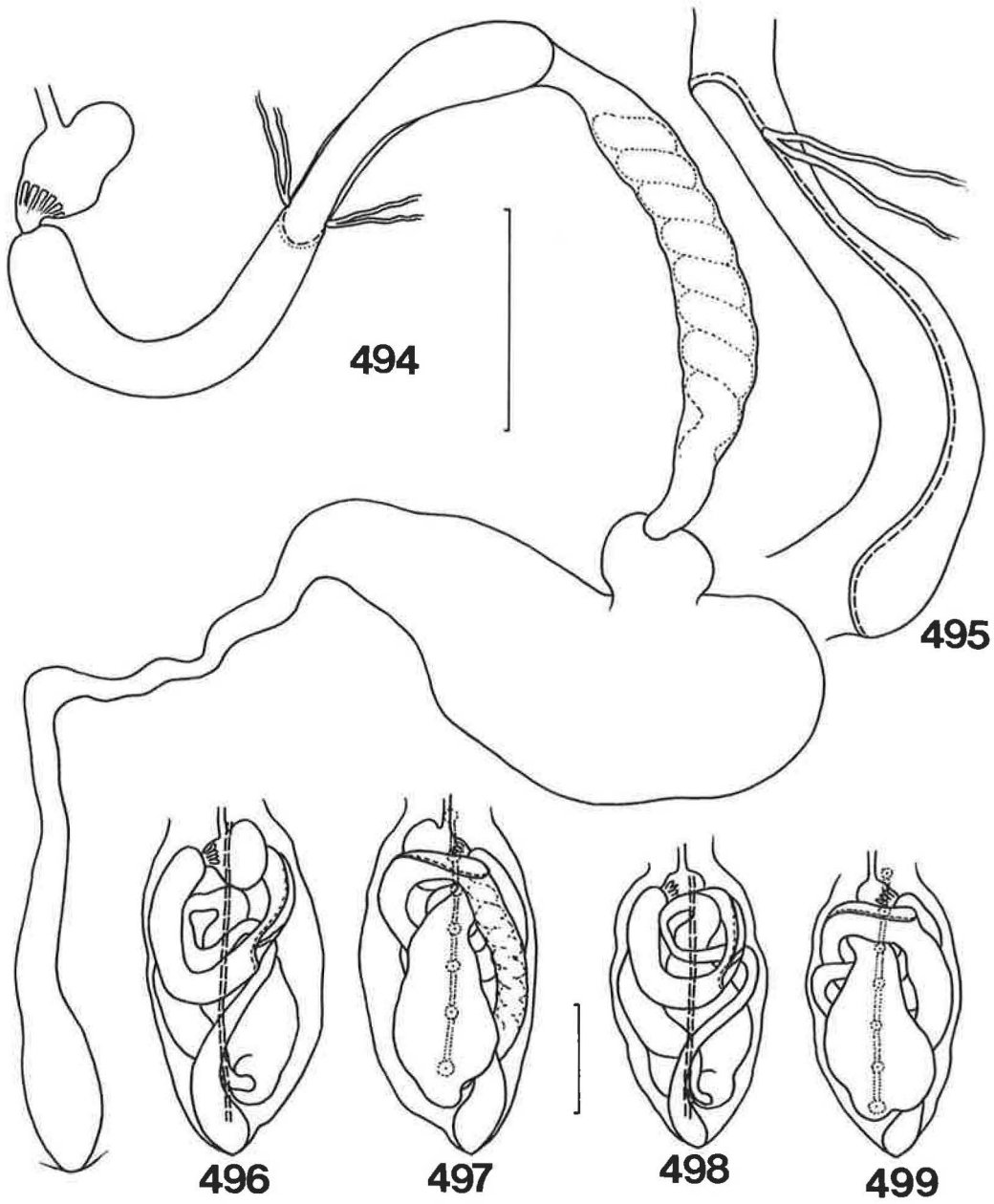
**Figures 482-486**

Soldier caste of *A. unidentatus*: 482,483, Head and mandibles, plan and profile; 484-486, Mandibles, variation. Bar (left) = 1 mm.



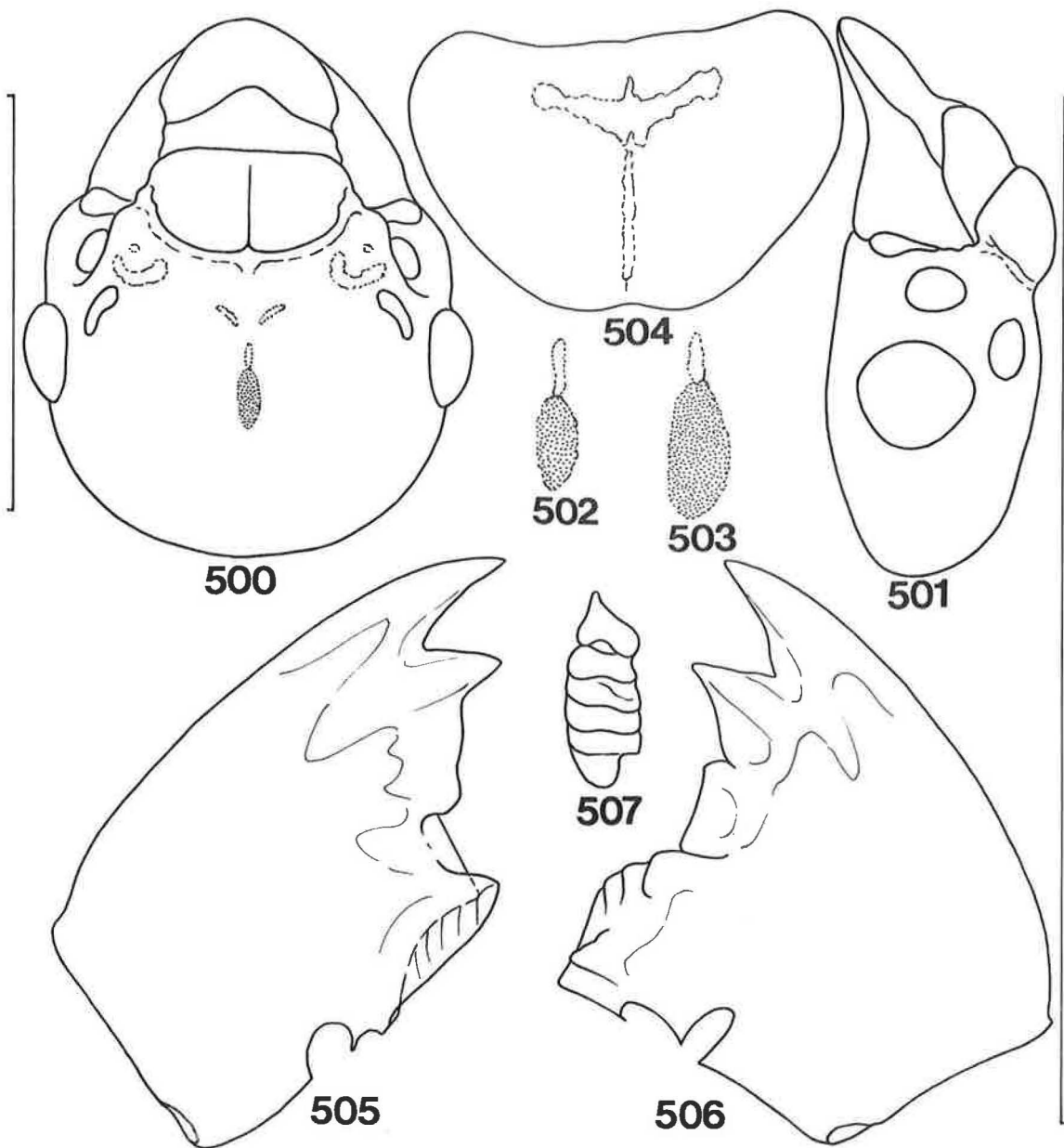
**Figures 487-493**

Worker castes of *A. unidentatus*: 487-489, Mandibles of late and 490-492, Early instars, 489,492, Right molar plates in surface view; 493, Fore coxa late instar. Bar (right) = 1 mm.



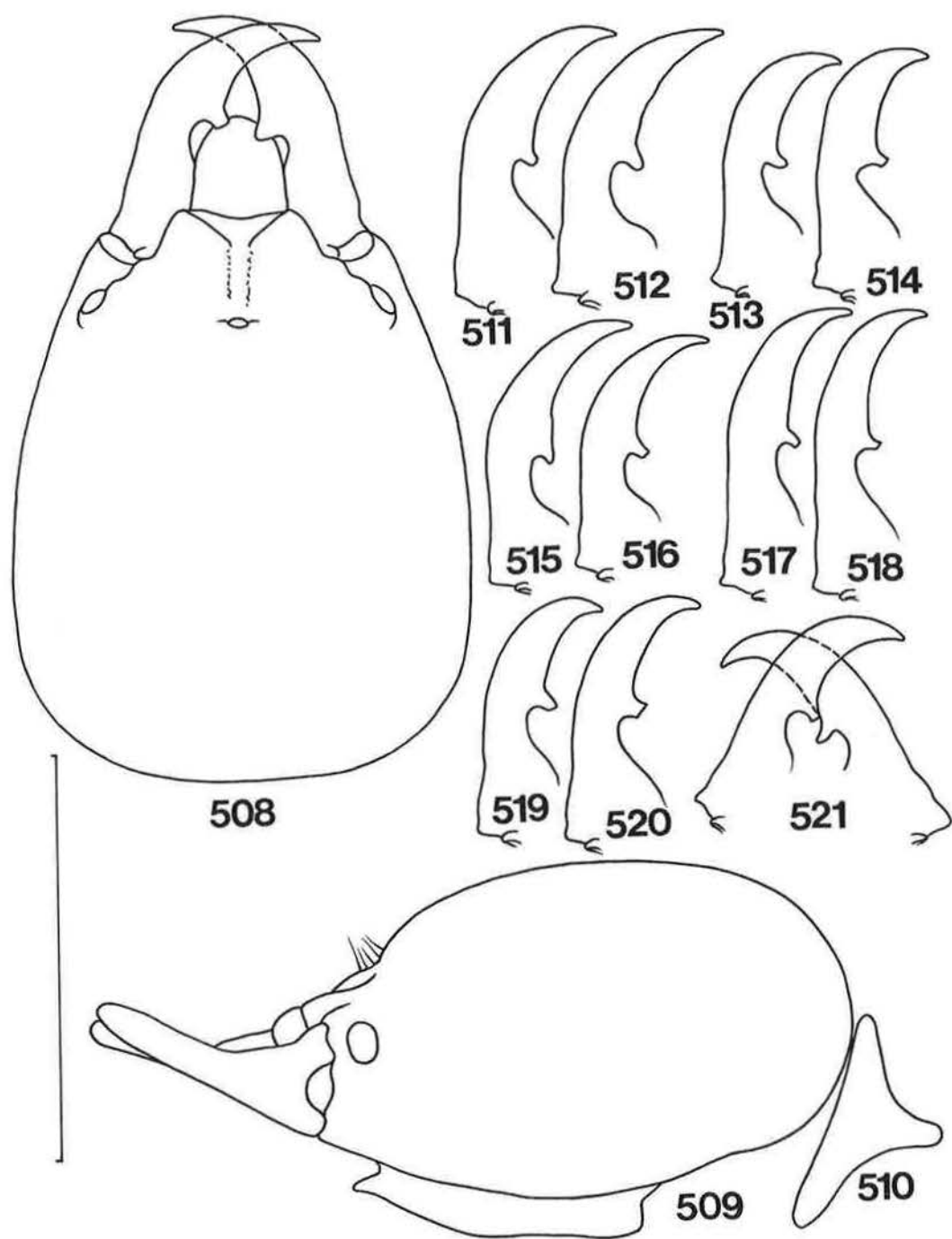
**Figures 494-499**

Worker caste of *A. unidentatus*: 494, Gut entire; 495, Mixed segment enlarged to show least width of mesenteron and attachment of Malpighian tubules; 496, 498, Dorsal and 497, 499, Ventral views of abdomens with guts *in situ*. Bars (middle upper, gut entire, bottom, abdomens) = 1 mm.



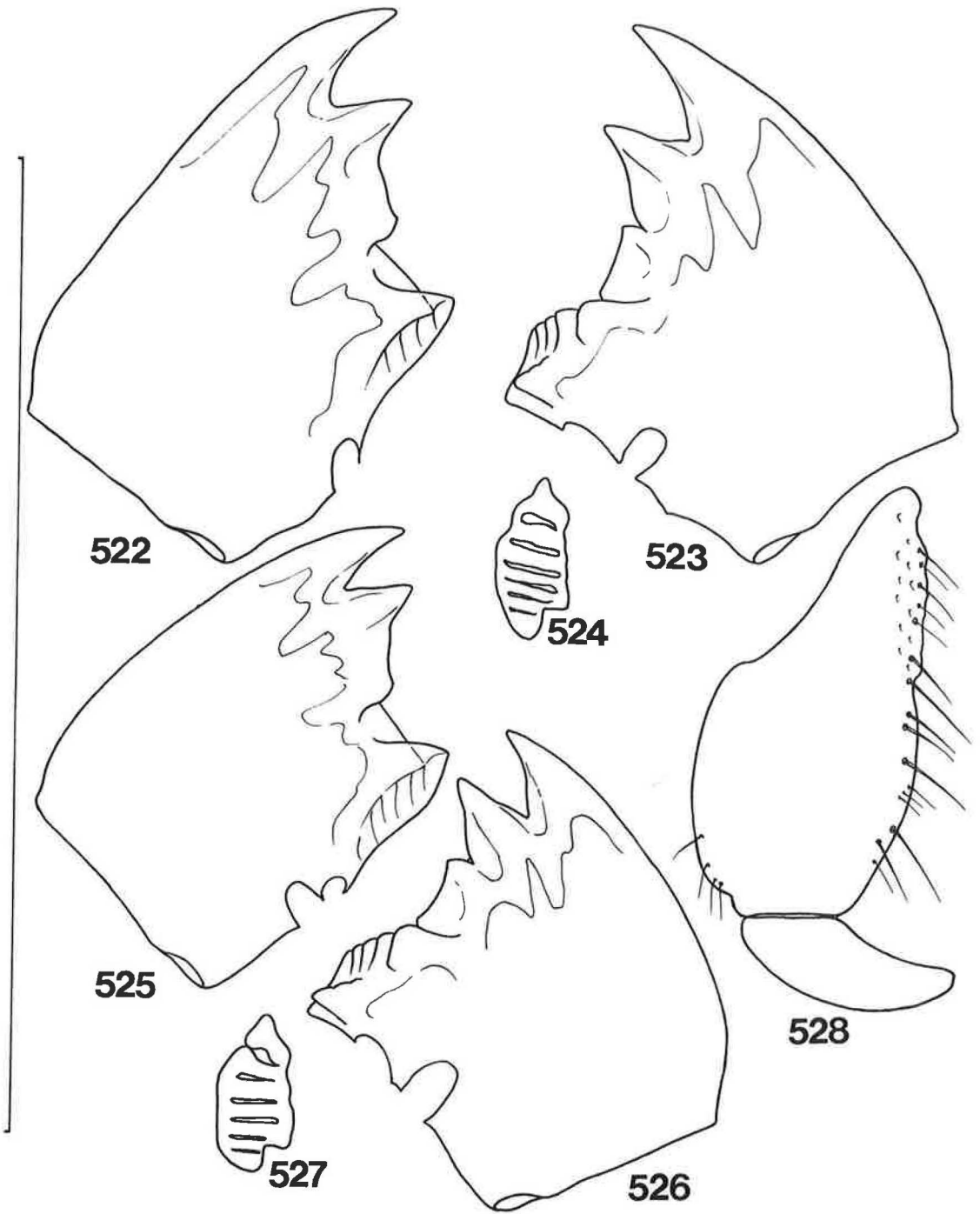
**Figures 500-507**

Imago of *A. vilis*: 500,501, Head capsule, front and side views; 502,503, Fontanelles enlarged; 504, Pronotum, plan view; 505-507, Mandibles, 507, Right molar plate, surface view. Bars (left, head and pronotum, right, mandibles and fontanelles) = 1 mm.



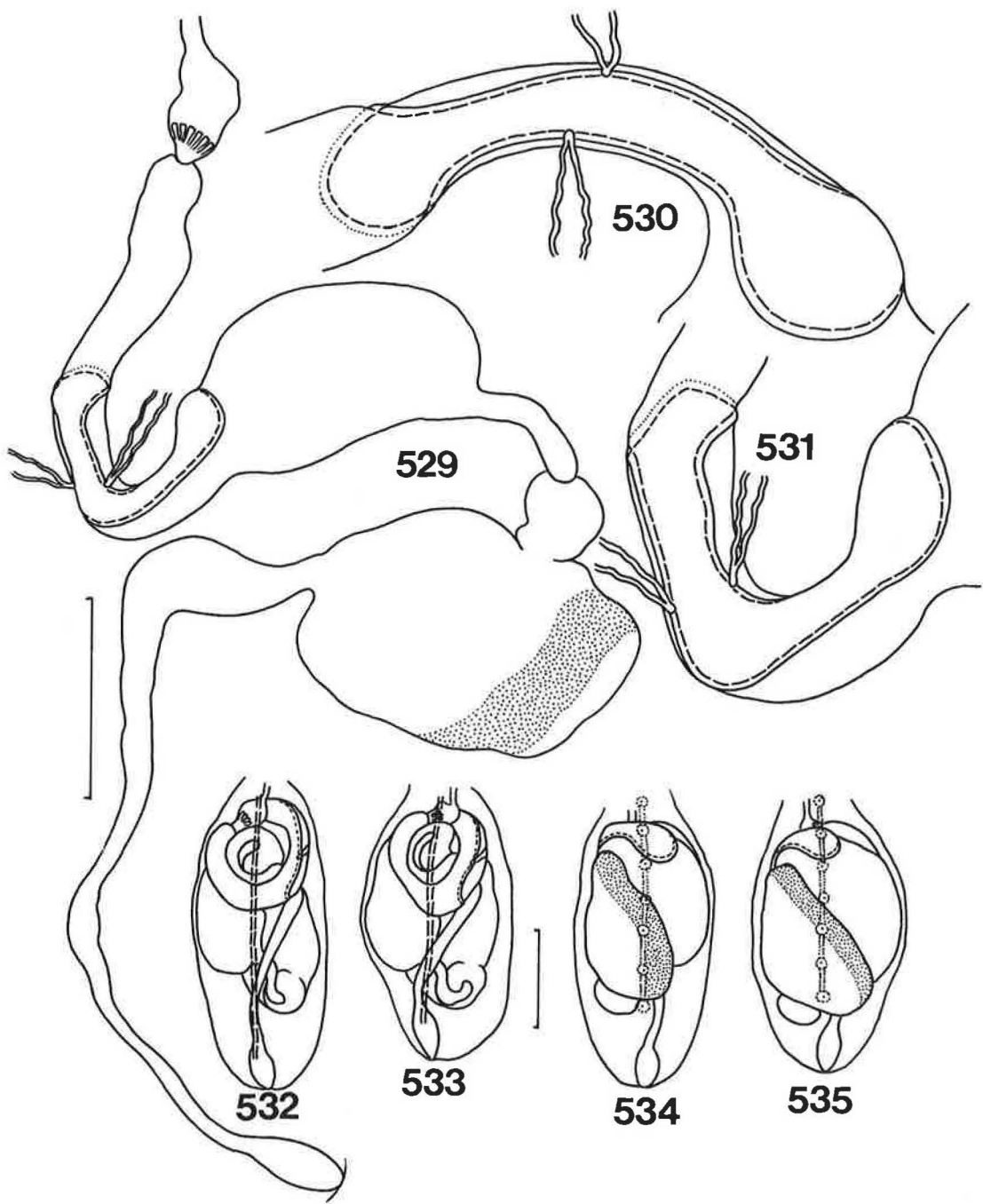
**Figures 508-521**

Soldier caste of *A. vilis*: 508,509, Head and mandibles, plan and profile, latter with 510, Pronotum; 511-521, Mandibles, variation. Bar (left) = 1 mm.



**Figures 522-528**

Worker castes of *A. vilis*: 522-524, Mandibles of late and 525-528, Early instars, 524,527, Right molar plates in surface view; 528, Fore coxa late instar. Bar (left) = 1 mm.



**Figures 529-535**

Worker caste of *A. vilis*: 529, Gut entire; 530,531, Mixed segments enlarged to show least width of mesenteron and attachment of Malpighian tubules; 532,533, Dorsal and 534,535, Ventral views of abdomens with guts *in situ*. Bars (left, gut entire, bottom, abdomens) = 1 mm.



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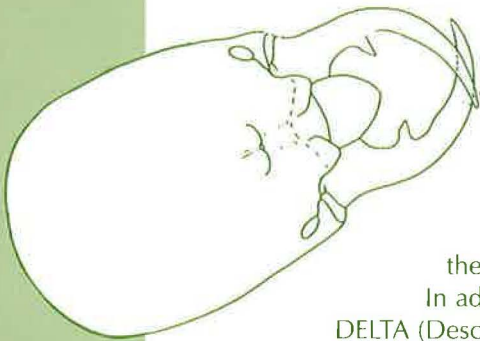
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This bulletin provides a re-examination of the termite genus *Amitermes*, including the description of two new species, the previously unknown imagoes of five others, and the complete keying of worker castes.

In addition, it represents the first study on termites to make use of the DELTA (Description Language for Taxonomy) format and the PANKEY programmes to produce the material necessary for phenetic and cladistic analysis.

Also available in the form of two diskettes, the computerized version contains an on-line identification system for the genus with a step-by-step manual for its use.

The application of this new tool in the field of taxonomic research to this widespread genus will be of interest, not only to taxonomists and termite entomologists, but also to all those needing reliable identification methods who lack easy access to conventional specialist services.