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A SYSTEMATIC REVISION OF THE GENUS LAELAPS S. STR.
(ACARI: MESOSTIGMATA) OF THE ETHIOPIAN REGION1

C. Selby Herrin² and Vernon J. Tipton²

Abstract.—This paper presents the results of a systematic study of mites of the genus Laelaps s. str. collected from small mammals of the Ethiopian region. Specimens taken from approximately 100,000 small mammals were examined from a wide variety of habitats and localities. The Ethiopian fauna of Laelaps mites includes 31 species, 8 of which are described as new: L. parasimillimus, L. myomys, L. malaconmys, and L. acomys. A numerical taxonomic analysis was made, the results of which were used in the preparation of a proposed classification of the African species of Laelaps. A key for identification of females is given, and females and males (where known) of all species are illustrated. Diagnostic characters are given for the female and male of each species. Collection data and, where pertinent, discussions of morphological characters and variability are provided. Also included are discussions of host-parasite associations.

The objective of this paper is to present a systematic revision of the genus Laelaps s. str. (i.e., not including species of Echinolaelaps Ewing) of the Ethiopian region. There has been no recent publication which presents a sufficiently comprehensive taxonomic review of this group of mites in Africa. Because of the great similarity as well as diversity among the Laelaps species in Africa, there has been a definite need for a complete, comprehensive revision of this group of mites. This need is increased by the great diversity of Laelaps taxa found in the collections from the Smithsonian African Ectoparasite Project.

Several scientists have contributed greatly to the knowledge of parasitic Laelaps mites of the Ethiopian region. Stanley Hirst (1912 to 1925) described as new seven species of African Laelaps, which were included in Bedford's (1932, 1936) checklists of ectoparasites of Ethiopian vertebrates. During the years between 1937 and 1954 Charles Radford published several papers dealing with new species and new host and collection records. In the 1950s and 1960s additional contributions were made by Drs. F. Zumpt, R. Taufflieb, H. L. Keegan, and M. Lavoipierre. They were responsible for the description of 21 Laelaps species and the publication of many new host and locality records. Tipton (1960) treated the genus Laelaps worldwide; however, 11 of the 32 species now known from Africa were described after this work. In his book Arthropod Parasites of Vertebrates in Africa (1961) listed 22 species. The only keys to the identification of African species of the genus were those of Tipton (1960) and Taufflieb (1959).

The concept of the genus Laelaps followed in this paper is basically that of Tipton (1960). That is, we do not feel that Laelaps and Echinolaelaps should be grouped together without at least separate subgeneric status for each. Thus, this paper deals only with Laelaps s. str. (subgenus Laelaps) as recognized by Tipton (1960) and does not include Echinolaelaps. The dorsal chaetotaxy signatures followed in this paper are those of Hirschmann (1937), and the morphological terminology is basically that of Evans and Till (1965).

Following the discussion of taxonomy and classification analyses and the identification key to females, each species is

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treated as follows: synonymy, brief description of female and male (where known), summary of all collection records (literature as well as collections of the African Mammal Project), and brief discussion of differential diagnostic characters and host-parasite relationships. For the species described herein as new, the collection records are presented in more detail.

For each species described as new to science, the holotype, allotype (where described), and one or more paratypes are to be deposited in the U.S. National Museum of Natural History, Washington, D.C. Paratypes are to be deposited in the collection of the South African Institute for Medical Research, Johannesburg, South Africa, and in the collections of the authors.

We acknowledge with gratitude the assistance of the many people associated with this study. Special thanks are given to Dr. Henry W. Setzer for logistic support and to Dr. Deane P. Furman for reviewing the manuscript. We are grateful to the South African Institute for Medical Research (Dr. F. Zumpt) and the British Museum, Natural History (Mr. K. H. Hyatt, curator), for the loan of type specimens, and to Dr. R. Taufflieb, who sent specimens from his personal collection. The Center for Health and Environmental Studies provided the laboratory space and equipment used in this study. Sheila E. Ford and Jerry N. Norton prepared the illustrations.

Materials and Methods

Materials Utilized

Type specimens of most of the previously described Laelaps species of Africa were obtained from various museums and individuals for examination and use in the numerical taxonomic analyses. Where type specimens were not available, positively identified representative specimens from the type locality were obtained for each species. Also, representative specimens of the various taxa found in the collections of the Smithsonian-African Ectoparasite Project were included in the numerical taxonomic studies. The specimens (OTUs) included in the numerical taxonomic analyses are listed in Table 1. The following source abbreviations are used in Table 1 and elsewhere in the paper: SAIMR = South African Institute for Medical Research; AMP = African Mammal Project; USNM = United States National Museum of Natural History, Smithsonian Institution; BMNH = British Museum (Natural History); Taufflieb = Roger Taufflieb, Dakar, Senegal.

A list of 159 characters was compiled for use in this study (Tables 2 and 3); of these, 33 were qualitative and 126 were quantitative (measurements). Each specimen selected for inclusion in the analyses was examined and the value of each character recorded on data forms. The data were entered on computer punch cards preparatory to the computer analyses.

Computational and Analytical Methods

The computer analyses were performed on the IBM 360 model 65 computer at the Brigham Young University Computer Center using the Numerical Taxonomy System of Multivariate Statistical Programs (NT-SYS) prepared by Dr. F. James Rohlf and associates of the State University of New York at Stony Brook. The specific procedures used in the analyses were as follows: (1) transformation of the basic data matrix by standardization (Sokal 1961); (2) computation of Pearson’s product-moment correlation (Mischeuer and Sokal 1957) and Sokal’s (1961) taxonomic distance to produce similarity matrices; (3) analysis of each similarity matrix by the UPGMA cluster analysis, yielding a phenogram (a graphic presentation of phylogenetic resemblance for each matrix; and (4) cophenetic correlations were computed to arrive at an estimate of the degree of information transferred from the similarity matrices to the phenograms. The purpose of these numerical taxonomic analyses was to objectively evaluate the affinity or similarity between the taxonomic units. The results of these analyses were then used in making decisions regarding the validity of all previously described Laelaps species as well as new taxa included in the analyses. The final proposed classification is based primarily on this phase of the investigation.

Results and Discussion

Taxonomic Analyses

Prior to the numerical taxonomic analyses, a proposed classification of the genus
Table 1. *Laelaps* specimens included in the numerical taxonomic analyses.

| Species                  | Type    | Host                          | Locality                      | Source  |
|--------------------------|---------|-------------------------------|-------------------------------|---------|
| L. transvaalensis        | Paratype| Otonyss irroratus             | Transvaal, So. Africa         | SAIMR   |
| L. keegani               | Paratype| Arvicantis nabitic            | Northern Nigeria              | SAIMR   |
| L. congoicola            | Paratype| Otonyss hypozanthus           | Brazzaville, Congo            | Taufflieb|
| L. parasimmillimus n. sp.| Holotype| Deiphonus defu                | Transvaal, So. Africa         | SAIMR   |
| L. simillimus            | Paratype| Thaldomys namaquensis         | Brazzaville, Congo            | Taufflieb|
| L. grenieri              | Paratype| Lenniscymys striatus          | Kampa, Uganda                 | SAIMR   |
| L. thamnomys             | Paratype| Thamnomys rutlans             | Yaounde, Cameroonos           | Taufflieb|
| L. kampalenisi           | Paratype| Lenniscymys striatus          | Yaounde, Cameroonos           | Taufflieb|
| L. moucheti              | Paratype| "rodents"                     | Yaounde, Cameroonos           | Taufflieb|
| L. laevi                 | Paratype| Mus bella                     | Adu, Nigeria                  | Taufflieb|
| L. nigeriensis           | Holotype| Crocidura sp.                 | Kalahara, So. Africa          | Taufflieb|
| L. friziumpii            | Paratype| Rattus paeludus               | Yaounde, Cameroonos           | Taufflieb|
| L. laropierrei           | Paratype| Lophuronys sikapusi           | Transvaal, So. Africa         | Taufflieb|
| L. tillae                | Paratype| Lenniscymys griselda          | Transvaal, So. Africa         | Taufflieb|
| L. roubaudi              | Paratype| Dasyonys incompus             | Transvaal, So. Africa         | Taufflieb|
| L. peregrinus            | Paratype| Rhadonys pumilio              | Adu, Nigeria                  | Taufflieb|
| L. peregrinus            | Paratype| Rhadonys pumilio              | Yaounde, Cameroonos           | Taufflieb|
| L. nutalli               | Paratype| Mus norvegicus                | Sierra Leone                  | BMNH    |
| L. malaconyss n. sp.     | Holotype| Mus algericus                 | Berchtesgaden, Ivy Coast      | BMNH    |
| L. algericus             | Paratype| "field mice"                  | Tougoury, Algeria             | BMNH    |
| L. orangiensis           | Paratype| Ditomysus collinus            | Oran, Algeria                 | BMNH    |
| L. brandbergensis        | Holotype| Myomys daltoni                | Brandberg, SW Africa          | BMNH    |
| L. zumpti               | Holotype| Myomys triton                 | Casa Mance, Senegal           | SAIMR   |
| L. myomys n. sp.         | Paratype| "Kapuku"                      | Liberia                       | BMNH    |
| L. liberiensis           | Holotype| Epimys defua                  | Karonga, Nyasaland            | BMNH    |
| L. lambornii             | Paratype| "Praomyx jacksoni"            | Ora, Western Nigeria          | SAIMR   |
| L. setzeri              | Paratype| Praomyx sp.                   | Brazzaville, Congo            | Taufflieb|
| L. brazzi                | Paratype| "ratts"                       | Brazzaville, Congo            | Taufflieb|
| L. benoiti              | Paratype| Acomys spinosissineus         | Wanga, Kenya                  | BMNH    |
| L. aethiopicus           | Syntype | "rodent"                      | So. Bugishu, Uganada          | BMNH    |
| L. vansomerini           | Syntype | Lycomys sp.                   | Manicaland, Rhodesia          | AMP     |
| L. acomyss n. sp.        | Holotype| Chrysoschochris               | Brazzaville, Congo            | SAIMR   |
| L. boqueri              | Paratype| "leucorrhina"                 | Congo                         | Taufflieb|
| L. spinifer              | Syntype | Arvicantiss doralis           | So. Africa                    | BMNH    |
| L. paraspinosus          | Syntype | Acomyss spinosissineus        | Transvaal, So. Africa         | USNM    |
| L. brevisperitremsus     | Paratype| Arvicantiss doralis           | Teheran Prov., Iran           | AMP     |
| L. kochi                | Paratype| Arvicantiss doralis           |                               |         |

Table 2. Quantitative characters (measurements) of females used in the numerical taxonomic analyses.

**Gnathosoma**
1. Greatest width at level of gnathosomal setae
2. Length from base to palpal trochanter
3. Length of palps
4. Length 2nd cheliceral segment
5. Length chelae
6. Length distal hypostomal setae
7. Length medial hypostomal setae
8. Length lateral hypostomal setae
9. Length gnathosomal setae
10. Distance between gnathosomal setae
11. Distance medial hypostomal setae to gnathosomal setae

**Venter**
12. Width sternal plate at level of coxae II
13. Median length sternal plate
14. Distance between setae st. 1
15. Distance between setae st. 2
16. Distance between setae st. 3
17. Distance between setae st. 1 and st. 2
18. Distance between setae st. 2 and st. 3
19. Length setae st. 1
20. Length setae st. 2
21. Length setae st. 3
22. Length setae st. 4 (metasternal)
23. Least width genital plate between coxae IV
24. Greatest width genital plate
25. Total length genital plate
26. Length genital plate from 1st genital setae to posterior end
27. Distance between 1st pair genital setae
28. Distance between 2nd pair genital setae
29. Distance between 3rd pair genital setae
30. Distance between 4th pair genital setae
31. Length 1st pair genital setae
32. Length 2nd pair genital setae
33. Length 3rd pair genital setae
34. Length 4th pair genital setae
35. Distance between genital plate and anal plate
36. Greatest width anal plate
37. Length anal plate from anterior margin to postanal seta
38. Distance between anal setae
39. Distance between anterior margin anal plate to anal setae
40. Distance from anal setae to postanal seta
41. Length anal setae
42. Length postanal seta
43. Length short setae of unarmed venter
44. Length longer setae of unarmed venter
45. Length metapodal plates
46. Width metapodal plates
Legs
47. Greatest width coxa I
48. Midventral length coxa I
49. Length proximal seta coxa I
50. Length distal seta coxa I
51. Length anterior dorsal seta 1 of femur I
52. Length posterior dorsal seta 1 of femur I
53. Width genu I
54. Length tarsus I
55. Greatest width coxa II
56. Midventral length coxa II
57. Length anterior seta coxa II
58. Length posterior seta coxa II
59. Length tibia II
60. Width tibia II
61. Length tarsus II
62. Greatest width coxa III
63. Midventral length coxa III
64. Length anterior seta coxa III
65. Length posterior seta coxa III
66. Length genu III
67. Width genu III
68. Length tibia III
69. Length tarsus III
70. Greatest width coxa IV
71. Median length coxa IV
72. Length seta coxa IV
73. Length trochanter IV
74. Width trochanter IV
75. Length femur IV
76. Length genu IV
77. Width genu IV
78. Length tibia IV
79. Length tarsus IV

Dorsum
80. Length of peritreme
81. Median length of dorsal plate
82. Greatest width of dorsal plate
83. Distance between setae r1
84. Distance between setae r1 and r2
85. Distance between setae r2
86. Distance between setae r2 and r3
87. Distance between setae r3 and r4
88. Distance between setae r4
89. Distance between setae i1 and r1
90. Distance between setae r1 and i1
91. Distance between setae i1 and i2
92. Distance between setae i2
93. Distance between setae i2 and i3
94. Distance between setae j3 and j4
95. Distance between setae j4
96. Distance between setae j4 and j5
97. Distance between setae j5
98. Distance between setae j5 and z5
99. Distance between setae z5 and z6
100. Distance between setae z6 and z7
101. Distance between setae z7 and z8
102. Distance between setae z8 and z9
103. Distance between setae z9 and z10
104. Distance between setae z10 and z11
105. Distance between setae z11 and z12
106. Distance between setae z12 and z13
107. Distance between setae z13 and z14
108. Distance between setae z14 and z15
109. Distance between setae z15 and posterior end of dorsal plate
110. Length of seta i1
111. Length of seta r1
112. Length of seta s1
113. Length of seta i2
114. Length of seta s2
115. Length of seta i3
116. Length of seta s3
117. Length of seta i4
118. Length of seta s4
119. Length of seta i5
120. Length of seta s5
121. Length of seta Z3
122. Length of seta Z4
123. Length of seta S4
124. Length of seta S5
125. Length of seta I5
126. Length of seta Z5

Table 3. Qualitative characters of females used in the numerical taxonomic analyses and in the construction of the identification key.

Gnathosoma
1. Form of gnathosomal setae:
   (1) Setaceous
   (2) Spinelike
   (3) Peglike
2. Form of hypostomal setae 2 (lateral):
   (1) Setaceous
   (2) Spinelike
   (3) Peglike

Venter
3. Shape of posterior margin of sternal plate:
   (1) Convex, more or less
   (2) Straight, irregularly
   (3) Slightly invaginated
   (4) Moderately invaginated, to setae st. 3
   (5) Deeply invaginated, to beyond st. 3
   (6) Extremely invaginated, to 2nd pair pores
4. Sternal plate length/width ratio (expressed in decimal fraction)
5. Form of sternal setae:
   (1) Setaceous
   (2) Spinelike
6. Genital plate length/width ratio (expressed in decimal fraction)
7. Place of greatest width of genital plate:
   (1) Level of genital setae
   (2) Level of 2nd genital setae (Zv1)
   (3) Level of 3rd genital setae (Jv1)
8. Relative distance between 1st versus 4th pairs of setae on genital plate:
   (1) 1st less than 4th
   (2) 1st equal to 4th
   (3) 1st greater than 4th
9. Shape of anterior margin of genital plate between 4th pair setae:
   (1) Convex, rounded
   (2) Straight
   (3) Concave, invaginated
10. Number of setae on unarmed venter
11. Relative distance between genital and anal plates:
   (1) Great distance
   (2) Moderate distance
   (3) Close, almost touching
12. Shape of metapodal plates:
   (1) Narrow elongate, much longer than wide
   (2) Broadly oval, moderately longer than wide
   (3) Rounded or oval, length equal to width
13. Length/width ratio of anal plate (expressed in decimal fraction)
14. Shape of anterior margin of anal plate:
   (1) Convex, rounded
   (2) Straight
   (3) Concave, invaginated
15. Position of anal setae relative to anal orifice:
   (1) Posterior to anal orifice
   (2) Slightly posterior to middle of anal orifice
   (3) At level of middle of anal orifice
   (4) Slightly anterior to middle of anal orifice
   (5) Anterior to anal orifice

16. Form of anal setae:
   (1) Setaceous and slender
   (2) Peglike and stout

17. Anterior extension of peritreme:
   (1) Anterior of coxa I
   (2) Middle of coxa I
   (3) Posterior of coxa I
   (4) Anterior of coxa II
   (5) Middle of coxa II

18. Chitinization of anterolateral margins of dorsal plate:
   (1) Normal chitinization
   (2) Heavily chitinized

19. Number of setae on dorsal plate

20. General form of central and anterior dorsal setae:
   (1) Setaceous
   (2) Peglike

Legs
21. Form of distal seta of coxa I:
   (1) Setaceous
   (2) Peglike

22. Form of proximal seta of coxa I:
   (1) Setaceous
   (2) Peglike

23. Form of proximal ventral seta of trochanter I:
   (1) Setaceous
   (2) Peglike

24. Relative length of pd 1 seta of femur I:
   (1) Subequal to ad 1 seta
   (2) About 1.5 times length of ad 1 seta
   (3) Two times or more length of ad 1 seta

25. Form of anterior seta of coxa II:
   (1) Setaceous
   (2) Peglike

26. Form of posterior seta of coxa II:
   (1) Setaceous
   (2) Peglike (acute)

27. Form of ventral proximal seta of trochanter II:
   (1) All setaceous
   (2) One peglike
   (3) Two peglike

28. Form of preapical setae of tarsus II:
   (0) All setaceous
   (1) One peglike
   (2) Two peglike
   (3) Three peglike
   (4) Four peglike

29. Form of anterior seta of coxa III:
   (1) Setaceous
   (2) Peglike

30. Form of posterior seta of coxa III:
   (1) Setaceous
   (2) Peglike

31. Form of preapical setae on tarsus III:
   (0) All setaceous
   (1) One peglike
   (2) Two peglike
   (3) Three peglike
   (4) Four peglike

32. Form of ventral seta of coxa IV:
   (1) Setaceous
   (2) Peglike

33. Form of preapical setae on tarsus IV:
   (0) All setaceous
   (1) One peglike
   (2) Two peglike
   (3) Three peglike
   (4) Four peglike

Laelaps s. str. was prepared based upon classical taxonomic methods (i.e., consideration of unequal weight given to a smaller number of key characters). This proposed classification, as presented in Table 4, defines three major groups (similimus group, muttalli group, and vansomerei group) based primarily upon the form of the proximal and distal setae of coxa I. The arrangement of taxa within the three groups is based on subjective judgments after having examined representative specimens of all taxa. No subgroups were defined in this arrangement.

Figure 1 summarized the taxonomic relationships given by the UPGMA cluster analysis of a standardized correlation coefficient matrix based upon an original data matrix of 37 OTUs and 159 characters. The cophenetic correlation coefficient for this phenogram (Fig. 1) was 0.669, which is not too high, yet higher than that for the phenogram of the taxonomic distance matrix. A phenon line drawn vertically across the phenogram at the 0.09 level defines eight clusters denoted as A-H. It should be noted here that the primary interest in the phenogram is in the grouping of taxa rather than the relative levels at which taxa and clusters link with each other. Also, it should be kept in mind that the vertical ordering of taxa and clusters is not significant, i.e., each cluster may be rotated on its horizontal axis by 180 degrees without altering any relationships.

Generally, the correlation between the
two classification arrangements is quite good, especially in the similarity between taxa. The first six taxa (L. transvaalensis, L. keegani, L. congoicola, L. parasimilimus n. sp., L. simillimus, and L. grenieri) of the a priori defined simillimus group formed the first cluster (A) of the phenogram, but with two taxa (L. lavoipierre and L. roubaudi) of the nuttalli group included also. Of the eight taxa in cluster A, L. simillimus and L. parasimilimus are the most similar. Based on the numerical taxonomic analysis (phenogram) alone, one might be tempted to synonymize these
Table 4. Preliminary proposed classification of the genus Laelaps s. str. based on classical taxonomic methods prior to the numerical taxonomic analysis.

Similimus group
L. transvaaldensis Zumpt, 1950
L. keegani Thurman, 1958 (= L. berlesi Keegan, 1956)
L. congoicola Taufflieb, 1959
L. parasimilimus n. sp.
L. similimus Zumpt, 1950
L. gremieri Taufflieb, 1954
L. thannomyss Taufflieb, 1954
L. kampalensis Taufflieb, 1959
L. moucheli Taufflieb, 1959
L. lavieri Taufflieb, 1954 (= L. nigeriensis Keegan, 1962)
L. fritzumpti Taufflieb, 1964

Nuttalli group
L. laoipierrei Taufflieb, 1954
L. tillae Taufflieb, 1959
L. roubaudii Taufflieb, 1954
L. peregrinus Taufflieb, 1959
L. nuttalli Hirst, 1915
L. malaconyss n. sp.
L. brandbergensis Taufflieb, 1959
L. zumpti Keegan, 1956
L. myomyss n. sp.
L. liberiensis Hirst, 1925 (= L. lamborni Hirst, 1925)
L. setteri Coffey, 1971
L. brazzai Taufflieb, 1962
L. benoiti Taufflieb, 1964

Vansomereni group
L. aethiopicus Hirst, 1925
L. vansomereni Hirst, 1923
L. acomyss n. sp.
L. boquereri Taufflieb, 1962
L. spinifer Taufflieb, & Mouchet, 1956
L. paraspinosus Tipton, 1960 (= L. parvulus Hirst, 1923)
L. brevipetitremus (Garrett & Strandmann, 1967)

Two taxa, but there are several quite distinctive morphological key characters separating them (see identification key). The placement of L. laoipierrei and L. roubaudii in cluster A of the phenogram is based on overall phenetic resemblance (i.e., 159 characters weighted equally) rather than consideration of several key characters as in the classical taxonomic arrangement. In the phenogram L. moucheti is included in cluster B, which includes taxa of the a priori Vansomereni group. In examining the basic data matrix, it appears that L. moucheti and L. boquereri are phenetically similar in characters related to length of setae, especially dorsal body setae. This was supported by an additional numerical taxonomic analysis in which the number of characters was reduced to 105, eliminating highly correlated characters, especially those related to length of setae. In the resulting phenogram L. moucheti was included in cluster A and most similar to L. transvaaldensis, L. malacomyss n. sp., which was originally placed in the nuttalli group, is included in cluster B of the phenogram with L. spinifer, most likely because of the many peglike and spinelike leg and body setae, characteristics which are more typical of taxa of the Vansomereni group. It should be noted that L. kochi of cluster B and L. algericus and L. oranicus of clusters E and F were included in the numerical taxonomic analysis, even though they are not indigenous to the Ethiopian region, because of their similarity to taxa from this region and because their distribution includes northern Africa (Palaeartic region), which borders the Ethiopian region on the north.

The four remaining taxa of the a priori defined Similimus group (L. thannomyss, L. kampalensis, L. lavieri, and L. fritzumpti) were divided between two closely related phenogram clusters (C and D). L. kampalensis appears in cluster C with L. tillae and L. peregrinus, two taxa of the nuttalli group. Cluster D consists of the remaining three taxa, L. thannomyss, L. fritzumpti, and L. lavieri. Prior to the numerical taxonomic analysis, L. lavieri and L. nigeriensis were determined to be synonyms, and this seems to be confirmed by their placement in the phenogram.

Cluster E contains six taxa of the a priori defined nuttalli group plus L. aethiopicus of the Vansomereni group. Prior to the numerical taxonomic analysis, L. liberiensis and L. lamborni were determined to be synonymous, and this seems to be confirmed by their placement in the phenogram. The close phenetic relationship between L. liberiensis, L. setteri, L. benoiti, and L. algericus was confirmed by the numerical taxonomic analysis. The low level at which L. aethiopicus joins cluster E poses some question on its actual phenetic resemblance with the nuttalli group.

Clusters F and G consist of all remaining taxa of the previously defined nuttalli group plus L. acomyss n. sp., which was originally placed with the Vansomereni group. These two clusters join together before either joins with any other cluster, thus confirming the phenetic relationship among the five taxa involved. The final cluster (H) consists of L. vansomereni and L. brevipetitremus. In the previously
noted numerical taxonomic analysis based on 105 characters. *L. vansomereni* joined *L. aethiopicus* prior to their inclusion in a particular cluster, thus giving some validity to the *a priori* defined close phenetic relationship between these two taxa.

Systematics of the Genus *Laelaps* s. str.

After critical study of the numerical taxonomic analyses and close examination of as many specimens of each taxa as were available, a final proposed classification of the genus *Laelaps* s. str. was prepared (Table 5). The taxonomic groupings in this proposed classification are based primarily on overall phenetic resemblance as determined by both classical and numerical taxonomic evaluations. We found no set of key characters which may be used to completely and definitively separate all these groups, especially the subgroups. The 31 taxa described in this paper are treated in the same order as listed in Table 5. The following identification key reflects to some degree the phenetic relationships between most taxa as presented in the proposed classification; however, it should be kept in mind that the key is based on sets of diagnostic qualitative characters, whereas the proposed classification is based more on overall phenetic resemblance.

The taxa of the three major groups (I, II and III) of the proposed classification are separated primarily on the form of the proximal and distal setae of coxa I. The taxa of major group I, except for *L. lavoipierrei*, may be distinguished by both coxa I setae being setaceous. The distal seta of coxa I of *L. lavoipierrei* is very small but blunt and peglike. The taxa of major group II may be basically distinguished by the blunt, peglike distal seta and setaceous proximal seta of coxa I, with but two exceptions: *L. kampalensis* bears a setaceous seta both proximally and distally on coxa I, and *L. aethiopicus* bears a blunt, peglike seta both proximally and distally on coxa I. Major group III contains taxa bearing a blunt, peglike seta both proximally and distally on coxa I.

### Table 5. Final proposed classification of the genus *Laelaps* s. str.

| Major group | Subgroup A | Subgroup B | Subgroup C | Subgroup D |
|-------------|------------|------------|------------|------------|
| I           | L. simillimus Zampt, 1950 | L. lavoipierrei Taufflieb, 1954 | L. brandbergensis Taufflieb, 1950 | L. spinifer Taufflieb and Mouchev, 1956 |
| II          | L. parsimillimus n. sp. | L. frizumpti Taufflieb, 1964 | L. paraspiniferus Taufflieb, 1959 | L. paraspiniferus Tipton, 1960 |
| III         | L. kampalensis Taufflieb, 1959 | L. kampalensis Taufflieb, 1959 | L. vansomereni Taufflieb, 1959 | L. breviperitremus (Garrett and Strandmann, 1967) |

**Key to Species of *Laelaps* from Small Mammals of Africa**

(Females)

1. Distal seta of coxa I setaceous
   2. Distal seta of coxa I spinelike or peglike

2(1). Tarsi II and III with all preapical setae setaceous or at most with one spinelike
   3. At least one blunt, peglike preapical seta on tarsi II and III

3(2). Smaller species, dorsal plate less than 575 μ long
   4. Larger species, dorsal plate greater than 575 μ long
4(3). Anal plate distinctly longer than wide; adanal setae short, length no greater than length of anal orifice; proximal seta of coxa I long, almost twice as long as distal seta (Figs. 14-17) ................................. L. transvaaldensis Zumpt

Anal plate as wide as or wider than long; adanal setae distinctly longer than length of anal orifice; proximal seta of coxa I not unusually long .................................................. 5

5(4). Posterior seta of coxa II long, setaceous or spinelike, never blunt and peglike; posterior seta of coxa III short and spinelike (Figs. 8-11) ................................................................. L. keegani Thurman

Posterior seta of coxae II and III always blunt and peglike .............................. 6

6(5). Posterior margin of sternal plate moderately invaginated, at least to level of setae st. 3; first sternal setae long, extending distinctly beyond posterior margin of sternal plate (Figs. 20-21) ................................................................. L. congoicola Taufflieb

Posterior margin of sternal plate only slightly, if at all, invaginated; first sternal setae shorter, not extending near to posterior margin of sternal plate ............................................ 7

7(6). Adanal setae rather short, not extending to base of postanal setae; unarmed venter bearing more than 10 pairs of rather short setae adjacent to genital and anal plates (Figs. 6-7) ........ L. parasimillimus n. sp.

Adanal setae longer, extending to or beyond base of postanal seta; unarmed venter bearing less than 10 pairs of medium-length setae adjacent to genital and anal plates ........................................ 8

8(7). Metapodal plates rather narrow elongate; distance between 2nd genital setae distinctly less than distance between 3rd; sternal plate length/width ratio less than .75 (Figs. 2-3) ................................. L. simillimus Zumpt

Metapodal plates irregularly oval, not so narrow and elongate; distance between 2nd genital setae greater than or equal to distance between 3rd; sternal plate length/width ratio greater than .75 (Figs. 28-29) .......................................................... L. grenieri Taufflieb

9(3). Posterior margin of sternal plate only slightly invaginated medi ally; greatest width of genital plate at level of 3rd genital setae; distance between 1st genital setae equal to or less than distance between 4th genital setae (Figs. 43-44) ....................... L. thamnomyss Taufflieb

Posterior margin of sternal plate moderately invaginated, to or slightly beyond level of 3rd sternal setae; greatest width of genital plate at level of 2nd genital setae; distance between 1st genital setae distinctly greater than distance between 4th genital setae (Figs. 54-55) .......................................................... L. kampulensis Taufflieb

10(2). Dorsal plate with 38 pairs of rather small setae, especially more centrally located setae, setae px3 absent; anterior margin of anal plate rounded; medial hypostomal setae short, extending no further than half distance to gnathosomal setae (Figs. 47-51) .......................... L. moucheti Taufflieb

Dorsal plate with usual 39 pairs of rather long setae; anterior margin of anal plate straight or slightly concave; medial hypostomal setae longer, extending distinctly further than half distance to gnathosomal setae ........................................................................................................ 11

11(10). Peritreme longer, extending anteriorly to middle or posterior of coxa I; tarsi II and III each bear one blunt, peglike preapical setae, and tarsus IV with no blunt preapical setae (Figs. 30-33) .............................. L. laevieri Taufflieb

Peritreme short, extending only to level of middle of coxa II; tarsi II, III, and IV each bear two or more blunt, peglike preapical setae (Figs. 36-40) ......................................................... L. fritzumpti Taufflieb
12(1). Proximal seta of coxa I setaceous and elongate ........................................... 13
Proximal seta of coxa I robust, short, and spinelike or peglike .......................... 25

13(12). Tarsi II, III, and IV with preapical setae setaceous or at most one
spinelike .................................................................................................................. 14
Tarsi II, III, and IV with one or more blunt, peglike preapical setae ....... 17

14(13). Distal seta of coxa I small, slender yet blunt and peglike; proximal
seta of coxa I slender, setaceous; posterior margin of sternal plate
only slightly invaginated, no further than level of 3rd sternal setae .... 15
Distal seta of coxa I large, robust, blunt, and peglike; proximal seta
of coxa I long and somewhat enlarged, almost elongate spinelike;
posterior margin of sternal plate moderately invaginated, distinctly
beyond level of 3rd sternal setae ................................................................. 16

15(14). Distance between 1st genital setae distinctly less than distance be-
 tween 4th, and distance between 2nd distinctly less than distance
between 3rd; distal seta of coxa I very small, blunt, and peglike
(Figs. 24-25) ................................................................................................. L. lavoiipierreii Taufflieb
Distance between 1st genital setae distinctly greater than distance be-
 tween 4th, and distance between 2nd greater than distance be-
 tween 3rd; distal seta of coxa I not small (Figs. 56-57) ..............
L. tilliae Taufflieb.......................................................................................... 17(13).
Peritreme extends anteriorly to near middle of coxa I ............................... 18
Peritreme extends anteriorly to near middle of coxa II ................................. 19

18(17). Gnathosomal setae slender, medium length, and setaceous; all ven-
tral setae of leg I slender, setaceous; adanal setae of moderate
length (Figs. 66-70) ...................................................................................... L. muttalli Hirst
Gnathosomal setae long, robust, and almost spinelike; some ventral
setae of leg I short, robust, and spinelike or peglike; adanal setae
short (Figs. 119-123) .............................................................................. L. myomys n. sp.

19(17). Seta pd 1 of femur I unusually long, nearly two times as long as
ad 1 seta; greatest width of genital plate at level of 2nd genital setae;
distance between 1st genital setae usually greater than distance
between 4th (Figs. 98-102) ........................................................................ L. brandbergensis Taufflieb
Seta pd 1 of femur I not unusually long, no more than 1.5 times as
long as ad 1 seta; greatest width of genital plate at level of 3rd
genital setae; distance between 1st genital setae equal to or less
than distance between 4th ........................................................................ 20

20(19). Adanal setae short, not reaching to base of postanal seta; posterior
margin of sternal plate moderately invaginated, to or beyond level
of 3rd sternal setae; distance between 2nd genital setae equal to
distance between 3rd (Figs. 105-109) ......................................................... L. zumpti Keegan
Adanal setae longer, extending to or beyond base of postanal seta;
posterior margin of sternal plate only slightly invaginated or with
moderate invagination medially between pair of posterior projections,
not invaginated near to level of 3rd sternal setae; distance
between 2nd genital setae distinctly less than distance between 3rd ................................................................. 21

21(20). Posterior margin of sternal plate only slightly invaginated, with rather small pair of posterior projections, if at all ................................................................. 22
Posterior margin of sternal plate with slight to moderate invagination between pair of prominent posterior projections ................................................................. 24

22(21). Tarsus II with three blunt, peglike preapical setae; tarsus III with four to five blunt, peglike setae, two of which are preapical; distal seta of coxa I more robust and enlarged; metapodal plates more elongate; smaller species (Figs. 126-130) .................................. L. malacoms n. sp.
Tarsus II with only two blunt, peglike preapical setae; tarsus III with two to three blunt, peglike setae, one of which is preapical; distal seta of coxa I not so enlarged; metapodal plates more oval or triangular; larger species ................................................................. 23

23(22). All dorsal setae long to medium in length, setae J5 extending to or beyond posterior margin of dorsal plate (Figs. 77-81) ............................................................. L. liberiensis Hirst
Anterior and all marginal setae long to medium in length, but posterocentral setae rather small, setae J5 short, not reaching even to level of setae Z5 (Figs. 84-88) ......................... L. setzeri Coffey

24(21). Sternal plate distinctly wider than long, posterocentral dorsal setae shorter, setae J4 not reaching near to level of J5, and J5 extending no further than posterior margin of plate (Figs. 112-116) ............................................................. L. brazzai Taufflieb
Sternal plate approximately as long as wide; all dorsal setae rather long, setae J4 extending almost to level of setae J5, and J5 extending beyond posterior margin of plate (Figs. 91-95) .. L. benoiti Taufflieb

25(12). Gnathosomal setae setaceous, never robust and spinelike or peglike ..... 26
Gnathosomal setae robust. spinelike or peglike ................................................................. 28

26(25). First sternal setae long, extending beyond posterior margin of sternal plate, well beyond level of setae st. 3; seta pd 1 of femur I shorter than sternal setae; adanal setae slender, setaceous (Figs. 73-76) ............................................................. L. aethiopicus Hirst
First sternal setae shorter, not extending to posterior margin of sternal plate or near to level of setae st. 3; seta pd 1 of femur I as long as or longer than sternal setae; adanal setae rather robust and spinelike ................................................................. 27

27(26). Anterior margin of sternal plate only slightly arched, posterior margin only slightly invaginated; anal plate rounded, slightly wider than long (Figs. 133-137) ............................................................. L. vansomereni Hirst
Anterior margin of sternal plate strongly arched, posterior margin deeply invaginated; anal plate elongate, distinctly longer than wide (Figs. 140-143) ............................................................. L. acomys n. sp.

28(25). Lateral hypostomal setae robust, slightly recurved, and peglike; anterior seta of coxae II and III robust, spinelike or peglike; peritreme extends to anterior of coxa I; dorsal plate with only 31 pairs of mostly minute setae (Figs. 157-161) ............................................................. L. bocquieri Taufflieb
Lateral hypostomal setae setaceous; anterior seta of coxae II and III setaceous; peritreme extends no further than anterior of coxa II; dorsal plate with at least 37 pairs of medium to large setae ........................ 29

29(28). Anal plate broadly triangular, considerably wider than long; adanal setae slender, setaceous; posterior margin of sternal plate irregular-
Laelaps. Analysis. and transvaalensis, millimus, on provided closely rei, sus characterized f)f

This Description. This 9(1):29. Zumpt, Sci. 1960, setae and for peglike. dorsal seta J5 longer, extending to or beyond posterior margin of dorsal plate ............................................. 30

30(29). Dorsal plate with 37 pairs of setae, most medium length and setaceous, with posterior and lateral marginal setae long; all ventral plate setae rather long and setaceous; more than 50 setae on unarmad opisthosoma (Figs. 150-15+) ...................... L. paraspinosus Tipton Dorsal plate with 39-40 pairs of setae, anterior two-thirds robust and spinelike, posterior one-third long and setaceous; sternal and first three genital setae short, robust, and spinelike; many less than 50 setae on unarmad opisthosoma (Figs. 164-165) ...................... L. breviperitremus (Garrett and Strandtmann)

Major Group I

This major division of the genus is characterized by both proximal and distal setae of coxa I being setaceous, except for L. lavoipierrei in which the distal seta is very small and slender, yet blunt and peglike. This group is further divided into two subgroups based primarily on the form of the preapical setae of tarsus II.

Subgroup A

This subgroup consists of 7 taxa: L. similinninus, L. paraspinosus, L. keegani, L. transvaalensis, L. congoicola, L. lavoipierrei, and L. grecieri. All taxa of this subgroup are characterized by having the preapical setae of tarsus II setaceous or at most somewhat spinelike, but never blunt and peglike. These taxa clustered quite closely in the numerical taxonomic analysis.

Laelaps (Laelaps) simillimus Zumpt Figs. 2-5

Laelaps simillimus Zumpt. 1960, S. Afr. J. Med. Sci. 15:81 (Holotype: Johannesburg, Transvaal, South Africa; South African Institute for Medical Research, Johannesburg); Tipton, 1960, Univ. Calif. Publ. Ent. 16(6):282; Zumpt, 1961, Publ. S.Afr. Inst. Med. Res. 9(1):29.

Description.— Female: (Figs. 2-3) Dorsal plate length 456 μ, width 262 μ. Gnathosomal and hypostomal setae setaceous; medial hypostomal setae long, reaching almost to or slightly beyond base of gnathosomal setae. Posterior margin of sternal plate slightly invaginated, invagination reaching no further than level of 3rd sternal setae; setae st. 1 of moderate length, reaching to level halfway between setae st. 2 and st. 3. Anterior flap of genital plate not overlapping posterior margin of sternal plate; distance between 1st genital setae slightly greater than distance between 4th genital setae, and distance between 2nd genital setae slightly less than distance between 3rd genital setae; greatest width of genital plate at level of 3rd genital setae. Anal plate roundly triangular, as wide as or wider than long, with anterior margins rounded; adanal setae of moderate length, extending to or slightly beyond base of postanal seta; adanal setae set at level near posterior end of anal orifice. Unarmed venter bears approximately nine pairs of setaceous setae, four pairs adjacent to genital and anal plate plus approximately five pairs near or on posterior lateral body margins; metapodal plates rather elongate. Peritreme extends to level of middle of coxa I. Dorsal plate bears 39 pairs of setaceous setae; most dorsal setae of moderate length, length slightly less than distance between adjacent setae; subterminal setae (J5) reaching at least to level of base of setae ZS. Twelve to 16 pairs of setae border dorsal opisthosoma on soft integument. Both proximal and distal setae of coxa I setaceous, proximal seta somewhat longer than distal seta; setae pd 1 and ad 1 of femur I relatively short and subequal in length; anterior seta of coxae II and III and seta of coxa IV setaceous; posterior seta of coxae II and III moderately robust, blunt, and peglike; preapical setae of tarsi II and III mostly setaceous; however, one or two
Figs. 2-3. *Laelaps simillimus* Zumpt, female. (2) venter; (3) dorsum. scale = 100μ.

Figs. 4-5. *Laelaps simillimus* Zumpt, male. (4) venter; (5) dorsum. scale = 100μ.
setae may be spinelike; all other leg setae setaceous and normally developed.

Male: (Figs. 4-5) Gnathosomal and hypostomal setae setaceous, with medial hypostomal setae of moderate length but not reaching to base of gnathosomal setae. Ventral setae, except anal and postanal setae, of moderate length, each extending in length beyond base of seta immediately posterior; holoventral plate broad between coxae II and III, narrowing considerably between coxae IV and expanded considerably posterior to coxae IV; expanded area between genital setae and anal orifice bears five pairs of setaceous setae; anal setae of moderate length extending slightly beyond base of postanal seta; anal setae set slightly posterior to middle of anal orifice; postanal seta somewhat more robust and longer than anal setae. Metapodal plates inapparent; unarmed venter bearing 12 to 14 pairs of setae adjacent to holoventral plate. Peritreme extends to level of middle or anterior of coxa I. Dorsal plate bearing 39 pairs of setaceous setae; length and position of setae as in female. Both proximal and distal setae of coxa I setaceous, proximal seta about 1.5 times as long as distal seta; setae pd 1 and ad 1 of femur I relatively short with seta pd 1 somewhat longer than ad 1; anterior setae of coxae II and III, posterior seta of coxa II, and seta of coxa IV all setaceous; posterior seta of coxa II rather long and setaceous, whereas posterior seta of coxa III spinelike; preapical setae of tarsi II and III mostly setaceous; however, one or two on each may be spinelike; all other leg setae setaceous and normally developed.

**COLLECTION RECORDS**

**Elephantulus intuli**
- South Africa; 1 coll. (1 female); AMP
- South Africa (ORS³): 1 coll. (1 female); AMP

**Macrossicllides proboscideus**
- South Africa; 2 coll. (2 females); AMP

**Tadarida midas**
- South Africa; Zumpt, 1961
- Southwestern Africa; Zumpt, 1961
- Rhodesia; Zumpt, 1961

**Tatera atra**
- South Africa; Zumpt, 1961
- Southwestern Africa; Zumpt, 1961
- Rhodesia; Zumpt, 1961

**Tatera leucogaster**
- South Africa; 1 coll. (8 females); AMP

**Aethomys chrysophilus**
- South Africa; Zumpt, 1961
- Southwestern Africa; Zumpt, 1961
- Rhodesia; Zumpt, 1961

**Aethomys namaquensis**
- South Africa (Transvaal); 32 females, 2 males (type specimens); Zumpt, 1950
- South Africa (Kamanjab); Tipton, 1960

**Lemniscomys griseola**
- Rhodesia; 1 coll. (1 female); AMP
- South Africa; 1 coll. (1 female); AMP

**Loipharonyx aequilus**
- Congo-Leopoldville; 7 females; Taufflieb, 1964
- Angola (Dundo); 7 females; Taufflieb, 1962

**Mastomys natalensis**
- South Africa; 1 coll. (1 female); AMP
- South Africa (ORS); 15 coll. (21 females, 2 males, 3 ny); AMP

**Rattus sp.**
- South Africa (Transvaal); 1 female; Taufflieb, 1964

**Rhodomyys pamphilus**
- South Africa; 3 coll. (5 females, 1 male, 1 ny); AMP
- Unknown
- Rhodesia; 1 coll. (1 female); AMP
- South Africa; 15 coll. (19 females, 1 male); AMP

**Remarks.**—*L. simillimus* closely resembles most other taxa of subgroup A, differing in several distinguishing characters. It differs from *L. parasimilimus* in bearing only a few medium-length setae ventrally adjacent to the genital and anal plates, in the longer anal setae, and in the genital plate which is somewhat more slender posteriorly. *L. simillimus* may be separated from *L. greneri* by the narrower more elongate metapodal plates, the smaller length/width ratio of the sternal plate (less than .75), and by the distance between the 2nd genital setae being distinctly less than that between the 3rd genital setae. It may be easily separated from *L. keegani* by the blunt, peglike seta posteriorly on coxae II and III, and from *L. transvaalensis* by the significantly longer anal setae, the broader anal plate, and the generally more elongate dorsal plate. In *L. congicolus* the 1st sternal setae are longer, reaching to or beyond the moderately invaginated posterior margin of the sternal plate. As noted previously, *L. lavoipierrei* differs in the very small, blunt distal seta of coxa I.

*L. simillimus* has been collected almost exclusively from southern Africa, reach-
ing no further north than Angola and Congo-Leopoldville. It is recorded from a variety of small mammals, but primarily from species of *Aethomys*, and most frequently from *Aethomys chrysophilus*.

**Laelaps (Laelaps) parasimilum**, n. sp.

Figs. 6-7

Holotype, female: Type locality: 10 mi. WNW Soubre, Ivory Coast; in U.S. National Museum, Washington, D.C.

**Description.**—Female: (Figs. 6-7) Dorsal plate length 405 µ, width 244 µ. Gnathosomal and hypostomal setae setaceous; median hypostomal setae of medium length, not reaching base of gnathosomal setae. Posterior margin of sternal plate very slightly invaginated medially; setae st. I of moderate length, reaching about one-third distance between 2nd and 3rd sternal setae; sternal setae as well as 4 pairs of genital setae of moderate length and rather slender. Anterior flap of genital plate overlapping posterior margin of sternal plate to or slightly anterior to level of 3rd sternal setae; distance between 1st genital setae distinctly less than distance between 4th genital setae; distance between 2nd genital setae distinctly less than distance between 3rd genital setae; greatest width of genital plate at level of 3rd pair of genital setae. Anal plate roundly triangular in shape, approximately as wide as long with rounded margins; adanal setae very short and small, length approximately equal to width of anal orifice; adanal setae set at level of posterior third of anal orifice; postanal setae rather small but somewhat larger than adanals and somewhat more robust. Unarmed venter bearing approximately 13 pairs of setae, medial 3 pairs adjacent to genital and anal plates longer with lateral pairs much shorter, some being almost spinelike; metapodal plates small, elongate oval. Peritreme extends to level of middle or anterior of coxa I. Dorsal plate bearing 39 pairs of setaceous setae; most dorsal setae of medium length, length distinctly less than distance between adjacent setae; subterminal setae (5) rather small and slender, reaching no further than level of base of terminal setae; terminal setae considerably larger and more robust than all other dorsal setae. Six to 8 pairs of rather small spinelike setae border dorsal opisthosoma.

![Figs. 6-7. *Laelaps parasimilum* n. sp., female. (6) venter; (7) dorsum. scale — 100µ.](image-url)
on soft integument. Proximal setae of coxa I of moderate length and robust, distal seta of coxa I quite small and slender; setae pd 1 and ad 1 of femur I subequal in length; anterior seta of coxae II and III and seta of coxa IV rather small, setaceous, although somewhat enlarged basally; posterior seta of coxae II and III rather small but robust and peglike; preapical setae of tarsi mostly setaceous as well as all other leg setae.

**Male:** Unknown.

**Type Material**

*Dephomys defua*

Ivory Coast (10 mi WNW Soubre); female holotype and 1 deutonymph (LWR 1471).

*Malacomys longipes*

Ivory Coast (10 mi WNW Soubre); 2 females (LWR 1478).

**Remarks.—** *L. parasimillimus* may be distinguished from all other closely related taxa by the following combination of characters: more than 10 pairs of mostly small setae ventrally adjacent to genital and anal plates; rather wide genital plate at level of 3rd genital setae; short adanal setae; distal seta of coxa I much shorter than proximal seta; small peglike seta posteriorly on coxae II and III; rather broad anal plate; and greater length of sternal plate.

This new species has been collected only from Ivory Coast on *Dephomys defua* and *Malacomys longipes*.

### Laelaps (Laelaps) keegani Thurman

**Figs. 8-13**

*Laelaps berlesi* Keegan, 1956, J. Egypt. Pbl. Hth. Assoc. 31 (6):264-265.

(Holotype: Pyramids, Giza, Egypt; U.S. National Museum, Washington, D.C.)

*Laelaps keegani* Thurman, 1958, Ent. Soc. Wash. 60 (2):74. Paperma, Furman, and Rothstein, 1970, Rev. Zool. Bot. Afr. 81 (3-4):330-336 (Host locality).

**Description.—** **Female:** (Figs. 8-11)

Dorsal plate length 505 μ, width 301 μ. Gnathosomal and hypostomal setae setaceous; medial hypostomal setae of moderate length but not reaching base of gnathosomal setae. Posterior margin of sternal plate only slightly invaginated; setae st. 1 of moderate length, reaching to point halfway between setae st. 2 and st. 3. Anterior flap of genital plate slightly over-lapping posterior of sternal plate; distance between 1st pair of genital setae slightly greater than distance between 4th genital setae; in type specimens, greatest width of genital plate at level of 3rd genital setae; however, in specimens from Nigeria greatest width of genital plate at level of 2nd pair of genital setae. Posterior margin of genital plate truncate as well as anterior margin of anal plate; anal plate width subequal to length; adanal setae slender reaching to base of postanal seta; adanal setae set at level near posterior end of anal orifice; postanal seta robust, slightly longer than adanal setae. Unarmed venter bearing about 16 pairs of setaceous setae, 4 pairs adjacent to genital and anal plates with others on posterior lateral and lateral body margins; metapodal plates rather elongate and narrow. Peritreme extending to middle of coxa I. Dorsal plate bearing 39 pairs of setaceous setae; most dorsal setae of moderate length, length equal to distance between adjacent setae; subterminal setae (J5) reach to or slightly beyond posterior margin of dorsal plate. Approximately 18 pairs of setaceous setae border dorsal plate on soft integument. Both proximal and distal setae of coxa I setaceous, with proximal seta 1.5 times as long as distal seta; setae pd 1 and ad 1 of femur I relatively short, subequal in length, with ad 1 seta only slightly longer; anterior seta of coxae II and III, posterior seta of coxa II, and seta of coxa IV setaceous; posterior seta of coxa III rather small and peglike (bluntly spine-like); tarsus II with one bluntly spine-like preapical seta; all other leg setae setaceous.

**Male:** (Figs. 12-13) Gnathosomal and hypostomal setae setaceous; medial hypostomal setae of moderate length, reaching almost to base of gnathosomal setae. Ventral setae, except adanal and postanal setae, of moderate length and slender, each extending slightly beyond base of adjacent posterior seta; hololateral plate rather broad between coxae II and III, greatly narrowing between coxae IV, and greatly expanded posterior to coxae IV; expanded area between genital setae and anal orifice bears 5 pairs of setaceous setae; adanal setae rather short, approximately equal to length of anal orifice; adanal setae set at level near middle of anal orifice; postanal seta approximately
twice as long as anal setae and somewhat more robust. Metapodal plates inapparent, apparently fused to lateral extensions of holoventral plate; unarmed venter bears approximately 10 to 12 pairs of setaceous setae adjacent to holoventral plate; peritreme extends to middle of coxae I. Dorsal plate bears 39 pairs of setaceous setae; length and position of setae approximately as in female. Both proximal and distal setae of coxa I setaceous, proximal seta somewhat longer than distal seta; setae pd 1 and ad 1 of femur I subequal in length; anterior setae of coxae II and III, posterior seta of coxae II and III, and seta of coxa IV setaceous, with posterior seta of coxa III somewhat more robust and spinelike; most leg setae setaceous and normally developed; however, some may be shorter and somewhat spinelike.

**Collection records**

- *Atelerix albiventris*
  - Upper Volta: 1 coll. (1 female); AMP

- *Crocidura sp.*
  - Upper Volta; 1 coll. (3 females, 1 male, 1 py.); AMP

- *Tatera kempi*
  - Dahomey; 1 coll. (1 female); AMP

- *Arvicanthis niloticus*
  - Egypt (Giza); holotype female: Keegan, 1956
  - Ghana (Accra-Tema); Paperna, et al., 1970
  - Nigeria; Zumpt Collection (AMP)
  - Ghana: 1 coll. (1 female); AMP
  - Ivory Coast; 10 coll. (19 females, 1 male); AMP
Nigeria; 23 coll. (62 females, 3 males, 7 ny.): AMP
Senegal; 3 coll. (18 females): AMP
Mus musculoides
Ghana; 1 coll. (4 females, 1 ny.): AMP
Felis lybica
Upper Volta; 1 coll. (1 female): AMP
Unknown
Nigeria; 2 coll. (13 females): AMP

Remarks.—L. keegani is quite distinctive in one key character which is invariant in all specimens examined in this study; this character is the setaceous or spinelike posterior seta of coxae II and III, rather than blunt, peglike setae as in all other closely related taxa. In addition to this character, L. keegani may be separated from certain other taxa by the longer adanal setae and the broad anal plate.

L. keegani was originally recorded from Giza, Egypt, on Arvicanthis niloticus. Subsequently, it has been collected from the countries of northwest Africa south of the Sahara and almost exclusively from Arvicanthis niloticus.

Laelaps (Laelaps) transvaalensis Zumpt
Figs. 14-19
Laelaps transvaalensis Zumpt. 1950, S. Afr. J. Med. Sci. 15: 77-82 (Holotype: Krugersdorp, Transvaal, South Africa; So. Afr. Inst. Med. Res., Johannesburg); Taufflieb, 1959, J. Ent. Soc. So. Afr. 22(2):404-408 (key); Tipton, 1960, Univ. Calif. Publ. Ent. 16(6):262-264, 283-284 (key, synopsis); Zumpt, 1961, Publ. So. Afr. Inst. Med. Res. 4(1):30 (host, locality).

Description.—Female: (Figs. 14-17)
Dorsal plate length 460 μ, width 317 μ. Gnathosomal and hypostomal setae setaceous; medial hypostomal setae long, reaching to base of gnathosomal setae. Posterior margin of sternal plate invaginated to or slightly beyond level of setae st. 3; setae st. 1 of moderate length, reaching to point halfway between setae st. 2 and st. 3. Anterior flap of genital plate overlapping posterior of sternal plate; distance between 1st genital setae slightly but distinctly further apart than 4th genital setae; greatest width of genital plate at or slightly behind level of 2nd pair of genital setae. Anal plate distinctly
longer than wide; adanal setae short, length less than distance from adanal setae to postanal seta; adanal setae set at level of middle of anal orifice; oval reticulate pattern near anterolateral margins of anal plate. Unarmed venter bearing about 10 pairs of setaceous setae, 4 pairs adjacent to genital and anal plates plus 6 pairs near or on posterolateral body margins; metapodal plates elongate oval. Peritreme extends to middle of coxa I. Dorsal plate bearing 39 pairs of setaceous setae; central and lateral setae of moderate length (length equal to distance between adjacent setae); setae r1, r2, r3, r4, J4 and J5 shorter; subterminal setae (J5) reaching to posterior margin of dorsal plate; distance between setae J4 greater than that between setae J5. Ten to 12 pairs of setae border dorsal opisthosoma on soft integument. Both proximal and distal setae of coxa I setaceous, with proximal seta 1.5 times as long as distal seta; setae pd 1 and ad 1 of femur I subequal in length, with ad 1 seta only slightly longer; anterior seta of coxae II and III setaceous and enlarged somewhat basally; posterior seta of coxae II and III robust, peglike (bluntly spiniform); tarsi II and III each with one spinelike preapical seta; all other leg setae setaceous, some may be heavier than others but not distinctly spinelike.

**Male:** (Figs. 18-19) Gnathosomal and
hypostomal setae all setaceous, with medial hypostomal setae two times as long as gnathosomal setae. Ventral setae, except adanal and postanal, of moderate length, each extending in length beyond base of seta immediately posterior by about one-third its length; holoventral plate rather narrow between coxae IV and considerably expanded posteriorly; expanded area between genital setae and anal orifice bearing 5 pairs of setaceous setae; adanal setae short, length less than distance between adanal and postanal seta; postanal seta spinelike and at least two times as long as adanal. Metapodal plates elongate oval; unarmed venter bearing 2 pairs of setae adjacent to holoventral plate plus about 5 pairs on posterolateral margins of body. Peritreme extends to level of middle of coxa I. Dorsal plate bearing 39 pairs of setaceous setae; length and position of setae as in female. Soft integument of opisthosoma bearing about 9 pairs of setae. Both proximal and distal setae of coxa I setaceous, with proximal seta nearly two times as long as distal seta; setae pd 1 and ad 1 of femur I subequal in length; anterior seta of coxae II and III setaceous and enlarged basally; posterior seta of coxa II elongate and setaceous, whereas posterior seta of coxa III short and peglike; tarsi II and III each with one preapical spinelike seta, and all legs with some ventral short spine-like setae.

COLLECTION RECORDS
Crocidura sp.
South Africa; 1 coll. (1 female);
Zumpt, 1961
Macroacelides proboscideus
South Africa (ORS); 1 female: AMP
Cryptomyx hottentotus
South Africa; 1 coll. (6 females); AMP
Petromus typicus
South Africa (ORS); 1 female; AMP
Tatera leucogaster
South Africa; 1 female; AMP
Aethonyx chrysophilus
South Africa; 7 coll. (10 females, 7 males); AMP
Aethonyx namaqueensis
South Africa (Transvaal); 1+ coll.
Mastomys natalensis
South Africa; 1 female; Zumpt. 1961

Myomys daltoni
Senegal; 1 female; AMP

Rhabdomys pumilio
South Africa: 1+ coll.; Zumpt. 1961
South Africa: 5 coll. (6 females, 4 males); AMP

Saccostomus campesiris
South Africa; 1 female; AMP

Otomys anagenensis
South Africa (ORS); 1 coll. (15 females, 2 males); AMP

Otomys irratus
South Africa (Transvaal); holotype and 4 females; Zumpt. 1950
South Africa (Transvaal); 1+ coll.; Tipton. 1960
South Africa; 3 coll. (13 females); AMP

Unknown host
South Africa (ORS); 2 coll. (5 females); AMP
South Africa; 12 coll. (23 females). 11 males; AMP
Botswana: 1 coll. (2 females); AMP

Remarks.— *L. transvaalensis* may be easily separated from other taxa by the form of the anal plate, i.e., narrower anal plate with short adanal setae and pair of dark areas laterally. Other distinguishing characters are as follows: dorsal plate rather broad relative to length; peritremes wider posteriorly than usual for the genus; moderately emarginated posterior margin of sternal plate; unusually long proximal seta of coxa I; and rather broad genitalic plate posteriorly.

This species is recorded almost exclusively from South Africa from a great variety of small mammal hosts. One collection is recorded from Botswana and one, possibly erroneous identification, from Senegal. More collections and specimens have been collected from species of *Otomys* than from any other host. It is anticipated that future records will reveal a much wider geographic distribution in southern Africa than the currently available records indicate.

Laelaps (*Laelaps*) congoicola Taufflieb
Figs. 20-23

*Laelaps congoicola* Taufflieb, 1959. J. Ent. Soc. S. Afr. 22(2):397-398 (Holotype: Brazzaville, Congo; Museum d'Histoire Naturelle, Paris).

Description.— Female: (Figs. 20-21) Dorsal plate length 538 µ, width 349 µ. Gnathosomal and hypostomal setae setaceous; medial hypostomal setae relatively long, reaching almost to base of gnathosomal setae. Posterior margin of sternal plate slightly invaginated, invagination reaching to level of third sternal setae; setae st. 1 long, reaching well beyond posterior margin of sternal plate. Anterior flap of genitalic plate overlapping posterior margin of sternal plate slightly; distance between 1st genitalic setae slightly greater than distance between 4th genitalic setae. Distance between 2nd genitalic setae slightly greater than distance between 3rd genitalic setae; greatest width of genitalic plate at level slightly anterior to 3rd genitalic setae. Anal plate roundly triangular, width equal to length, with anterior margins rounded; adanal setae rather short, extending no further than base of postanal seta; adanal setae set at level of posterior end of anal orifice. Unarmed venter bearing about 8 to 10 pairs of setaceous setae, 4 pairs immediately adjacent to genitalic and anal plates plus approximately 4 to 6 pairs near or on posterior lateral body margins; metapodal plates oval to elongate-oval, length about twice width. Peritreme extends to level of anterior of coxa I. Dorsal plate bearing 39 pairs of setaceous setae; most dorsal setae of medium length, length equal to or slightly greater than distance between adjacent setae; subterminal setae (J5) reaching to or slightly beyond posterior margin of dorsal plate; terminal setae (Z5) much longer than other adjacent setae. About 12 pairs of setae border dorsal opisthosa on soft integument. Both proximal and distal setae of coxa I setaceous, proximal seta distinctly longer than distal seta; setae pd 1 and ad 1 of femur I subequal in length; anterior seta of coxae II and III and seta of coxa IV slender, setaceous; posterior seta of coxae II and III robust, blunt and peglike, with posterior seta of coxa II somewhat longer than that of coxa III; no robust, blunt precapical setae on tarsi II, III, or IV; however, one or two spinelike precapical setae may be present on tarsi II and III; most other leg setae setaceous and normally developed.

Male: (Figs. 22-23) Gnathosomal and hypostomal setae setaceous, with medial hypostomal setae of moderate length, extending almost to base of gnathosomal setae. Ventral setae, except adanal and postanal setae, relatively long, each extending well beyond base of seta immediately adjacent; holoventral plate rather broad between coxae II and III.
Figs. 20-21. *Laelaps congoicola* Taufflieb, female. (20) venter; (21) dorsum. scale = 100μ.

Figs. 22-23. *Laelaps congoicola* Taufflieb, male. (22) venter; (23) dorsum. scale = 100μ.
narrowing considerably between coxae IV, and greatly expanded immediately posterior to coxae IV; expanded area between genital setae and anal orifice bearing 5 pairs of setaceous setae; adanal setae relatively short, not extending to base of postanal seta; adanal setae set slightly posterior to level of middle of anal orifice; postanal seta considerably longer than adanal setae and rather robust. Metapodal plates inapparent, apparently fused to lateral extensions of holoventral plate; unarmed venter bearing 6 to 9 pairs of setaceous setae, about 3 or 4 pairs set quite close to holoventral plate laterally. Peritreme extending to middle or anterior of coxa I. Dorsal plate bears 39 pairs of setaceous setae: length and position of setae as in female. Both proximal and distal setae of coxa I setaceous, with proximal seta slightly longer than distal seta; setae pd 1 and ad 1 of femur I subequal in length: anterior seta of coxae II and III, posterior seta of coxa II and seta of coxa IV all setaceous; posterior seta of coxa III robust and spinelike; no blunt apical setae on tarsi II, III, or IV; however some apical setae may be spinelike; most other leg setae setaceous and normally developed.

Collection records

Oenomys hypoxanthus
French Congo (Brazzaville): 35 females (type specimens); Taufflieb, 1959

Remarks.—The most distinguishing characters of *L. congocola*, separating it from other closely related taxa, are the long st. 1 setae and the moderate posterior invagination of the sternal plate, i.e., setae st. I extends to or beyond posterior margin of sternal plate. Other diagnostic characters are as follows: relatively broad oval dorsal plate; medium-length adanal setae; blunt, peglike seta on posterior of coxae II and III; and setaceous proximal and distal setae of coxa I.

This taxon has been reported only from *Oenomys hypoxanthus* in French Congo (Brazzaville).

Laelaps (Laelaps) lavoipierrei Taufflieb

Figs. 24-27

Laelaps lavoipierrei Taufflieb, 1954, Ann. Parasit. 29(4):440 (Holotype: Brazzaville, Congo; Institut Pasteur, Paris); Tipton, 1960, Univ. Calif. Publ. Ent. 16(6):274.

Description.—Female: (Figs. 24-25) Dorsal plate length 495 μ, width 315 μ. Gnathosomal and hypostomal setae setaceous; medial hypostomal setae of moderate length, reaching almost to base of gnathosomal setae. Posterior margin of sternal plate only very slightly invaginated medially; setae st. 1 of moderate length, reaching to level approximately halfway between setae st. 2 and st. 3. Anterior flap of genital plate overlapping posterior margin of sternal plate at least to level of 3rd sternal setae; distance between 1st genital setae subequal to distance between 4th genital setae, distance between 2nd genital setae slightly less than distance between 3rd genital setae; greatest width of genital plate at level of 3rd pair of genital setae. Anal plate roughly triangular in shape, as wide as long, with anterior margins concave or invaginated; adanal setae of moderate length, extending slightly beyond base of postanal seta; adanal setae set at level near posterior end of anal orifice; postanal seta rather robust and slightly longer than adanal setae. Unarmed venter bearing 10 to 14 pairs of setaceous setae, 4 pairs immediately adjacent to genital and anal plates plus approximately 6 to 8 pairs near or on posterior lateral body margin; metapodal plates elongate, considerably longer than wide. Peritreme extends to level of middle or anterior of coxa I. Dorsal plate bearing 39 pairs of setaceous setae; most dorsal setae of medium length, length almost equal to distance between adjacent setae; subterminal setae (J5) reaching almost to posterior margin of dorsal plate. Nine to 12 pairs of setae border dorsal opisthosoma on soft integument. Proximal seta of coxa I setaceous and of moderate length, distal seta of coxa I quite small, blunt and peglike; setae pd 1 and ad 1 of femur I subequal in length; anterior seta of coxae II and III and seta of coxa IV setaceous; posterior seta of coxae II and III robust, blunt, and peglike; no robust, blunt apical setae on tarsi II, III, or IV; however often with one spinelike seta on coxae II and III; most other leg setae setaceous and normally developed.

Male: (Figs. 26-27) Gnathosomal and hypostomal setae setaceous; medial hypostomal setae of moderate length, reaching almost to base of gnathosomal setae. Ventral setae, except adanal and postanal
Figs. 24-25. *Laelaps lavoipierrei* Taufflieb, female. (24) venter; (25) dorsum. scale = 100μ.

Figs. 26-27. *Laelaps lavoipierrei* Taufflieb, male. (26) venter; (27) dorsum. scale = 100μ.
setae, rather long and slender, each extending well beyond base of adjacent posterior setae; hololateral plate rather broad between coxae II and III greatly narrowing between coxae IV, and greatly expanding posterior to coxae IV; expanded area between genital setae and anal orifice bearing 5 pairs of setaceous setae; adanal setae of medium length, extending to or slightly beyond base of postanal seta; adanal setae set at level near posterior end of anal orifice; postanal setae slightly longer than adanal setae and slightly more robust. Metapodal plate inapparent, apparently fused to lateral extensions of hololateral plate; unarmored venter bearing approximately 8 to 10 pairs of setaceous setae, those more marginal and more posterior somewhat longer. Peritreme extends to level of coxa I. Dorsal plate bearing 39 pairs of setaceous setae; length and position of setae approximately as in female. Both proximal and distal distal setae of coxa I setaceous, proximal seta somewhat longer than distal seta; setae pd 1 and ad 1 of femur I subequal in length, both rather short; anterior seta of coxae II and III, posterior seta of coxa II, and seta of coxa IV all setaceous; posterior seta of coxa III short and spine-like; several preapical setae of tarsi II and III rather robust and spine-like; most other leg setae setaceous and normally developed; however, some may be shorter and somewhat spine-like.

**Collection records**

**Hipposideros boetus**
Ivory Coast: 1 coll. (1 female): AMP

**Lophuromys sikapusi**
Congo (Brazzaville): 3 females (type specimens); Tautfliel, 1954
Cameroon (Yaounde): Tautfliel, 1962
Ghana: 26 coll. (59 females, 3 males. 5 ny.); AMP
Ivory Coast: 21 coll. (10 females, 14 males, 3 ny.); AMP
Nigeria: 11 coll. (57 + females, 1 male, 1 ny.); AMP

**Mastomys natalensis**
Ivory Coast: 1 coll. (1 female, 1 male); AMP
Upper Volta: 1 coll. (1 female); AMP

**Mus musculus**
Ghana: 1 coll. (1 female); AMP

**Pronomys talbergi**
Ivory Coast: 1 coll. (1 female, 6 ny.); AMP

**Uranomys ruddi**
Ghana: 1 coll. (3 females); AMP

**Remarks.**— *L. lavoipierrei* may be easily separated from all other taxa by the very small, blunt, peglike distal seta of coxa I.

In this one character alone it resembles taxa of major group II, but on the basis of overall morphological characters it is placed in major group I near *L. congocola* and *L. grenieri*. Another character which may be used to separate *L. lavoipierrei* from the latter two taxa is the straight to concave shape of the anterior margin of the anal plate, rather than a rounded, convex margin.

This mite is parasitic primarily on *Lophuromys sikapusi* in northwest Africa south of the Sahara. Single collections have been recorded from several other small mammals.

**Laelaps (Laelaps) grenieri** Taufflieb
(Figs. 28-29)

**Laelaps grenieri** Taufflieb, 1954, Ann. Parasit. 29(4):439. (Holotype: Brazzaville, Congo; Institut Pasteur, Paris): Tipton, 1960, Univ. Calif. Publ. Ent. 16(6):270.

**Description.**— *Female*: (Figs. 28-29) Dorsal plate length 515 μ, width 307 μ. Gnathosomal and hypostomal setae setaceous; medial hypostomal setae of moderate length, reaching at least half distance to gnathosomal setae. Posterior margin of sternal plate irregularly straight to very slightly invaginated; setae st. 1 relatively long, reaching almost to level of 3rd sternal setae. Anterior flap of genital plate not overlapping posterior margin of sternal plate; distance between 1st genital setae slightly greater than distance between 4th genital setae, distance between 2nd genital setae slightly greater than distance between 3rd genital setae; greatest width of genital plate at level of 2nd pair of genital setae. Anal plate roughly triangular in shape, as wide as long, with anterior margin almost straight; adanal setae of moderate length, extending somewhat beyond base of postanal seta; adanal setae set at level of posterior end of anal orifice. Unarmored venter bearing 6 pairs of setaceous setae, 4 pairs immediately adjacent to genital and anal plates plus 2 pairs near or on posterior lateral body margin; metapodal plates elongate-oval. Peritreme extends to level of anterior of coxa I. Dorsal plate bearing 39 pairs of setaceous setae; most dorsal setae of moderate length, length equal to or slightly greater than distance between adjacent setae; subterminal setae (J5) reaching only to level of base of terminal
setae; terminal setae rather long and slender. Fourteen to 18 pairs of setae border dorsal opisthosoma on soft integument. Both proximal and distal setae of coxa I setaceous, proximal seta considerably longer than distal seta; setae pd 1 and ad 1 of femur I subequal in length; anterior seta of coxae II and III and seta of coxa IV setaceous; posterior seta of coxae II and III robust, blunt, and peglike; no robust, blunt preapical setae on tarsi II, III, or IV; however, some preapical setae may be spinelike; most other leg setae setaceous and normally developed.

**Male:** Unknown.

**Collection records**

*L. grenieri Taufflieb.*

**Tadarida major**

Upper Volta: 1 coll. (2 females); AMP

**Tatera Kempi**

Dahomey: 1+ coll. (1+ female); Zumpt coll. (AMP)

**Dasymys inornatus**

Congo (Brazzaville); Taufflieb, 1962

**Hybomys trivirgatus**

Ivory Coast: 4 coll. (26 females, 4 ny.); AMP

**Lenniscyonys barbarus**

Ghana: 2 coll. (2 females); AMP

Upper Volta; 2 coll. (10 females, 1 ny.); AMP

**Lenniscyonys maculatus**

Ivory Coast; 2 coll. (8 females); AMP

**Lenniscyonys striatus**

Congo (Brazzaville); 6 females (type specimen); Taufflieb, 1954

Ghana: 1 coll. (3 females); AMP

Ivory Coast; 8 coll. (29 females, 1 male); AMP

Nigeria; 11 coll. (41 females, 1 ny.); AMP

Togo; 8 coll. (19 females); AMP

**Lophuromyys sikapusi**

Nigeria; 1 coll. (7 females); AMP

**Mus musculus**

Congo (Brazzaville): 1 coll. (1 female); Taufflieb, 1954

**Myomys daltoni**

Ghana; 1 coll. (1 female); AMP

**Proomyx tullbergi**

Nigeria; 1 coll. (1 female); AMP

**Urocyon guevii**

Senegal; 2 coll. (2 females); AMP

**Urocyon ruddi**

Ivory Coast; 3 coll. (13 females, 1 ny.); AMP

**Unknown**

Dahomey; 1 coll. (2 females); AMP

Ivory Coast; 2 coll. (6 females, 1 ny.); AMP
Remarks.—There is no one character which may be used to distinguish L. grenieri from all other taxa of this subgroup as in the case of L. keegani, L. transvaalensis, L. congoicola, and L. laevipierrei. This taxon may be separated from L. simillimus and L. parasimillimus by the greatest width of the genital plate at the level of the 2nd genital setae rather than at the level of the 3rd, the metapodal plates more irregularly oval rather than elongate, and the greater length/width ratio of the sternal plate (greater than .75).

L. grenieri has been recorded from a variety of different small mammal hosts in northwestern Africa south of the Sahara; however, it is parasitic primarily on several species of Lennsiscomys.

Subgroup B

This subgroup is composed of only four taxa: L. laevieri, L. fritzumpti, L. thamnomys, and L. moucheti. The first two and the fourth taxa bear at least one blunt, peglike setae preapically on tarsi II and III, whereas tarsi II and III of L. thamnomys bear all setaceous setae. This latter species is placed with subgroup B because of its overall phenetic similarity to the other three species.

Laelaps (Laelaps) laevieri Taufflieb
Figs. 30-35

Laelaps laevieri Taufflieb, 1954. Ann. Parasit. 29(4):442 (Holotype: Brazzaville, Congo: Institut Pasteur, Paris); Tipton, 1969. Univ. Calif. Publ. Ent. 16(6):273-274.
Laelaps nigeriensis Keegan, 1962. J. Parasit. 48(4):621-622 (Holotype: Adu, Nigeria; United States National Museum, Washington, D.C.).

Description.—Female: (Figs. 30-33) Dorsal plate length 600 μ, width 419 μ. Gnathosomal and hypostomal setae setaceous; medial hypostomal setae relatively long, reaching almost to base of gnathosomal setae. Posterior margin of sternal plate very slightly invaginated medially. Anterior flap of genital plate not overlapping posterior margin of sternal plate; distance between 1st genital setae subequal to distance between 4th genital setae, and distance between 2nd genital setae subequal to distance between 3rd genital setae; greatest width of genital plate near or slightly anterior to level of 3rd genital setae. Anal plate triangular in general shape, longer than wide, and with anterior margin slightly invaginated; adanal setae of moderate length, extending to base of postanal setae; adanal setae set at level of posterior end of anal orifice. Unarmed venter bearing approximately 14 pairs of setaceous setae, 4 pairs adjacent to genital and anal plates plus approximately 10 pairs near or on posterior body margins; metapodal plates oval, slightly longer than wide. Peritreme extending to level of posterior of coxa I. Dorsal plate bearing 30 pairs of setaceous setae; most dorsal setae of medium length, length usually equal to distance between adjacent setae; subterminal setae (15) reaching at least to level of terminal setae and possibly to posterior margin of dorsal plate. Twelve to 14 pairs of setae border dorsal opisthosoma on soft integument. Both proximal and distal setae of coxa I setaceous, proximal setae somewhat longer than distal setae; setae pd 1 and ad 1 of femur I subequal in length; anterior seta of coxae II and III and seta of coxa IV setaceous; posterior seta of coxae II and III robust, blunt, and peglike; tarsi II and III each with one robust, blunt preapical setae plus one spinelike setae; all other leg seta setaceous and normally developed.

Male: (Figs. 34-35) Gnathosomal and hypostomal setae setaceous, with medial hypostomal setae somewhat longer than gnathosomal setae but not reaching to base of gnathosomal setae. Ventral setae, except adanal and postanal setae, relatively long, extending well beyond base of seta immediately posterior; holovenital plate broad between coxae II and III, narrowing considerably between coxae IV and greatly expanded posterior to coxae IV; expanded area between genital setae and anal orifice bearing 5 pairs of setaceous setae; adanal setae relatively short, extending no further than base of postanal setae; postanal seta much longer than adanal setae. Metapodal plates inapparent, apparently fused to lateral margin of holovenital plate. Unarmed venter bearing 9 or 10 pairs of setae immediately adjacent to holovenital plate, plus 8 to 10 pairs on posterior lateral body margin. Peritreme extends to level of posterior or middle of coxa I. Dorsal plate bearing 39 pairs of setaceous setae; posterior dorsal setae relatively long, length considerably...
greater than distance between adjacent setae; subterminal setae (J5) extending well beyond posterior margin of dorsal plate and about half the length of the terminal setae; both proximal and distal setae of coxa I setaceous, with proximal seta considerably longer and more robust basally than distal seta; setae pd I and ad I of femur I subequal in length; anterior seta of coxae II and III, posterior seta of coxa II, and seta of coxa IV all setaceous; posterior seta of coxa III relatively short and spinelike; tarsi II and III each with two or three rather robust, spinelike to peglike preapical setae; other leg setae mostly setaceous and normally developed.

**Collection Records**

*Crocida* sp.
- Nigeria (Adu): 2 females; Keegan, 1962

*Sylvirurus gemmatus*
- Ghana: 1 coll. (1 female, 1 male); AMP

*Hypsignathus monstrosus*
- Ivory Coast; 1 coll. (1 female): AMP
Figs. 34-35. _Laelaps lavieri_ Taufflieb, male. (34) venter; (35) dorsum, scale = 100μ.

**Nycteris areole**
Upper Volta; 1 coll. (1 female, 1 male): AMP

**Hipposideros caffer**
Ivory Coast; 2 coll. (3 females, 1 male, 2 ny.): AMP

**Hipposideros cyclops**
Ivory Coast; 1 coll. (1 female): AMP

**Tatera leucogaster**
South Africa; 2 coll. (2 females): AMP
South Africa (ORS); 1 coll. (1 female): AMP

**Aethomys chrysophilus**
Rhodesia; 1 coll. (1 female): AMP
South Africa; 1 coll. (2 females): AMP
South Africa (ORS); 2 coll. (2 females): AMP

**Lemniscomys macculus**
Ivory Coast; 1 coll. (3 females): AMP

**Lemniscomys striatus**
Togo; 2 coll. (3 females): AMP

**Lophuromys sikapusi**
Ghana; 1 coll. (10 females): AMP

**Mastomys natura**
Ghana; 1 coll. (1 female): AMP
South Africa; 1 coll. (1 female, 1 male): AMP
South Africa (ORS); 4 coll. (6 females): AMP

**Mus sp.**
Angola (Dundo); 2 females; Taufflieb, 1962
Cameroons (Yaounde); Taufflieb, 1962
Congo (Leopoldville); 3 females, 1 male; Taufflieb, 1962

**Mus haussa**
Nigeria; 2 coll. (5 females, 1 male): AMP

**Mus minutoides**
Ghana; 1 coll. (1 female): AMP
Ivory Coast; 1 coll. (1 female): AMP
Rhodesia; 3 coll. (18 females, 1 male): AMP
South Africa (ORS); 7 coll. (9 males): AMP

**Mus muscoides**
Congo (Brazzaville); 4 females (type specimens); Taufflieb, 1954
Ghana; 13 coll. (46 females, 16 males, 5 ny.): AMP
Ivory Coast; 23 coll. (62 females, 3 males, 33 ny.): AMP
Nigeria (Adu); 1 coll. (1 female); Keegan, 1962
Nigeria; Zumpt collection (AMP)
Upper Volta; 3 coll. (6 females): AMP

**Mus setulosus**
Ghana; 18 coll. (80 females, 6 males, 2 ny.): AMP
Ivory Coast; 23 coll. (127 females, 11 males, 10 ny.): AMP

**Myomys daltoni**
Ghana; Zumpt collection (AMP)

**Praomys tullbergi**
Ghana; 3 coll. (12 females, 7 males, 2 ny.): AMP
Ivory Coast; 1 coll. (1 female): AMP
Saccostomus campestris  
South Africa (ORS): 1 coll. (1 female); AMP

Ictonyx striatus  
South Africa (ORS): 1 coll. (1 female); AMP

Genetta villiersi  
Ivory Coast; 1 coll. (2 females); AMP

Unknown  
Botswana; 3 coll. (3 females, 2 males); AMP

Ghana; 1 coll. (10 females, 5 males, 8 ny.); AMP

Togo; 1 coll. (2 females); AMP

Remarks.—L. lavieri resembles L. fritzumpti in overall morphological characters but may be separated by the longer peritreme (extends anteriorly to middle or posterior of coxa I) and the presence of only one blunt, peglike preapical seta on tarsi II and III rather than two or more on each tarsus II-IV. This latter character may also be used to separate L. lavieri from L. thannomys, as well as the overall body size; i.e., L. thannomys is considerably larger (length of dorsal plate greater than 575 μ). Both L. lavieri and L. fritzumpti may be separated from L. moucheti by the longer dorsal setae as opposed to quite short dorsal setae in the latter, and by the presence of dorsal setae p3 which is absent in L. moucheti. Also the medial hypostomal setae are distinctively longer than in L. moucheti.

L. lavieri has been collected from many small mammal hosts throughout Africa, southern Africa as well as northwest Africa; however, it is parasitic primarily on species of Mus. More collections are recorded from this group of hosts than from all other small mammal hosts combined.

Laclaps (Laclaps) fritzumpti Taufflieb  
Figs. 36-42

Laclaps fritzumpti Taufflieb, 1964, Z. f. Parasiten. 24:305-308 (Holotype: Nosob River, Kalahari, South Africa; South African Institute for Medical Research, Johannesburg).

Description.—Female: (Figs. 36-40) Dorsal plate length 634 μ, width 417 μ. Gnathosomal and hypostomal setae setaceous; medial hypostomal setae of moderate length, not reaching to base of gnathosomal setae. Posterior margin of sternal plate slightly invaginated, invagination not reaching to level of 3rd sternal setae; setae st. 1 rather long, reaching to or almost to level of 3rd sternal setae but not to posterior margin of sternal plate. Anterior flap of genital plate overlapping posterior margin of sternal plate only slightly if at all; distance between 1st genital setae subequal to distance between 4th genital setae, distance between 1st genital setae may be slightly less; distance between 2nd genital setae slightly less than distance between 3rd genital setae; greatest width of genital plate at level of 3rd pair of genital setae. Anal plate roundly triangular, width equal to length, anterior margins straight; adanal setae rather long, extending distinctly beyond base of postanal setae; adanal setae set at level of posterior end of anal orifice. Unarmed venter bearing approximately 10 pairs of setaceous setae, 4 pairs adjacent to genital and anal plates plus approximately 6 pairs near or on posterior lateral body margins; metapodal plates elongate-oval. Peritreme extending anteriorly to level of middle of coxa II. Dorsal plate bearing 39 pairs of setaceous setae; most dorsal setae relatively long, length equal to or slightly greater than distance between adjacent setae; subterminal setae (J5) reaching almost to posterior margin of dorsal plate. Fifteen to 20 pairs of setae bordering dorsal opisthosoma on soft integument. Both proximal and distal setae of coxa I setaceous, with distal seta slightly shorter than proximal seta; setae pd 1 and ad 1 of femur I subequal in length; anterior seta of coxae II and III and seta of coxa IV setaceous; posterior seta of coxae II and III robust, blunt, and peglike, posterior seta of coxa II somewhat more elongate than that of coxa III; tarsi II and III each with three rather robust, blunt preapical setae; tarsus IV with one or two longer blunt, preapical setae; all other leg setae setaceous and normally developed.

Male: (Figs. 41-42) Gnathosomal and hypostomal setae setaceous, with medial hypostomal setae of moderate length but not reaching to base of gnathosomal setae. Ventral setae, except adanal and postanal setae, rather long, each extending in length well beyond base of seta immediately posterior; holoventral plate rather narrow between coxae IV, and greatly expanded immediately posterior to coxae IV; expanded area between genital setae and anal orifice bearing 5 pairs of setaceous setae; adanal setae relatively
Figs. 36-40. *Laelaps fritzumpti* Taufflieb, female. (36) venter; (37) dorsum, scale = 100 μ; (38) ventral view of tarsus II; (39) ventral view of tarsus III; (40) ventral view of tarsus IV, scale = 50 μ.
short, reaching no further than base of postanal seta; postanal seta considerably longer than adanal setae and enlarged somewhat basally. Metapodal plates fused to lateral margins of holoventral plate posterior to coxae IV. Peritremeextends to level of middle of coxa II. Dorsal plate bearing 39 pairs of setaceous setae; most dorsal setae rather long, length considerably greater than distance between adjacent setae; subterminal setae (J5) somewhat longer than normal, extending distinctly beyond posterior margin of dorsal plate. Unarmed venter bearing 6 to 8 pairs of setae adjacent to holoventral plate. Soft integument of opisthosoma bearing 8 to 10 pairs of setae. Both proximal and distal setae of coxa I setaceous, proximal seta considerably longer than distal seta; setae ad 1 and pd 1 of femur I subequal in length, ad 1 seta slightly shorter; anterior seta of coxae I and II, posterior seta of coxa II, and seta of coxa IV all setaceous; posterior seta of coxa III shorter and spinelike; tarsi II and III each with two or three spinelike preapical setae, one pair on each tarsi may be blunt; all other leg setae mostly setaceous and normally developed.

**Collection Records**

*Elephantulus myurus*
South Africa (ORS); 2 coll. (2 females); AMP

*Elephantulus rupestris*
South Africa (ORS); 10 coll. (11 females); AMP

*Macrosselides proboscideus*
South Africa, (ORS); 1 coll. (3 females); AMP

*Desmodillus auricularis*
South Africa (ORS); 8 coll. (12 females); AMP

*Gerbillus poeba*
South Africa (ORS); 31 coll. (54 females, 1 male); AMP

*Tatera brandsi*
South Africa (ORS); 2 coll. (2 females); AMP

*Tatera leucogaster*
South Africa (ORS); 4 coll. (16 females); AMP

*Petromuscus collinus*
South Africa; 1 coll. (1 female); AMP
South Africa (ORS); 7 coll. (7 females); AMP
Aethomys sp.
South Africa (Cape Province): 13 females; Taufflieb, 1964

Aethomys chrysophilus
Rhodesia: 1 coll. (1 female); AMP
South Africa (ORS): 2 coll. (63 females, 1 male); AMP

Aethomys namaquensis
Botswana: 1 coll. (12 females); AMP
Botswana (northern): Taufflieb, 1964
South Africa (ORS): 70 coll. (534 females, 2 males); AMP
South Africa (Transvaal): 2 females; Taufflieb, 1964

Mastomys natatalensis
South Africa (ORS): 3 coll. (3 females); AMP

Thallomys sp.
South Africa (Cape Province): 2 females; Taufflieb, 1964

Thallomys paeculus
South Africa (Cape Province): 17 females (type specimens); Taufflieb, 1964
South Africa (ORS): 12 coll. (52 females); AMP

Rhabdomys pumilio
South Africa (ORS): 10 coll. (12 females); AMP

Saccostomus campestris
South Africa (ORS): 2 coll. (8 females); AMP

Otonyus sp.
South Africa (Cape Province): 1 female; Taufflieb, 1964

Otonyus irroratus
South Africa (Orange): 1 female; Taufflieb, 1964

Paratonyus brandi
South Africa (ORS): 1 coll. (1 female); AMP

Unknown
South Africa: 1 coll. (1 female); AMP
South Africa (ORS): 11 coll. (14 females); AMP

Remarks.—L. fritzumpti may be distinguished from all other taxa of the subgroup by the three blunt, peglike preapical setae on tarsi II and III, and by the shorter peritreme (extends only to middle of coxa II). Several other diagnostic characters are the relatively large genital and anal plates, adanal setae almost as long as postanal seta, and rather long dorsal setae.

This species is very abundant on many small mammal hosts throughout southern Africa. It has been collected most frequently from Aethomys species, Thallomys species, Rhabdomys pumilio, Gerbillus paeba, and Elephantulus rupestris.

Laelaps (Laelaps) thamnomys Taufflieb
Figs. 43-46

Laelaps thamnomys Taufflieb, 1954, Ann. Parasit. 29(4):444-446 (Holotype: Brazzaville, Congo; Institut Pasteur. Paris); Tipton, 1960, Univ. Calif. Publ. Ent. 16(6): 283.

Description.—Female: (Figs. 43-44) Dorsal plate length 599 μ, width 364 μ. Gnathosomal and hypostomal setae setaceous; median hypostomal setae of moderate length but not reaching to base of gnathosomal setae. Posterior margin of sternal plate only very slightly invaginated; setae st. 1 rather long, reaching almost to level of 3rd sternal setae. Anterior flap of genital plate slightly overlapping posterior margin of sternal plate; distance between 1st genital setae only slightly less than distance between 4th genital setae, distance between 2nd genital setae slightly less than distance between 3rd genital setae; greatest width of genital plate at level of 3rd pair of genital setae. Anal plate rounded triangular, as wide as long, with anterior margins rounded; adanal setae of moderate length, extending slightly beyond base of postanal seta; adanal setae set near posterior end of anal orifice. Unarmed venter bearing approximately 10 pairs of setaceous setae, 4 pairs immediately adjacent to genital and anal plates plus approximately 6 pairs near or on posterior lateral body margins; metapodal plates oval, slightly longer than wide. Peritreme extends to level of middle of coxa I. Dorsal plate bearing 39 pairs of setaceous setae; most dorsal setae of medium length, length only slightly greater than distance between adjacent setae, if as long; subterminal setae (5) reaching no further than posterior margin of dorsal plate. Twelve to 14 pairs of setae border dorsal opisthosome on soft integument. Both proximal and distal setae of coxa I setaceous, proximal seta considerably longer than distal seta; setae pd 1 and ad 1 of femur I subequal in length; anterior seta of coxae II and III and seta of coxa IV setaceous; posterior seta of coxae II and III robust, blunt, and peglike; no blunt, robust preapical setae on tarsi II, III, or IV; however, some preapical setae may be spinelike; most other leg setae setaceous and normally developed.

Male: (Figs. 45-46) Gnathosomal and hypostomal setae setaceous; median hypostomal setae of moderate length, reaching almost to base of gnathosomal setae. Ventral setae, except adanal and postanal setae, rather long and slender, extending well beyond base of adjacent posterior...
Figs. 43-44. *Laelaps thamnomys* Taufflieb, female. (43) venter; (44) dorsum. scale = 200μ.

Figs. 45-46. *Laelaps thamnomys* Taufflieb, male. (45) venter; (46) dorsum. scale = 100μ.
setae; holoventral plate rather broad between coxae II and III, greatly narrowing between coxae IV, and greatly expanded posterior to coxae IV; expanded area between genital setae and anal orifice bearing 5 pairs of setaceous setae; anal setae of medium length, extending to or slightly beyond base of postanal seta; adanal setae set at level slightly posterior to middle of anal orifice; postanal setae approximately twice as long as adanal setae, and somewhat more robust. Metapodal plates inapparent, apparently fused to lateral extension of holoventral plate; unarmed venter bearing approximately 12 to 14 pairs of setaceous setae adjacent to holoventral plate. Peritreme extending to middle of coxa I. Dorsal plate bearing 39 pairs of setaceous setae, length and position of setae approximately as in female. Both proximal and distal setae of coxa I setaceous, proximal seta somewhat more robust and longer than distal seta; setae ad 1 and pd 1 of femur I subequal in length, pd 1 seta slightly longer; anterior seta of coxae II and III and seta of coxa IV of moderate length and setaceous; posterior seta of coxa II of moderate length and rather robust, with posterior seta of coxa III short, robust, and spinelike; most leg setae setaceous and normally developed; however, some may be shorter and rather spinelike.

**Collection records**

*Mus musculus*
- Togo: 1 coll. (1 female): AMP

*Praonmys rulbergi*
- Togo: 2 coll. (2 females): AMP

*Thammomys rutilans*
- Congo (Brazzaville): 6 females (type specimens); Taufflieb, 1954
- Ivory Coast: 1 coll. (6 females): AMP
- Togo: 8 coll. (66 females, 1 male, 1 ny.): AMP

**Remarks.**—As noted previously, *L. thammomys* differs from other taxa of subgroup B in the form of preapical setae on tarsi II and III, i.e., setaceous rather than blunt, peglike. Also, it is a rather large species with the dorsal plate exceeding 575 μ in length. In these two characters *L. thammomys* is quite similar to *L. kampalenis*, which is placed in major group II, subgroup A, because of overall phenetic similarity. The former differs from the latter in the following characters: only slightly invaginated posterior margin of sternal plate, greatest width of genital plate at level of 3rd genital setae rather than at level of 2nd, and distance between 1st genital setae equal to or less than distance between 4th, rather than the reverse.

This taxa is recorded primarily from *Thammomys rutilans* in northwest Africa south of the Sahara.

*Laelaps (Laelaps) moucheti* Taufflieb

Figs. 47-53

*Laelaps moucheti* Taufflieb, 1959. J. Ent. Soc. So. Afr. 22(2):398-399 (Holotype: Yaounde, Cameroun: Museum d'Histoire Naturelle, Paris).

**Description.—Female:** (Figs. 47-51) Dorsal plate length 484 μ, width 302 μ. Gnathosomal and hypostomal setae setaceous. Medial hypostomal setae relatively short, reaching no more than half distance to gnathosomal setae. Posterior margin of sternal plate somewhat invaginated, invagination reaching no further than level of 3rd sternal setae; setae st. 1 of medium length, reaching to level halfway between 2nd and 3rd sternal setae. Anterior flap of genital plate overlapping posterior margin of sternal plate only slightly; distance between 1st genital setae slightly greater than distance between 4th genital setae; distance between 2nd genital setae slightly greater than distance between 3rd genital setae: greatest width of genital plate at level of 2nd pair of genital setae. Anal plate roundly triangular, almost as wide as long, with anterior margins rounded; adanal setae of moderate length, extending to base of postanal seta; adanal setae set at level of posterior end of anal orifice. Unarmed venter bearing approximately 14 to 16 pairs of setaceous setae, 4 pairs immediately adjacent to genital and anal plates plus approximately 10 to 12 pairs near or on posterior lateral body margin; metapodal plates oval to elongate-oval. Peritreme extends to level of middle of coxa I. Dorsal plate bearing 38 pairs of rather small setaceous setae. setae px3 absent; most dorsal setae relatively short, length no greater than half distance between adjacent setae; subterminal setae (J5) smaller than all others, and terminal setae (Z5) considerably longer than other adjacent setae. Ten to 12 pairs of setae border dorsal opisthosoma on soft integument. Both proximal and distal setae of
Figs. 47-51. *Laelaps moucheti* Taufflieb, female. (47) venter; (48) dorsum, scale = 100\(\mu\); (49) ventral view of tarsus II; (50) ventral view of tarsus III; (51) ventral view of tarsus IV, scale = 50\(\mu\).
coxa I setaceous, with proximal seta considerably longer than distal seta; setae ad 1 and pd 1 of femur I subequal in length; anterior seta of coxae II and III and seta of coxa IV setaceous; posterior seta of coxae II and III rather robust, blunt, and peglike; tarsi II and III each with one robust, blunt preapical setae; all other leg setae mostly setaceous and normally developed.

Male: (Figs. 52-53) Gnathosomal and hypostomal setae setaceous, medial hypostomal setae relatively short, not reaching more than half distance to gnathosomal setae. Ventral setae, except adanal and postanal setae, of moderate length, each extending in length somewhat beyond base of seta immediately posterior; holoventral plate rather broad between coxae II and III, rather narrow between coxae IV, and greatly expanded immediately posterior to coxae IV; expanded area between genital setae and anal orifice bearing 5 pairs of setaceous setae; adanal setae relatively short, length not extending to base of postanal seta; adanal setae set near level of middle of anal orifice; postanal seta considerably longer than adanal setae. Metapodial plates inapparent, apparently fused with lateral extension of holoventral plate; unarmed venter bearing 16 to 18 rather small, slender setae. Peritreme extending to middle of coxa I. Dorsal plate bearing usual 39 pairs of setaceous setae; length and position of setae as in female. Soft integument of opisthosoma bearing 10 to 12 pairs of setaceous setae. Both proximal and distal setae of coxa I setaceous, with proximal seta considerably longer than distal seta; setae pd 1 and ad 1 of femur I subequal in length; anterior seta of coxae II and III and seta of coxa IV slender and setaceous; posterior seta of coxae II and III spinelike; no blunt preapical setae on tarsi II, III or IV; however, some preapical setae may be spinelike; most other leg setae setaceous and normally developed.
Collection records
rodents
Cameroon (Yaounde): 10 females (type specimens); Taufflieb, 1959

Remarks.—L. moucheti possesses several diagnostic characters which separate it from other taxa of subgroup B (major group I): unusually short dorsal setae, particularly posterocentrally; dorsal setae px3 absent, thus dorsal plate bears only 38 pairs of setae; medial hypostomal setae short, extending no further than half distance to gnathosomal setae.

This species is reported only from the "type" collection which is from "rodents" in Cameroon (Yaounde). It has not been found in any collections of the African Mammal Project to date.

Major Group II

This major group contains 14 taxa, as opposed to major group I which consists of 11 and major group III which has 6. With but two exceptions (L. kampalensis and L. aethiopicus), taxa of this major group are characterized by the presence of a blunt, peglike distal seta and a setaceous proximal seta on coxa I. L. kampalensis differs in having a setaceous distal seta on coxa I, and L. aethiopicus bears blunt, peglike setae both proximally and distally on coxa I. Both of these taxa are placed in this major group because of their overall phenetic similarity to taxa within this group.

Subgroup A

The four species of this subgroup (L. kampalensis, L. tillae, L. peregrinus, and L. roubaudi) are characterized by tarsi II and III bearing setaceous preapical setae; no blunt, peglike setae are present on the tarsi of any of them. This is in contrast to all other taxa of major group II which bear at least one blunt, peglike preapical seta on tarsi II and III. As noted above, L. kampalensis differs from the other three species of this subgroup in having a setaceous distal seta on coxa I.

Laelaps (Laelaps) kampalensis Taufflieb
Figs. 54-55

Laelaps kampalensis Taufflieb, 1959. J. Ent. Soc. So. Afr. 22(2):402-403. (Holotype: Kampala, Uganda; Museum d'Histoire Naturelle, Paris).
DESCRIPTION.—Female: (Figs. 54-55)
Dorsal plate length 659 μ, width 445 μ.
Gnathosomal and hypostomal setae setaceous; medial hypostomal setae of moderate length but not reaching base of gnathosomal setae. Posterior margin of sternal plate invaginated to or slightly beyond level of setae st. 3; setae st. 1 of moderate length, reaching to point half-way between setae st. 2 and st. 3. Anterior flap of genital plate not overlapping posterior of sternal plate; distance between 1st genital setae distinctly greater than distance between 4th genital setae; greatest width of genital plate between 2nd and 3rd genital setae; distance between 2nd genital setae subequal to that between 3rd genital setae; posterior margin of genital plate between 4th pair of genital setae straight to slightly invaginated. Anal plate length subequal to width, anterior margin convex; adanal setae relatively long, extending well beyond base of postanal seta; adanal setae set near posterior end of anal orifice; postanal seta somewhat longer than adanal setae. Unarmed venter bearing about 14 pairs of setaceous setae, 8 pairs distinctly ventral adjacent to genital and anal plates, with other pairs more marginal; metapodal plates elongate-oval. Peritreme extends to middle of coxa I. Dorsal plate bearing 39 pairs of setaceous setae; most dorsal setae of moderate length, length equal to distance between adjacent setae; subterminal setae (J5) reaching to posterior margin of dorsal plate. Fourteen to 17 pairs of setae border dorsal plate on soft integument. Both proximal and distal setae of coxa I setaceous, with proximal seta slightly longer than distal seta; setae pd 1 and ad 1 of femur I subequal in length, with ad 1 seta only slightly longer; anterior seta of coxae II and III and seta of coxa IV setaceous; posterior seta of coxae II and III robust and peglike; all leg setae setaceous; however, one or two preapical setae of tarsi II and III may be somewhat more robust than other setae.

Male: Unknown.

Collection records
Lemniscomys striatus
Uganda; 8+ females (type specimens): Taufflieb, 1959
Unknown
Togo; 1 coll. (1 female): AMP

Remarks.—In overall morphological characters L. kampalensis is most similar to L. tillae: however, it may be distinguished from the latter by the significantly larger size (dorsal plate greater than 575 μ long), and by the setaceous distal seta of coxa I rather than a small, blunt, peglike seta. In the above noted characters as well as certain others L. kampalensis is similar to L. thannomys; yet it differs in the following notable characters: posterior margin of sternal plate distinctly more invaginated; greatest width of genital plate at level of 2nd genital setae rather than at 3rd; and distance between 1st genital setae distinctly greater than distance between 4th.

L. kampalensis is recorded from the type collection which is Lemniscomys striatus in Uganda, except for a single collection from an unknown host in Togo. Thus, at present very little is known of the actual host and geographic distribution of this species.

Laelaps (Laelaps) tillae Taufflieb
Figs. 56-59

Laelaps tillae Taufflieb, 1959, J. Ent. So. Afr. 22(2):403-404 (Holotype: Kruger National Park, Transvaal, South Africa; Museum d’Histoire Naturelle, Paris).

DESCRIPTION.—Female: (Figs. 56-57)
Dorsal plate length 644 μ, width 416 μ.
Gnathosomal and hypostomal setae setaceous; medial hypostomal setae of medium length, reaching slightly further than half distance to gnathosomal setae. Posterior margin of sternal plate slightly invaginated; sternal setae st. 1 relatively long, reaching to or slightly beyond level of 3rd sternal setae, but not to posterior margin of sternal plate. Anterior flap of genital plate overlapping posterior margin of sternal plate only slightly; distance between 1st genital setae distinctly greater than distance between 4th genital setae, and distance between 2nd genital setae distinctly greater than distance between 3rd genital setae; greatest width of genital plate at level of 2nd pair of genital setae. Anal plate triangular in general shape, slightly longer than wide, with anterior margin straight; adanal setae of moderate length, extending to or slightly beyond base of postanal seta; adanal setae set at level of posterior end of anal orifice. Unarmed venter bearing approximately 10 pairs of setaceous setae, 4 pairs adjacent to genital and anal plates plus ap-
Figs. 56-57. *Laelaps tillae* Taufflieb, female. (56) venter; (57) dorsum, scale = 200μ.

Figs. 58-59. *Laelaps tillae* Taufflieb, male. (58) venter; (59) dorsum, scale = 100μ.
proximately 6 pairs near or on posterior lateral body margins. Metapodal plates rather elongate. Peritreme extends to level of middle of coxa I. Dorsal plate bearing 39 pairs of setaceous setae; most dorsal setae of medium length, length equal to or slightly greater than distance between adjacent setae; setae J4 somewhat shorter than adjacent anterior setae, and subterminal setae (J5) reaching no further than posterior margin of dorsal plate; terminal setae (Z5) approximately three times as long as subterminal setae. Twelve to 15 pairs of setae border dorsal opisthosoma on soft integument. Proximal seta of coxa I setaceous, distal seta rather small, blunt and peglike; setae ad 1 and pd 1 of femur I subequal in length; anterior seta of coxae II and III and seta of coxa IV setaceous, coxa IV seta somewhat smaller; posterior seta of coxae II and III rather robust, blunt, and peglike; no robust, blunt preapical setae on tarsi II, III, and IV; however, some preapical setae may be spinelike; most other leg setae setaceous and normally developed.

**Male:** (Figs. 58-59) Gnathosomal and hypostomal setae setaceous; medial hypostomal setae long and slender, extending to base of gnathosomal setae. Ventral setae, except adanal setae, rather long, each extending in length well beyond base of adjacent posterior setae; holoventral plate rather broad between coxae II and III. Quite narrow between coxae IV, and moderately expanded posterior to coxae IV, but not greatly expanded as in some other species; expanded area between genital setae and anal orifice bearing 5 pairs of setaceous setae; adanal setae relatively short, extending no more than half distance between postanal seta; adanal setae at level near middle of anal orifice; postanal seta considerably longer than adanal, and rather robust and spinelike. Metapodal plates elongate-oval, at least twice as long as wide; unarmed venter bearing approximately 10 pairs of setae. 2 immediately adjacent to holoventral plate and anal region plus about 8 pairs on posterior lateral body margins. Peritreme extending to middle or anterior of coxa I. Dorsal plate bearing 39 pairs of setaceous setae; length and position approximately as in female. Soft integument of opisthosoma bearing about 8 to 10 pairs of setaceous setae. Both proximal and distal setae of coxa I setaceous, with proximal seta somewhat longer than distal seta; setae pd 1 and ad 1 of femur I subequal in length, with seta pd slightly longer: anterior seta of coxae II and III, posterior seta of coxae II, and seta of coxa IV setaceous, coxa IV seta somewhat shorter; posterior seta of coxa III rather short, robust, and spinelike; no robust, blunt peglike preapical setae on tarsi II, III, or IV; however, some preapical setae and other leg setae may be shorter and spinelike.

**Collection records**

- *Athomyus chrysophilus*
  - South Africa: 2 coll. (3 females); AMP
- *Lemniscomys sp.*
  - South Africa (Transvaal): 7 females; Taufflieb, 1959
- *Lemniscomys griseola*
  - Rhodesia; 1 coll. (1 female); AMP
  - South Africa: 1 coll. (1 female.
  - 1 niv.); AMP
  - South Africa (Transvaal): 29 females; Taufflieb, 1959 and 1964
- *Mastomys natalensis*
  - South Africa: 4 coll. (4 females, 4 males); AMP
  - South Africa (Transvaal): 22 females (type specimens); Taufflieb, 1959
- *Rhabdomys pumilio*
  - South Africa; 1 coll. (1 female); AMP
- *Saccostomus campestris*
  - Rhodesia: 1 coll. (1 female); AMP
  - Unknown
  - South Africa (ORS); 1 coll. (1 female): AMP

**Remarks.**—As noted previously, *L. tillac* is phenetically quite similar to *L. kampalensis* in overall morphological characters but differs primarily in the smaller size (dorsal plate less than 575 µ long) and in the presence of a small, blunt, peglike seta distally on coxa I. *L. tillac* differs from the other two taxa of subgroup A by the smaller, more slender peglike distal seta of coxa I, the more slender, setaceous proximal seta of coxa I, and the slight invagination of the posterior margin of the sternal plate.

*L. tillac* has been collected only from southern Africa on a half dozen different hosts; however, it is reported most frequently from *Mastomys natalensis* and *Lemniscomys* species.

**Laelaps (Laelaps) peregrinus** Taufflieb

Figs. 60-61

*Laelaps peregrinus* Taufflieb, 1959. *J. Ent. So. Afr.* 22(2): 401-402 (Holotype: Pilgrims Rest, Transvaal, South Africa: Museum d'Histoire
Figs. 60-61. *Laelaps peregrinus* Taufflieb, female. (60) venter; (61) dorsum. scale = 200μ.

Naturelle de Paris): Taufflieb, 1964, Z. f. Parasiten 24:307.

**Description.** — *Female:* (Figs. 60-61) Dorsal plate length 653 μ, width 438 μ. Gnathosomal and hypostomal setae setaceous; medial hypostomal setae long, but not reaching to base of gnathosomal setae. Posterior margin of sternal plate invaginated slightly beyond level of seta st. 3; setae st. 1 rather long, reaching almost to posterior margin of sternal plate. Anterior flap of genital plate rather narrow and not overlapping posterior of sternal plate; distance between 1st genital setae much greater than distance between 4th genital setae; distance between 2nd genital setae distinctly greater than distance between 3rd genital setae; greatest width of genital plate at level of 2nd pair of genital setae. Anal plate slightly wider than long; adanal setae of moderate length, extending to base of postanal seta; adanal setae set at level near posterior end of anal orifice; postanal seta considerably larger than adanal setae. Unarmed venter bearing about 17 pairs of setaceous setae, 6 to 10 pairs distinctly ventral with others more marginal; metapodal plates elongated-oval. Peritreme extending to middle or posterior of coxa I. Dorsal plate bearing 39 pairs of setaceous setae; most setae of moderate length, length equal to distance between adjacent setae; subterminal setae (J5) reaching slightly beyond posterior margin of dorsal plate; approximately 20 setae bordering dorsal opisthosomal on soft integument. Proximal seta of coxa I setaceous but somewhat robust, distal seta usually blunt, peglike (may be robust and spinelike), and about half the length of proximal seta; setae pd 1 and ad 1 of femur I subequal in length, with ad 1 only slightly longer; anterior seta of coxae II and III and seta of coxa IV setaceous; posterior seta of coxae II and III bluntly spinelike; all leg setae setaceous; however, some preapical setae of tarsi may be somewhat robust.

*Male:* Unknown.

**Collection records.**

*Aethomys chrysophilus*

South Africa; 1 coll. (1 female); AMP
Rhodobius pumilio
South Africa (Transvaal); 1 female (type specimen); Taufflieb, 1959
South Africa (Cape Prov.); 1 female; Taufflieb, 1964
South Africa; 1 coll. (1 female); AMP
South Africa (Somerset East, Cape Prov.); 1 coll. (1 female); AMP
Otomys sp.
South Africa (Transvaal); 1 female; Taufflieb, 1959

Remarks.—L. peregrinus and L. roubaudi are quite similar to each other, both differing from L. tillae in the much more robust setae of coxa I, and in the deeper invagination of the posterior margin of the sternal plate. L. peregrinus may be distinguished from L. roubaudi by the following key characters: genital plate distinctly more expanded posteriorly with greatest width at level of 2nd genital setae; peritreme extends anteriorly only to level of middle of coxa II; and larger idiosoma, dorsal plate length greater than 600 μ.

L. peregrinus has been collected to date only from the country of South Africa, almost exclusively from Rhodobius pumilio.

Laelaps (Laelaps) roubaudi Taufflieb
Figs. 62-65

Laelaps roubaudi Taufflieb, 1954, Ann. Parasit. 29(4):437 (Holotype: Brazzaville, Congo; Institut Pasteur, Paris); Tipton, 1960, Univ. Calif. Publ. Ent. 16(6):281.

Description.—Female: (Figs. 62-63) Dorsal plate length 523 μ, width 374 μ. Gnathosomal and hypostomal setae setaceous; medial hypostomal setae of medium length, reaching slightly more than half distance to base of gnathosomal setae. Posterior margin of sternal plate moderately invaginated, invagination reaching to or slightly beyond level of 3rd sternal setae; setae st. 1 relatively long, reaching to or almost to level of 3rd sternal setae. Anterior flap of genital plate overlapping posterior margin of sternal plate only slightly; distance between 1st genital setae considerably greater than distance between 4th genital setae, and distance between 2nd genital setae subequal to distance between 3rd; greatest width of genital plate at or between 2nd and 3rd genital setae. Anal plate triangular in general shape, about as wide as long, with anterior margin straight to slightly concave or invaginated; adanal setae relatively long, extending beyond base of postanal setae; adanal setae set at level near posterior one-third of anal orifice. Unarmed venter bearing 7 or 8 pairs of setaceous setae, 4 pairs immediately adjacent to genital and anal plates plus 4 or 5 pairs near or on posterior lateral body margins; metapodal plates irregularly oval, slightly longer than wide. Peritreme extending to level of middle or anterior of coxa I. Dorsal plate bearing 39 pairs of setaceous setae; most dorsal setae of medium length, length equal to or slightly greater than distance between adjacent setae; subterminal setae (J5) reaching slightly beyond posterior margin of dorsal plate. Fourteen to 16 pairs of setae bordering dorsal opisthosoma on soft integument. Proximal seta of coxa I of medium length, robust, and spinelike, distal seta of coxa I short, robust, and peglike; setae ad I and pd I of femur I subequal in length; anterior seta of coxae II and III and seta of coxa IV setaceous, with coxa IV seta rather small; posterior seta of coxa II blunt, peglike but longer, posterior seta of coxa III short, robust, and peglike; one preapical seta of each tarsi II and III spinelike; most other setae setaceous and normally developed.

Male: (Figs. 64-65) Gnathosomal and hypostomal setae setaceous; medial hypostomal setae of moderate length, reaching almost to base of gnathosomal setae. Ventral setae, except adanal and postanal setae, rather long and slender, extending well beyond base of adjacent posterior setae; holoventral plate very broad between coxae II and III, narrowing between coxae IV, and expanded posterior to coxae IV; expanded area between genital setae and anal orifice bearing 5 pairs of setaceous setae; adanal setae of medium length, extending to or slightly beyond base of postanal setae; adanal setae set at level near posterior of anal orifice; postanal seta somewhat longer and considerably more robust than adanal setae. Metapodal plates inapparent, apparently fused to lateral extensions of holoventral plate; unarmed venter bearing approximately 8 to 10 pairs of setaceous setae adjacent to holoventral plate, marginal seta longer. Peritreme extending to middle of coxa I. Dorsal plate bearing 39 pairs of setaceous setae; length and position approximately...
Figs. 62-63. *Laelaps roubaudi* Taufflieb, female. (62) venter; (63) dorsum, scale = 100μ.

Figs. 64-65. *Laelaps roubaudi* Taufflieb, male. (64) venter; (65) dorsum, scale = 100μ.
as in female. Both proximal and distal setae of coxa I setaceous, proximal seta somewhat longer and more robust than distal seta; setae ad 1 and pd 1 of femur I subequal and medium in length; anterior seta of coxae II and III, posterior seta of coxa II and seta of coxa IV setaceous; posterior seta of coxa III short, robust, and spinelike; several preapical setae of tarsi II and III somewhat robust and spinelike; most other leg setae setaceous and normally developed; however, some may be shorter and rather spinelike.

Collection records

*Crocidura* sp.
Nigeria: 1 coll. (1 female); AMP

*Tatera kempi*
Dahomey: 1 coll. (4 females); AMP
Ivory Coast: 2 coll. (3 females, 5 males); AMP

*Taterillus nigeriae*
Nigeria (northern): 1+ coll. (1+ female); AMP

*Dasymphys foxi*
Nigeria: 2 coll. (4 females): AMP

*Dasymphys inconspitus*
Congo (Brazzaville): 11 females (type specimens); Taufflieb, 1954
Ivory Coast: 8 coll. (20 females, 6 ny.); AMP

*Lophuronyms sikapusii*
Congo (Brazzaville): Taurifieb, 1962

*Pelomys sp.*
Congo (Brazzaville): Taufflieb, 1962

*Pravomys tulbergi*
Ghana: 1 coll. (1 female); AMP

Remarks.—As noted previously, *L. roubaudii* is most similar to *L. peregrinus* but differs in being a smaller species (length of dorsal plate less than 600 μ). Also, the peritremes extends distinctly further anteriorly (to level of middle of coxa I), and the distance between 2nd genital setae is no greater than that between 3rd. It may be separated from *L. tillae* by the more robust setae on coxa I and the deeper invagination of the posterior margin of the sternal plate.

*L. roubaudii* has been collected from a variety of different hosts in northwest Africa south of the Sahara. More specimens have been collected from *Dasymphys inconspitus* than from any other host, but the number of collections from any one host species is not sufficient to draw accurate conclusions on host-parasitic relationships.

Subgroup B

The formation of this subgroup is based primarily on the numerical taxonomic results. The 5 taxa of this subgroup differ from subgroup A by the presence of one or more blunt, peglike setae apically on tarsi II and III, but there is no set of key characters which easily distinguishes this subgroup from subgroup C. As noted previously, *L. aethiopicus* differs from the other taxa of this subgroup in bearing blunt, peglike setae both proximally and distally on coxa I; however, it is phenetically similar to the taxa of this subgroup in overall similarity.

Laelaps (*Laelaps*) nuttalli Hirst

Figs. 66-72

*Laelaps nuttalli* Hirst, 1915. Bull. Ent. Res. 6: 183 (Holotype: Colombo, Ceylon; British Museum [Natural History], London): Zampt, 1950. S. Afr. J. Med. Sci. 15:87; Keegan, 1956. J. Egypt. Publ. Hist. Assoc. 31:262; Zampt and Till, 1958. J. Ent. Soc. S. Afr. 21:266; Taufflieb, 1959. J. Ent. Soc. S. Afr. 22:406; Tipton, 1960. Univ. Calif. Publ. Ent. 16:278; Coffee, 1971, Zeits Angew. Zool. 58:43-52.

Description.—Female: (Figs. 66-70) Dorsal plate length 621 μ, width 423 μ. Gnathosomal and hypostomal setae setaceous; medial hypostomal setae relatively long, not reaching to base of gnathosomal setae. Posterior margin of sternal plate only slightly invaginated; setae st. 1 relatively long, reaching almost to posterior margin of sternal plate. Anterior flap of genital plate slightly overlapping posterior of sternal plate; distance between 1st genital setae and 4th genital setae approximately equal; greatest width of genital plate at or slightly anterior to 3rd pair of genital setae. Anal plate roundly triangular, anterior margin somewhat rounded, width approximately equal to length; anal setae of medium length, less than distance to postanal seta; anal setae set at level of posterior end of anal orifice. Unarmed venter bearing about 12 pairs of setaceous setae. 5 pairs adjacent to genital and anal plates plus about 7 pairs near or on posterior lateral body margins; metapodal plates elongate oval. Peritreme extending to or nearly to middle of coxa I. Dorsal plate bearing 39 pairs of setaceous setae; most dorsal setae of medium length, length almost equal to distance between adjacent setae; subterminal setae (J5) reaching almost to posterior margin of dorsal plate. Ten to 12 pairs of setae bordering dorsal opistho-
Figs. 66-70. *Laelaps nullalli* Hirst, female. (66) venter; (67) dorsum, scale = 100μ; (68) ventral view of tarsus II; (69) ventral view of tarsus III; (70) ventral view of tarsus IV, scale = 50μ.
soma on soft integument. Proximal seta of coxa I setaceous and of medium length, distal seta relatively short, blunt, and peglike; setae pd I and ad I of femur I subequal in length, with ad I seta only slightly longer; anterior seta of coxae I and II and seta of coxa IV setaceous. Posterior seta of coxae II and III robust and peglike; tarsi II and III each with two blunt, preapical setae, and tarsus IV with one blunt, preapical setae; all other leg setae setaceous and normally developed.

**Male:** (Figs. 71-72) Gnathosomal and hypostomal setae setaceous; medial hypostomal setae of moderate length reaching to base of gnathosomal setae. Ventral setae, except anal anal setae, rather long and slender, each extending well beyond base of posterior setae; holoventral plate rather broad between coxae II and III, greatly narrowing between coxae IV, and greatly expanded posterior to coxae IV; expanded area between genital setae and anal orifice bears 5 pairs of setaceous setae; anal setae of medium length, extending slightly beyond base of postanal seta; anal anal setae at level near posterior end of anal orifice; posterior seta approximately twice as long as anal anal and usually slightly more robust. Metapodal plates inapparent, apparently fused to lateral extension of holoventral plate; unarmed venter bearing approximately 12 to 14 pairs of setaceous setae adjacent to holoventral plate, those closer to holoventral plate rather short, with those on margins quite long. Peritreme extends to middle of coxa I. Dorsal plate bearing 39 pairs of setaceous setae; length and position of setae approximately as in female. Both proximal and distal setae of coxa I setaceous, proximal seta slightly longer and more robust than distal seta; setae pd I and ad I of femur I subequal in length, pd I seta slightly longer; anterior seta of coxae II and III, and posterior seta of coxa IV mostly setaceous but somewhat robust basally; posterior seta of coxa III short.

Figs. 71-72. *Laelaps muttalli* Hirst, male, (71) venter; (72) dorsum. scale 100μ.
quite robust, and spinelike to peglike; several preapical setae of tarsi II and III rather robust and spinelike; most other leg setae setaceous and normally developed; however, some may be shorter and somewhat spinelike.

**Collection records**

*Rattus rattus*

Belgian Congo (Elizabethville): Zampt, 1961

Madagascar: 1 female: Zampt, 1961, and Coffey, 1971

Madagascar: 4 coll. (65 females, 2 males); AMP

Mauritius: 4 coll. (12 females); AMP

*Mastomys coucha*

South Africa: Tipton, 1960

Remarks.—*L. nuttalli* and *L. aethiopicus* may be easily distinguished from the other taxa of subgroup B by the shorter peritreme which extends anteriorly to near middle of coxa I. These two taxa also differ from the taxa of subgroup C, except for *L. myomys*. In the same character, *L. nuttalli* and *L. myomys* may be separated from *L. aethiopicus* in that the proximal seta of coxa I is setaceous rather than blunt and peglike. *L. nuttalli* bears smaller setaceous gnathosomal setae, setaceous ventral leg setae, and moderate-length anal setae rather than robust, spinelike, or peglike ventral leg setae and short anal setae as in *L. myomys*.

*L. nuttalli* is reported almost exclusively from *Rattus rattus* in the Ethiopian region. All collections of the African Manual Project were from this host in Madagascar and Mauritius. *L. nuttalli* is a rather cosmopolitan mite, occurring worldwide wherever *Rattus* species are found.

**Laelaps** (*Laelaps*) *aethiopicus* Hirst

**Figs. 73-76**

*Laelaps aethiopicus* Hirst, 1925, Proc. Zool. Soc Lond. 4:56 (Holotype: Ashundwa’s Camp, Wanga, Kenya; British Museum [Natural History], London); Zampt, 1950, So. Afr. J. Med. Soc. 15:78; Radford, 1950, Parasitology 40 (3-4):368; Keegan, 1936, Egypt. Publ. Hlth. Assoc. 31 (6):258.

Description.—Female: (Figs. 73-76) Dorsal plate length 672 µ, width 501 µ. Gnathosomal and hypostomal setae setaceous; medial hypostomal setae long, reaching almost to base of gnathosomal setae. Posterior margin of sternal plate slightly invaginated, invagination reaching no further than level of 3rd sternal setae; setae st. 1 long, reaching beyond posterior margin of sternal plate. Anterior flap of genital plate overlapping posterior margin of sternal plate only slightly; distance between 1st genital setae distinctly less than distance between 4th genital setae, and distance between 2nd genital setae distinctly less than distance between 3rd genital setae; greatest width of genital plate at level of 3rd pair of genital setae. Anal plate roundly triangular, almost as wide as long, with anterior margins rounded; anal setae of moderate length, extending to or slightly beyond base of postanal seta; anal setae set at level of posterior end of anal orifice. Unarmed venter bearing approximately 12 pairs of setaceous setae, 4 pairs adjacent to genital and anal plate plus approximately 6 pairs near or on posterior lateral body margins; metapodal plates elongate-oval. Peritreme extending to level of middle or at least posterior of coxa I. Dorsal plate bearing 39 pairs of setaceous setae; most dorsal setae relatively long, length equal to or slightly greater than distance between adjacent setae; subterminal setae (J5) reaching to or slightly beyond posterior margin of dorsal plate. Eighteen to 20 pairs of setae bordering dorsal opisthosoma on soft integument. Both proximal and distal setae of coxa I robust, blunt, and peglike, with distal setae slightly shorter than proximal seta; setae pd 1 of femur I slightly longer than ad 1; anterior seta of coxae II and III and seta of coxa IV setaceous; posterior seta of coxae II and III robust, blunt, and peglike; tarsus II with four or five robust, blunt preapical setae, tarsus III with three or four blunt, robust preapical setae, and tarsus IV with two blunt preapical setae; all other leg setae setaceous and normally developed.

**Collection records**

*Rats*

Kenya (Ashundwa’s Camp, Wanga): Hirst, 1925

Remarks.—*L. aethiopicus* is easily distinguished from other taxa of subgroup B as well as all others of major group II by the robust, peglike proximal seta of coxa I. Based upon this one character alone, this mite would be placed in major group III with *L. variomaculatus*; however, in overall morphological characters it most closely resembles *L. nuttalli*. *L.
**Laelaps aethiopicus** Hirst, female. (73) venter; (74) dorsum, scale = 100μ; (75) ventral view of tarsus II; (76) ventral view of tarsus III, scale = 50μ.

*aethiopicus* differs from taxa of major group III by the following characters: gnathosomal setae setaceous, never robust and spinelike or peglike; 1st sternal setae long, extending beyond posterior margin of sternal plate; and adanal setae slender and setaceous, not robust and spinelike.

*L. aethiopicus* is known only from the type collection which is reported by Hirst (1925) from Kenya on “Rats.” No specimens have yet been recovered from the African Mammal Project collections.

**Laelaps (Laelaps) liberiensis** Hirst

Figs. 77-83

*L. liberiensis* Hirst. 1925. Proc. Zool. Soc. Lond. 1:68 (Holotype: Gonyon Country, Liberia; British Museum [Natural History], London); Keegan. 1956. J. Egypt. Publ. Hlth. Assoc. 31:261; Zumpt and Till. 1958. J. Ent.
Figs. 77-81. *Laelaps libericensis* Hirst, female. (77) venter; (78) dorsum, scale = 100μ; (79) ventral view of tarsus II; (80) ventral view of tarsus III; (81) ventral view of tarsus IV, scale = 50μ.
Laelaps lamborni Hirst, 1925, Proc. Zool. Soc. Lond. 4:61 (Holotype: Karonga, Nyasaland; British Museum [Natural History], London); Zumpt, 1950, So. Afr. J. Med. Soc. 15:78; Keegan, 1956, J. Egypt. Publl. Hlth. Assoc. 31:260; Zumpt and Till. 1958, J. Ent. Soc. So. Afr. 21:266; Tautfliel, 1959, J. Ent. Soc. So. Afr. 22:460; Tipton, 1960, Univ. Calif. Publl. Ent. 16:273; Coffee, 1971, Zeitsch. Angew. Zool. 58:43-46.

Description.—Female: (Figs. 77-81) Dorsal plate length 634 μ, width 432 μ. Gnathosomal and hypostomal setae setaceous; most dorsal setae moderately long but not reaching base of gnathosomal setae. Posterior margin of sternal plate slightly invaginated; setae st. 1 moderately long, reaching to base of setae st. 3. Anterior flap of genital plate slightly overlapping posterior margin of sternal plate; distance between 1st genital setae subequal to that between 4th genital setae; distance between 2nd genital setae distinctly less than distance between 3rd genital setae; greatest width of genital plate at level of 3rd genital setae. Anal plate relatively triangular, almost as wide as long, with anterior margin relatively straight; adanal setae rather long, extending distinctly beyond base of postanal setae; adanal setae set at level near posterior end of anal orifice. Unarmed venter bearing approximately 10 to 12 pairs of setaceous setae, 4 or 5 pairs adjacent to genital and anal plates plus 5 or 6 pairs near or on posterior body margins; metapodal plates oval. Peritreme extending to level of middle or anterior of coxa II. Dorsal plate bearing 39 pairs of setaceous setae; most dorsal setae of medium length. Length approximately equal to distance between adjacent setae; subterminal setae extend beyond posterior margins of dorsal plate. Nine to 12 pairs of setae bordering dorsal opisthosomal on soft integument. Proximal seta of coxa I of moderate length and setaceous, distal seta of coxa I relatively short, blunt, and peglike; setae pd 1 and ad 1 of femur I subequal in length; anterior seta of coxae II and III and seta of coxa IV setaceous; posterior seta of coxae II and III robust, blunt, and peglike; tarsus II with two robust, blunt preapical setae, tarsus III with one blunt, robust preapical setae, and tarsus IV with one blunt preapical seta; all other leg setae setaceous and normally developed.

Male: (Figs. 82-83) Gnathosomal and hypostomal setae all setaceous, with median hypostomal setae moderately long but not reaching to base of gnathosomal setae. Ventral setae, except adanal and postanal setae, relatively long, each extending in length beyond base of seta immediately posterior by about one-third its length; holoventral plate rather narrow between coxae IV but considerably expanded posterior to coxae IV expanded area between genital setae and anal orifice bears five pairs of setaceous setae; adanal setae of moderate length, extending slightly beyond base of postanal setae; metapodal plates not apparent; unarmed venter bearing 15 to 20 pairs of setaceous setae varying in length from rather short to quite long. Peritreme extending to middle of coxa II. Dorsal plate bearing 39 pairs of setaceous setae; length and position of setae as in female. Both proximal and distal setae of coxa I setaceous; however, proximal seta much larger and more robust with distal seta about half the length; setae pd 1 and ad 1 of femur I subequal in length; anterior seta of coxae II and III and seta of coxa IV setaceous; posterior seta of coxa II setaceous but somewhat robust; posterior seta of coxa III rather short, robust, and spine-like; one or two preapical setae on tarsi II and III spine-like but not blunt and peglike; all other leg setae setaceous and normally developed.

Collection records

Elephantulus myurus
South Africa (ORS); 1 coll. (1 female): AMP

Macroscelides proboscideus
South Africa (ORS); 1 coll. (1 female): AMP

Cricidura sp.
Ghana; 2 coll. (3 females); AMP

Cricidura hirta
Rhodesia; 1 coll. (2 females): AMP

Hypsigalea monstrosa
Ivory Coast; 1 coll. (1 female): AMP

Nycteris hispida
Mauritania; 1 coll. (3 females): AMP

Nycteris macrotis
Senegal; 1 coll. (1 female): AMP

Rhinolophus simulator
Rhodesia; 1 coll. (1 female): AMP

Epitesicus rapax
South Africa (ORS); 1 coll. (2 females): AMP

Tadarida leonis
Senegal; 2 coll. (3 females): AMP
Figs. 82-83. *Laelaps liberiensis* Hirst, male. (82) venter; (83) dorsum, scale = 100μ.

*Tadarida major*
Upper Volta; 1 coll. (1 female); AMP

*Tadarida pumila*
Togo; 1 coll. (2 females); AMP

*Galago senegalensis*
Upper Volta; 3 coll. (5 females, 2 ny.); AMP

*Ceropithecus mitis*
Rhodesia; 1 coll. (1 female); AMP

*Erythrocebus patas*
Upper Volta; 1 coll. (1 female, 1 male); AMP

*Lepus saxtilis*
Botswana; 1 coll. (4 females); AMP

*Cryptomys hottentotus*
Botswana; 2 coll. (5 females, 1 male); AMP

*South Africa (ORS)*: 1 coll. (1 female); AMP

*Graphiurus murinus*
Nigeria (Afon); 2 females; Coffey, 1971

*Desmodillus auricularis*
*Nigeria (Afon)*: 1 coll. (1 female); AMP

*Desmodillus braueri*
Upper Volta; 2 coll. (2 females, 3 ny.); AMP

*Gerbillus fossor*
South Africa (ORS); 1 coll. (1 female); AMP

*South Africa*; 1 coll. (1 female, 1 ny.); AMP

*Tatera sp.*
Congo (Leopoldville); 6 females; Taufflieb, 1964

*Tatera gambianus*
Senegal; 3 coll. (1 female, 1 male, 3 ny.); AMP

*Tatera guineae*
Ghana; 1 coll. (1 female); AMP

*Tatera kempi*
Dahomey; 1 coll. (1 female, 1 male); AMP

*Ghana (south)*; 1 female

*Paperna et al., 1970*
Ivorv Coast; 6 coll. (8 females, 2 males, 1 ny.); AMP

*Upper Volta*; 1 coll. (1 female); AMP

*Taterillus lucogaster*
Botswana; 2 coll. (4 females); AMP

*South Africa (ORS)*; 1 coll. (1 female); AMP

*South Africa*; 5 coll. (4 females, 1 male); AMP

*Taterillus gracilis*
Upper Volta; 1 coll. (5 females, 3 ny.); AMP

*Taterillus nigerianus*
Nigeria (Dada); 1 male; Coffey, 1971
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Dendromus melanotis
South Africa (ORS); 1 coll. (2 females); AMP
Malacothrix typicus
South Africa (ORS); 2 coll. (4 females); AMP
Steatomys carinatus
Ivory Coast; 1 coll. (6 females); AMP
Acemys cairinensis
Ghana; 1 coll. (1 female); AMP
Aethomys chrysophilus
Botswana; 2 coll. (2 females. 1 male); AMP
South Africa (ORS); 4 coll. (6 females); AMP
South Africa; 22 coll. (32 females, 16 males, 4 ny.); AMP
Aethomys namaquensis
South Africa (ORS); 4 coll. (4 females); AMP
South Africa (Cape); 1 female; Taufflieb, 1964
Aethomys stannarius
Nigeria (Ugar, Jabar); 6 females; Coffey, 1971
Arvicanthis niloticus
Egypt (El Tabiyah, Giza); Keegan, 1956
Ghana; 1 coll. (1 female); AMP
Ivory Coast; 1 coll. (1 female); AMP
Nigeria; 1 coll. (2 females); AMP
Nigeria (Paunam Fish Farm); 15 females, 3 males; Coffey, 1971
Nigeria (Ugar, Jabar); 3 females, 1 male; Coffey, 1971
Cricetomys emini
Upper Volta; 1 coll. (1 female); AMP
Cricetomys gambianus
Nigeria; 1 coll. (1 female, 1 male); AMP
Dasymys inornatus
Rhodesia; 1 coll. (2 females); AMP
Diphomys defua
Ghana; 1 coll. (2 females); AMP
Liberia (Gonyon Country); 1 female; Hirst, 1925
Grammomys dolichurus
Upper Volta; 1 coll. (3 females); AMP
Hylomyscus allenii
Ghana; 1 coll. (3 females, 5 males, 11 ny.); AMP
Togo; 3 coll. (3 females); AMP
Lemmiscymys barbarus
Nigeria (Upper Ogum Ranch); 1 female, male; Coffey, 1971
Lemmiscymys griselda
South Africa; 1 coll. (1 female, 3 males); AMP
South Africa (Transvaal); 1 female; Taufflieb, 1964
Lemmiscymys striatus
Nigeria; 2 coll. (6 females, 3 males); AMP
Togo; 3 coll. (8 females); AMP
Lophuromys sikapusi
Ghana; 1 coll. (4 females); AMP
Nigeria (Ibadan); 1 female; Coffey, 1971
Malacomys longipes
Ivory Coast; 1 coll. (2 females, 3 males, 9 ny.); AMP
Mastomys sp.
Angola (Dundo); 2 females; Taufflieb, 1962
Mastomys albicaudatus
South Africa (ORS); 1 coll. (2 females); AMP
Mastomys coucha
Botswana; 1 coll. (3 females); AMP
Rhodesia; 1 coll. (6 females); AMP
Ghana (Acra-Tema); Papernia et al., 1970
Ghana; 100 coll. (321 females, 64 males, 101 ny.); AMP
Ivory Coast; 26 coll. (120 females, 39 males, 129 ny.); AMP
Mastomys natalensis
Botswana; 1 coll. (2 females); AMP
South Africa (ORS); 27 coll. (50 females); AMP
South Africa (Transvaal); 1 female; Taufflieb, 1964
South Africa; 102 coll. (302 females, 119 males, 69 ny.); AMP
Togo, 4 coll. (10 females, 1 male, 2 ny.); AMP
Upper Volta; 63 coll. (79 females, 62 males, 89 ny.); AMP
Mus minutoides
South Africa (ORS); 4 coll. (5 females); AMP
South Africa; 1 coll. (1 male); AMP
Mus musculus
Egypt (Nahya, Imhaba, Giza); Keegan, 1956
Mus musculoides
Nigeria (Ibadan); 3 females; Coffey, 1971
Nigeria (Federal Dist.); 2 females; Coffey, 1971
Senegal; 1 coll. (1 female); AMP
Togo; 1 coll. (2 females, 1 male); AMP
Myomys daltoni
Ghana; 3 coll. (4 females); AMP
Ivory Coast; 1 coll. (1 female); AMP
Senegal; 9 coll. (19 females, 7 males, 11 ny.); AMP
Praomys daltoni
Nigeria (Zaria); 2 females; Coffey, 1971
Praomys fumatus
Nigeria (Iella); Coffey, 1971
Praomys jacksoni
Angola (Dundo); 1 female; Taufflieb, 1962
Congo (Leopoldville); 1 female; Taufflieb, 1964
Kenya (Rift Valley Prov.); Keegan, 1956
Praomys tullbergi
Congo (Brazzaville); Taufflieb, 1962
Ghana; 4 coll. (4 females); AMP
Nigeria: 3 coll. (3 females, 3 males, 3 ny); AMP
Togo: 1 coll. (1 female, 1 ny); AMP

“Rats”
Kenya (No. Kitosh & Wamia); Hirst, 1925
Nyasa (Karonga); Hirst, 1925

Prasomys morio
Cameroon; Taufflieb and Mouchet, 1959
Congo (Brazzaville); Zumpt, 1961

Rattus frugivorus
Congo (Brazzaville); Taufflieb, 1962

Rattus norvegicus
Congo (Yaounde); Zumpt, 1961

Rattus rattus
Congo (Leopoldville); 1 female; Taufflieb, 1964
Nigeria (Ntiri); Keegan, 1956

Rhombomys pantherinus
Kivu (N. Rift Valley); Keegan, 1956
South Africa (ORS); 10 coll. (13 females); AMP
South Africa; 6 coll. (16 females); 7 males, 3 ny); AMP

Saccostomus campestris
South Africa (ORS); 4 coll. (5 females); AMP
South Africa; 1 coll. (3 females); AMP

Thomomys milianus
Togo; 1 coll. (1 female); AMP

Uranomys rixius
Ivory Coast; 1 coll. (1 female); AMP

Otomyx isoratus
South Africa (ORS); 1 coll. (1 female); AMP

Thryonomys swinderianus
Rhodesia; 1 coll. (1 female); AMP

Funisciurus pyrrhopus
Ivory Coast; 1 coll. (1 female); AMP
Nigeria (Felele); 1 female; Coffey, 1971

Ictonyx striatus
South Africa (ORS); 1 coll. (2 females); AMP

Genetta servalina
Senegal; 1 coll. (1 female); AMP

Genetta silversonic
Ivory Coast; 1 coll. (1 female); AMP

Crassochus obtusus
Ivory Coast; 1 coll. (1 female, 1 male); AMP

Herpestes sanguineus
Rhodesia; 1 coll. (2 females); AMP

Unknown host
Botswana; 18 coll. (204 females, 12 males, 5 ny); AMP
Ivory Coast; 5 coll. (28 females, 9 males, 3 ny); AMP
Rhodesia; 1 coll. (7 females); AMP
Togo; 1 coll. (8 females); AMP
South Africa; 35 coll. (37 females, 21 males, 29 ny); AMP

Remarks.—L. liberienis is phenetically quite close to L. setzeri, L. benoi, L. Algericus, and L. mutnalli. It is easily separated from L. mutnalli by the shorter peri-treme, and from L. Algericus by the lack of a heavily sclerotized anterolateral margin of the dorsal plate. Also, L. Algericus has not been reported from the Ethiopian region, although it does occur in Africa just north of the Sahara. L. liberienis differs from L. benoi by a distinctly shallower invagination of the posterior margin of the sternal plate and the absence of a pair of posterior projections on the sternal plate; also, the body setae, especially dorsally, are somewhat less robust than in L. benoi. L. liberienis is easily separated from L. setzeri by the size of the posterior central setae of the dorsal plate. In the former all dorsal setae are medium size to long, whereas in the latter the setae of the posterior central area are much reduced in length. Another character which may be used to separate L. liberienis from other taxa of major group II is the presence of only two blunt, peglike preapical setae on tarsus II, and two or three such setae on tarsus III but with only one in the preapical position.

L. liberienis was synonymized with L. lamborni by Coffey (1971), a decision with which we fully agree. This species is the most widely distributed of all Laelaps species in Africa, both in geographic distribution and in host association. It has been reported from a multitude of hosts throughout the Ethiopian region as well as in Africa north of the Sahara (Egypt and Morocco). The host with which it is most closely associated is Mastomys natalensis; in the collections of the African Mammal Project by far the majority of the collections of this mite were from this host species.

During the examination of specimens of L. liberienis from the different localities and hosts, a certain amount of morphological variability was observed, primarily in the size and general shape of body structures. The large collection of specimens in the African Mammal Project would be ideal for further statistical analyses of intraspecific variability between localities and host species.

Laelaps (Laelaps) setzeri Coffee

Figs. 84-90

Laelaps setzeri Coffee, 1971, Zeitschr. Angew. Zool. 58:49-51 (Holotype: Tsuanchaga, Northern Nigeria; U. S. National Museum, Washington, D. C.).

Description.—Female: (Figs. 84-88) Dorsal plate length 714 μ, width 512 μ. Gnathosomal and hypostomal setae seta-
Figs. 84-88. *Laelaps setzeri* Coffee, female. (84) venter; (85) dorsum, scale = 200μ; (86) ventral view of tarsus II; (87) ventral view of tarsus III; (88) ventral view of tarsus IV. scale = 50μ.
Figs. 89-90. *Laelaps setzeri* Coffee, male. (89) venter; (90) dorsum. scale = 100μ.

ceous; medial hypostomal setae of moderate length, not reaching to base of gnathosomal setae. Posterior margin of sternal plate slightly invaginated medially; setae st. 1 of moderate length, reaching almost to level of base of setae st. 3. Anterior flap of genital plate slightly overlapping posterior margin of sternal plate; distance between 1st genital setae and 4th genital setae subequal; distance between 2nd genital setae distinctly less than distance between 3rd genital setae; greatest width of genital plate at level near 3rd pair of genital setae. Anal plate triangular in shape, almost as wide as long, and with anterior margin straight; adanal setae of moderate length, extending to or slightly beyond base of postanal seta; adanal setae set at level of posterior end of anal orifice. Unarmed venter bearing 14 to 16 pairs of setaceous setae, 4 pairs adjacent to genital and anal plates, plus approximately 10 to 12 pairs near or on posterior lateral body margin; metapodal plates irregularly oval, width approximately equal to length. Peritremes extending to level of middle or anterior of coxa II. Dorsal plate bearing 39 pairs of setaceous setae; anterior, lateral, and all marginal dorsal setae relatively long, but about 7 pairs of posterior central dorsal setae rather small; subterminal setae (J5) smallest, reaching no further than level of base of setae Z5. Ten to 12 pairs of setae border dorsal opisthosoma on soft integument. Proximal seta of coxa I setaceous and of moderate length, distal seta of coxa I short, robust, and peglike; setae pd 1 and ad 1 of femur I of moderate length and subequal; anterior seta of coxae II and III and seta of coxa IV setaceous; posterior seta of coxa II of moderate length, blunt, and peglike; posterior seta of coxa III rather short, robust, and peglike; tarsus II with two robust, blunt, peglike preapical setae; tarsi III and IV each with one rather robust, blunt preapical setae; all other leg setae setaceous and normally developed.

**Male:** (Figs. 89-90) Gnathosomal and hypostomal setae setaceous; medial hypostomal setae of moderate length, reaching almost to base of gnathosomal setae; ventral setae, except adanal and postanal setae, very long and slender, each extending much beyond base of adjacent posterior setae; holoventral plate broad be-
between coxae II and III, extremely narrowing between coxae IV, and greatly expanded posterior to coxae IV; expanded area between genital setae and anal orifice bearing 5 pairs of setaceous setae; anal setae of medium length, extending to or slightly beyond base of postanal seta; anal setae set at level near posterior end of anal orifice; postanal setae at least twice as long as anal setae and somewhat more robust. Metapodal plates inapparent, apparently fused to lateral extension of holoventral plate; unarmed venter bearing approximately 12 to 14 pairs of setaceous setae adjacent to holoventral plate, more marginal setae much longer. Peritreme extending to middle of coxae II. Dorsal plate bearing 39 pairs of setaceous setae; length and position of setae approximately as in female. Both proximal and distal setae of coxa I setaceous; however, proximal seta much longer and much more robust than short, slender distal seta; setae pd 1 and ad 1 of femur I subequal in length, pd 1 seta slightly longer; anterior seta of coxae II, III, and IV setaceous and somewhat enlarged basally; posterior seta of coxa II of medium length, rather robust, and somewhat spinelike; and posterior seta of coxa III short, robust, and spinelike to peglike; 1 seta of each tarsus II and III robust, blunt, and peglike; several other pairs of setae of tarsi II and III rather robust and spinelike; most other leg setae setaceous and normally developed; however, some may be shorter and rather spinelike.

**Collection records**

*Hipposideros caffer*
- Ivory Coast: 1 coll. (2 females, 1 male): AMP
- *Scotophilus nigeria*
  - Ivory Coast; 1 coll. (6 females): AMP
- *Paromys cahirinus*
  - Ghana: 1 coll. (1 female): AMP
- *Machteomyx longipes*
  - Togo: 1 coll. (4 females, 3 males, 1 ny.): AMP
- *Mastomys natalensis*
  - Togo: 2 coll. (2 females): AMP
- *Mus musculusoides*
  - Nigeria (Iblashe): 3 females; Coffey, 1971
  - Togo: 2 coll. (4 females): AMP
- *Paromys allenii*
  - Nigeria (Tsanchaga): 13 females; Coffey, 1971
  - Nigeria (Federal Dist.): 2 females; Coffey, 1971
  - Nigeria (Igbo-Ora): 2 females; Coffey, 1971

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**Paromys jacksonii**
- Nigeria (Igbo-Ora): 2 females; Coffey, 1971
- Nigeria (Kudo): 1 female; Coffey, 1971

**Paromys tallbergi**
- Ghana: 31 coll. (32 females, 21 males, 12 ny.): AMP
- *Laelaps
collection
- Ivory Coast: 39 coll. (64 females, 62 males, 140 ny.): AMP
- Nigeria (Sapaba): 1 female; Coffey, 1971
- Nigeria (Federal Dist.): 3 females; Coffey, 1971
- Nigeria (2 coll. (1 female, 1 male, 5 ny.): AMP
- Senegal: 2 coll. (7 females, 1 male): AMP
- Togo: 63 coll. (149 females, 36 males, 8 ny.): AMP

**Rattus rattus**
- Ivory Coast: 1 coll. (1 female): AMP
- Unknown host
  - Ivory Coast: 1 coll. (1 female): AMP
  - Togo: 1 coll. (2 females): AMP

**Remarks.**— *L. setzeri* may be easily distinguished from other closely related taxa by the following characters: distinctly shorter setae on the dorsal plate posterior and central in position; tarsus II with only two blunt, peglike preapical setae; and the posterior margin of the sternal plate only slightly invaginated and if pair of posterior projections present, rather small.

This taxon is reported primarily from *Paromys* species, most frequently *P. tallbergi*, in northwestern Africa south of the Sahara.

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**Laelaps (Laelaps) benoi** Taufflieb

Figs. 91-97

**Laelaps benoi** Taufflieb. 1964. Rev. Zool. Bot. Afr. 69(3-4):377-380 (Holotype: Kibombo, Luviro, Kivu, Congo-Leopoldville: Musee Royal de l'Afrique Centrale, Turvuren, Belgium).

**Description.**— *Female*: (Figs. 91-95)

Dorsal plate length 770 µ, width 570 µ. Gnathosomal and hypostomal setae setaceous; medial hypostomal setae relatively long, but not reaching to base of gnathosomal setae. Posterior margin of sternal plate moderately invaginated medially, with two posterior projections between 3rd sternal setae and medial invagination; setae st. 1 of medium length, reaching to level halfway between 2nd and 3rd sternal setae. Anterior flap of genital plate overlapping posterior margin of sternal plate only slightly; distance between 1st genital setae somewhat less than distance between 4th genital setae,
Figs. 91-95. *Laelaps benoitii* Taufflieb, female. (91) venter; (92) dorsum, scale = 200μ; (93) ventral view of tarsus II; (94) ventral view of tarsus III; (95) ventral view of tarsus IV, scale = 50μ.
distance between 2nd genital setae less than distance between 3rd genital setae; greatest width of genital plate at level of 3rd genital setae. Anal plate triangular in general shape, almost as wide as long, with anterior margin straight to slightly convex or invaginated; adanal setae of medium length, extending slightly beyond base of postanal seta; adanal setae set at level posterior to anal orifice; postanal seta over twice as long as adanal seta and more robust. Unarmed venter bearing 12 to 14 pairs of setaceous setae, 4 pairs adjacent to genital and anal plates plus approximately 8 to 10 pairs near or on posterior lateral body margins; metapodal plates oval, only slightly longer than wide. Peritreme extending to level of middle or anterior of coxa II. Dorsal plate bearing 39 pairs of setaceous setae; most dorsal setae relatively long and robust, length slightly greater than distance between adjacent setae; subterminal setae (J5) of moderate length, reaching distinctly beyond posterior margin of dorsal plate; terminal setae (Z5) about twice as long as subterminal setae. Six to 8 pairs of setae border dorsal opisthosoma on soft integument. Proximal seta of coxa I setaceous and of medium length; distal seta of coxa I short, robust, and peglike; setae pd 1 and ad 1 of femur I unequal in length, seta pd 1 somewhat longer than ad 1; anterior seta of coxae II and III and seta of coxa IV setaceous, with coxa IV seta rather small; posterior seta of coxae II and III robust, blunt, and peglike; tarsi II and III each with two rather robust, blunt preapical setae, and tarsus IV with one blunt preapical seta; most other leg setae setaceous and normally developed.

Male: (Figs. 96-97) Gnathosomal and hypostomal setae setaceous; medial hypostomal setae quite long, extending to or slightly beyond base of gnathosomal setae. Ventral setae, except adanal setae, rather long and somewhat robust, each extending in length well beyond base of seta immediately posterior or adjacent; holoventral plate rather broad between coxae II and III, much narrowing between coxae IV, and greatly expanded posterior to...
coxae IV; expanded area between genital setae and anal orifice bearing 5 pairs of setae; anal setae of medium length, extending well beyond base of postanal seta, anal setae set at level slightly posterior to middle of anal orifice; postanal seta twice as long as adanal and rather robust. Metapodal plate inapparent, apparently fused with lateral extensions of holoventral plate; soft integument of opisthosoma bearing 14 to 16 pairs of setae. Proximal seta of coxa I setaceous and of moderate length; distal seta of coxa I short, robust, and spinelike; seta pd 1 of femur I slightly longer than seta ad 1; anterior seta of coxae I and III and seta of coxa IV setaceous; posterior seta of coxa II robust and spinelike, but posterior seta of coxa III robust and peglike and somewhat shorter; two setae of each tarsus II and II robust and spinelike rather than blunt; most other leg setae setaceous and normally developed.

**Collection records**

*Hippodesta* *coffer*
- Ivory Coast: 1 coll. (1 female); AMP
*Mus bella*
- Congo-Leopoldville (Kiwiro, Kivu, Kibombo): 2 females; Taufflieb, 1964
*Mus minutoides*
- Ghana: 1 coll. (1 female); AMP
- Rhodesia: 1 coll. (4 females, 1 male); AMP
*Mus muscoloides*
- Ghana (Odumi, Jongo): 1+ coll.; AMP
- Zumpt Collection
- Ghana: 3 coll. (3 females); AMP
- Ivory Coast: 3 coll. (4 females); AMP
- Nigeria (Iboshe, Igbo-Ora): 3+ coll.; AMP
- Zumpt Collection
*Mus setulosus*
- Ghana: 6 coll. (15 females, 2 males); AMP
- Ivory Coast: 8 coll. (14 females, 1 male); AMP
*Praomys tulibergi*
- Ghana: 1 coll. (1 female); AMP
- Togo: 1 coll. (1 female); AMP
- Unknown host
- Togo: 1 coll. (1 female); AMP

**Remarks.**—*L. benoiit* may be separated from the other taxa of subgroup B by the presence of a pair of prominent projections on the sternal plate, with a moderate invagination medially between the projections. In this character this mite resembles *L. brauzzi* but differs from it in several other notable characters, i. e., all dorsal setae distinctly longer, setae J4 extending almost to level of setae J5, setae J5 extending beyond posterior margin of dorsal plate, and sternal plate longer, approximately as long as wide.

This mite has been collected primarily from *Mus* species in northwestern Africa south of the Sahara; however, one collection of four females and one male from Rhodesia has been tentatively identified as *L. benoiit*.

**Subgroup C**

As noted in the discussion of subgroup B, there is no set of distinguishing characters which can be used to separate this group of five taxa from those of subgroup B; however, in the several numerical taxonomic analyses four of these five taxa clustered together.

*Laelaps* (Laelaps) *brandbergenis*

Taufflieb

Figs. 98-104

*Laelaps brandbergenis* Taufflieb, 1959. J. Ent. Soc. S. Afr. 22(2):400. (Holotype: Brandberg, Southwest Africa; South African Institute for Medical Research, Johannesburg).

**Description.**—*Female:* (Figs. 98-102) Dorsal plate length 575 μ, width 410 μ. Gnathosomal and hypostomal setae setaceous; medial hypostomal setae long, reaching to or slightly beyond base of gnathosomal setae. Posterior margin of sternal plate slightly invaginated, invagination reaching no further than level of 3rd sternal setae; setae st. 1 long, reaching almost to posterior margin of sternal plate. Anterior flap of genital plate slightly overlapping posterior margin of sternal plate; distance between 1st genital setae slightly greater than distance between 4th genital setae; distance between 2nd genital setae distinctly greater than distance between 3rd genital setae; greatest width of genital plate at level of 2nd pair of genital setae. Anal plate roundly triangular, as wide as long, with anterior margins slightly rounded; adanal setae of moderate length, extending slightly beyond base of postanal setae; adanal setae set at level of posterior end of anal orifice. Unarmed venter bearing approximately 12 pairs of setaceous setae, 6 pairs adjacent to genital and anal plates plus approximately 6 pairs near or on posterior lateral body margins; ventral setae all relatively long and somewhat robust; metapodal plates irregularly oval, width equal to length. Peritreme extending
Figs. 98-102. *Laelaps brandbergensis* Taufflieb, female. (98) venter; (99) dorsum, scale = 100μ; (100) ventral view of tarsus II; (101) ventral view of tarsus III; (102) ventral view of tarsus IV, scale = 50μ.
Figs. 103-104. *Laelaps brandbergensis* Taufflieb, male. (103) venter; (104) dorsum, scale = 100μ.

to middle of coxa II. Dorsal plate bearing 39 pairs of setaceous setae; most dorsal setae relatively long, length usually greater than distance between adjacent setae; subterminal setae (Z5) quite short, reaching no further than terminal setae (Z5). Six to 8 pairs of setae bordering dorsal opisthosoma on soft integument. Proximal setae of coxa I setaceous and of moderate length; distal seta of coxa I quite robust, short, and peglike; seta pd 1 of femur I rather long, almost twice the length of seta ad 1; anterior seta of coxae II and III and seta of coxa IV slender and setaceous; posterior seta of coxae II and III rather robust, blunt, and peglike; tarsi II and III each with two rather short, robust, blunt, preapical setae, tarsus IV with one moderately long, blunt preapical seta; other leg setae mostly setaceous and normally developed.

**Male:** (Figs. 103-104) Gnathosomal and hypostomal setae setaceous; medial hypostomal setae of moderate length, reaching at least half distance to base of gnathosomal setae. Ventral setae, except adanal setae, rather long and slender, each extending well beyond base of adjacent posterior seta; holoventral plate rather broad between coxae II and III, greatly narrowing between coxae IV, and rather narrow posterior to coxae IV; holoventral plate posterior to coxae IV with irregular lateral margins; expanded area between genital setae and anal orifice bearing only 3 pairs of setaceous setae, other 2 pairs which are usually on the holoventral plate set off on soft integument; adanal setae rather short, not extending to base of postanal seta; adanal setae set at level of posterior third of anal orifice; postanal seta 2 or 3 times as long as adanal setae and quite robust; unarmed venter bearing approximately 14 to 15 pairs of setaceous setae adjacent to holoventral plate, those more anterior and median in position shorter with the more marginal setae rather long. Metapodal plates somewhat oval in shape. Peritreme extending to middle or anterior of coxa II. Dorsal plate bearing 39 pairs of setaceous setae; length and position of setae
approximately as in female. Proximal seta of coxa I rather long and setaceous, with distal seta of coxa I short, robust, and spinelike; seta pd 1 of femur I approximately twice as long as seta ad 1; anterior seta of coxae II and III, posterior seta of coxa II, and seta of coxa IV setaceous; posterior seta of coxa III shorter, robust, and spinelike; 2 or 3 pairs of mostly preapical setae of tarsi II and III short, robust, and peglike, with some other setae of tarsi II, III, and IV somewhat spinelike; most other leg setae setaceous and normally developed; however, some may be shorter and somewhat spinelike.

**Collection records**

*Petromyces collinus*  
Southwest Africa; 7 females (type specimens); Taufflieb, 1959  
South Africa (ORS); 16 coll. (31 females); AMP  
*Aethomys namaquensis*  
South Africa (ORS); 1 coll. (1 female); AMP

**Remarks.**—The most diagnostic character of *L. brandbergensis* is the unusually long pd 1 seta of femur I: the pd 1 seta is nearly two times as long as the ad 1 seta. All other phylogenetically similar taxa bear a much shorter pd 1 seta on femur I, only slightly longer than the ad 1 seta. This mite is known only from southern Africa primarily parasitic on *Petromyces collinus*. A single collection is reported from *Aethomys namaquensis*.

**Laelaps (Laelaps) zumpti** Keegan  
Figs. 105-111

*Laelaps zumpti* Keegan, 1956, J. Egypt. Publ. Hlth. Assn. 31(6):263 (Holotype: MJoro, Rift Valley Province, Kenya; U.S. National Museum, Washington, D.C.); Tipton, 1960, Univ. Calif. Publ. Ent. 16(6):285.

**Description.**—**Female:** (Figs 105-109) Dorsal plate length 514 μ, width 401 μ. Gnathosomal and hypostomal setae setaceous; medial hypostomal setae long, reaching to or almost to base of gnathosomal setae. Posterior margin of sternal plate moderately invaginated, invagination reaching to level of 3rd sternal setae; setae st. 1 relatively long, reaching beyond level of 2nd pair of sternal pores but not to posterior margin of sternal plate. Anterior flap of genital plate only slightly overlapping posterior margin of sternal plate; distance between 1st genital setae subequal to distance between 4th genital setae, and distance between 2nd genital setae subequal to distance between 3rd genital setae; greatest width of genital plate at level between 2nd and 3rd pairs of genital setae. Anal plate triangular in general shape, anterior margin slightly convex to slightly concave; adanal setae of moderate length, extending to or almost to base of postanal seta; adanal setae set at level of posterior end of anal orifice. Unarmed venter bearing approximately 12 to 14 pairs of setaceous setae, 4 pairs adjacent to genital and anal plate plus approximately 8 to 10 pairs near or on posterior lateral body margins; metapodal plate almost circular, width almost equal to length. Peritreme extending to level of middle of coxa II. Dorsal plate bearing 39 pairs of setaceous setae; most dorsal setae relatively long, length slightly greater than distance between adjacent setae; subterminal setae (15) reaching slightly beyond posterior margin of dorsal plate. Approximately 9 pairs of setae bordering dorsal opisthosoma on soft integument. Proximal seta of coxa I setaceous, distal seta short, blunt, and peglike, and approximately half the length of proximal seta; setae pd 1 and ad 1 of femur I subequal in length, with ad 1 setae slightly longer; anterior seta of coxae II and III and seta of coxa IV setaceous; posterior seta of coxae II and III robust, blunt, and peglike; tarsi II and III each with two rather robust, blunt preapical setae; tarsus IV may have one blunt preapical setae or all setaceous; all other leg setae setaceous and normally developed.

**Male:** (Figs. 110-111) Gnathosomal and hypostomal setae setaceous; medial hypostomal setae long, reaching almost to base of gnathosomal setae. Ventral setae, except adanal setae and postanal seta, of moderate length, each extending in length well beyond base of seta immediately posterior; holoventral plate filling area between coxae II and III, narrowing considerably between coxae IV, and greatly expanded posterior to coxae IV; expanded area between genital setae and anal orifice bearing 5 pairs of setaceous setae; adanal setae relatively short, extending no further than to base of postanal seta; postanal setae somewhat more robust and about twice as long as adanal setae. Metapodal plates inapparent or joining holoventral plate lat-
Figs. 105-109. *Laelaps zumpti* Keegan, female. (105) venter; (106) dorsum, scale = 100μ; (107) ventral view of tarsus II; (108) ventral view of tarsus III; (109) ventral view of tarsus IV, scale = 50μ.
erally; unarmed venter bearing 6 to 8 pairs of setae adjacent to holosetaneous plate. Peritreme extending to level of anterior of coxa II. Dorsal plate bearing 39 pairs of setaceous setae; length and position as in female. Soft integument of opisthosoma bearing about 8 to 12 pairs of setae. Both proximal and distal setae of coxae I setaceous, with proximal seta considerably longer than distal seta; setae pd 1 and ad 1 of femur I subequal in length; anterior seta of coxae II and III and seta of coxa IV setaceous; posterior seta of coxa II setaceous, posterior seta of coxa III spinelike; tarsi II and III each with about two pairs of spinelike preapical setae; all other leg setae setaceous and normally developed.

**Collection records**

*Aethomys chrysophilus*
- Rhodesia; 1 coll. (1 female); AMP

*Lemniscomys striatus*
- Kenya (Rift Valley); 1 female; Keegan, 1956

*Mus bella*
- Congo (Leopoldville); 10 females, 1 male; Keegan, 1956

*Mus minutoides*
- Rhodesia; 1 coll. (1 female); AMP

*Mus triton*
- Kenya (Rift Valley); 1 female, 2 males, 2 ny. (type specimens); Keegan, 1956

**Remarks.**— *L. zumpti* is quite similar to *L. brazzai* and *L. brandbergensis* in overall characteristics; however, it may be easily separated by the unusually short adanal setae and by the shape of the sternal plate which has a distinctly broader and deeper invaginated posterior margin and prominent extensions posterior and lateral to the 3rd sternal setae. In *L. brandbergensis* the posterior margin of the sternal plate is only slightly invaginated with no posterior lateral projections, and in *L. brazzai* the posterior invagination is only slight and is between two small, more medial posterior projections.

This taxon is parasitic primarily on *Mus* species in the southern half of Africa from Congo and Kenya to Rhodesia.

**Laelaps (Laelaps) brazzai** Taufflieb

Figs. 112-118

*Laelaps brazzai* Taufflieb, 1962, *Acarologia* t. IV. fasc. 4: 499-501 (Holotype: Brazzaville, Congo: pers. coll. of R. Taufflieb).
DESCRIPTION. — Female: (Figs. 112-116). Dorsal plate length 408 µ, width 397 µ. Gnathosomal and hypostomal setae setaceous; medial hypostomal setae long, reaching beyond base of gnathosomal setae. Posterior margin of sternal plate irregular, slightly invaginated medially between two small posterior projections; setae st. 1 of moderate length, reaching halfway between 2nd and 3rd sternal setae; sternal setae as well as 4 pairs of genital setae rather robust. Anterior flap of genital plate overlapping posterior margin of sternal plate slightly; distance between 1st genital setae slightly less than distance between 4th genital setae, and distance between 2nd genital setae less than distance between 3rd genital setae; greatest width of genital plate at level of 3rd pair of genital setae. Anal plate roundly triangular, almost as wide as long, with anterior margins irregularly rounded; adanal setae of moderate length, extending somewhat beyond base of postanal seta; adanal setae set at level of posterior end of anal orifice; postanal seta rather robust. Unarmed venter bearing approximately 12 pairs of setaceous setae, 5 or 6 pairs adjacent to genital and anal plates plus 4 to 6 pairs near or on posterior lateral body margins; metapodal plates irregularly oval, slightly longer than wide. Peritreme extending to level of middle or anterior of coxa II. Dorsal plate bearing 39 pairs of setaceous setae; most dorsal setae of medium length, length usually no greater than distance between adjacent setae; subterminal setae (J5) reaching no further than posterior margin of dorsal plate. Eight to 10 pairs of setae bordering dorsal opisthosoma on soft integument. Proximal seta of coxa I of moderate length and spinelike, distal seta of coxa I quite robust and peglike; seta pd 1 of femur I somewhat longer than seta ad 1; anterior seta of coxae II and III and seta of coxa IV setaceous, coxa IV seta rather small; posterior seta of coxae II and III rather robust, blunt, and peglike; tarsi II and III each with 3 blunt, preapical setae, and tarsus IV with 1 or 2 blunt preapical setae; most other leg setae setaceous and normally developed; however, some may be shorter and spinelike.

Male: (Figs. 117-118) Gnathosomal and hypostomal setae setaceous; medial hypostomal setae of moderate length, reaching almost to base of gnathosomal setae. Ventral setae, except adanal setae, rather long and slender, each extending well beyond base of adjacent posterior seta; holoventral plate rather broad between coxae II and III, greatly narrowing between coxae IV, and greatly expanded posterior to coxae IV; expanded area between genital setae and anal orifice bearing 5 pairs of setaceous setae; adanal setae of medium length, extending to or slightly beyond base of postanal seta; adanal setae set at level of posterior third of anal orifice; postanal seta at least twice as long as adanal and somewhat more robust. Metapodal plates inapparent, apparently fused to lateral extensions of holoventral plate; unarmed venter bearing approximately 10 pairs of setaceous setae adjacent to holoventral plate, 2 or 3 posteriorly located pairs rather long, with other more anteriorly located pairs about half this length. Peritreme extending to middle or anterior of coxa II. Dorsal plate bearing 39 pairs of setaceous setae; length and position of setae approximately as in female. Soft integument of opisthosoma bearing approximately 8 to 10 pairs of setaceous setae. Both proximal and distal setae of coxa I setaceous, proximal seta somewhat longer than distal seta; setae pd 1 and ad 1 of femur I subequal in length, pd 1 slightly longer; anterior seta of coxae II and III, posterior seta of coxa II, and seta of coxa IV all setaceous; posterior seta of coxa III shorter, robust, and spinelike; no blunt, preapical setae on tarsi II, III, or IV; however, some preapical setae robust and spinelike; most other leg setae setaceous and normally developed; however, some often shorter and spinelike.

COLLECTION RECORDS

*Dasymys* goslingi
- Congo-Leopoldville (Lwiro, Bukavu, Kivu): 2 females; Taufflieb, 1964

*Dasymys inomitus*
- Congo (Brazzaville): Taufflieb, 1962

*Leptiosmys striatus*
- Congo (Brazzaville): Taufflieb, 1962

*Lophurornys aequus rita*
- Angola (Dundo): 1 female; Taufflieb, 1962

*Lophurornys sikapusi*
- Congo-Leopoldville (Lwiro, Bukavu, Kivu): 2 females; Taufflieb, 1964

*Mastomys natalensis*
- Congo-Leopoldville (Lwiro, Bukavu, Kivu): 2 females; Taufflieb, 1964
Figs. 112-116. *Laelaps brazzai* Taufflieb, female. (112) venter; (113) dorsum, scale = 100µ; (114) ventral view of tarsus II; (115) ventral view of tarsus III; (116) ventral view of tarsus IV, scale = 50µ.
Remarks.—*L. brazzai* may be distinguished from all other phenoetically similar taxa by the following characters: posterior margin of sternal plate slightly invaginated medially between pair of rather prominent posterior projections posterior and medial to setae st. 3; genital plate somewhat narrower, greatest width at level of 3rd pair of setae rather than at level of 2nd pair; and dorsal setae *Z5* rather long but *J5* quite short, not reaching to posterior margin of dorsal plate.

*L. brazzai* is recorded from a variety of different hosts by Taufflieb (1962, 1964). No collections of this taxon have yet been identified from the African Mammal Project material.

*Laelaps* (*Laelaps*) *myomys*, n. sp.

Figs. 119-125

Holotype, female; type locality: Sedhiou, Casmane Region, Senegal; in U.S. National Museum, Washington, D.C.

Description.—Female: (Figs. 119-123) Dorsal plate length 534 μ, width 378 μ. Gnathosomal and hypostomal setae setaceous; medial hypostomal setae long, reaching to or almost to base of gnathosomal setae. Posterior margin of sternal plate slightly invaginated medially; setae st. 1 relatively long reaching almost to level of 3rd sternal setae; sternal setae as well as 4 pairs of genital setae rather long and slender, although somewhat robust basally. Anterior flap of genital plate overlapping posterior margin of sternal
Figs. 119-123. *Laelaps myomys* n. sp., female. (119) venter; (120) dorsum, scale = 100μ; (121) ventral view of tarsus II; (122) ventral view of tarsus III; (123) ventral view of tarsus IV, scale = 50μ.
plate to level slightly anterior to 3rd sternal setae; distance between 1st genital setae subequal to or slightly less than distance between 4th genital setae; distance between 2nd genital setae slightly less than distance between 3rd genital setae; greatest width of genital plate at level of 3rd genital setae. Anal plate roundly triangular to heartshaped, as wide as long, with rounded anterior lateral margins and slightly concave posterior margin; adanal setae of moderate length and slender, extending slightly beyond base of postanal seta; adanal setae set at level of posterior end of anal orifice; postanal setae rather long and robust. Unarmed venter bearing approximately 6 to 8 pairs of setaceous setae, some rather long with others rather short; metapodal plates of moderate size, irregularly elongate in shape. Peritreme extending to level of anterior of coxa II. Dorsal plate bearing 39 pairs of setaceous setae; most dorsal setae slender and rather elongate, length equal to or slightly greater than distance between adjacent setae; subterminal setae (J5) reaching almost to posterior margin of dorsal plate. Eight to 10 pairs of setae bordering dorsal opisthosoma on soft integument. Proximal seta of coxa I of moderate length and setaceous, yet somewhat robust, distal seta of coxa I quite robust and peglike; seta pd 1 of femur I distinctly longer than seta ad 1; anterior seta of coxae II and III of moderate length and setaceous but somewhat robust basally; seta of coxa IV shorter and setaceous; posterior seta of coxae II and III rather large, robust, and peglike; tarsus II with three robust, peglike preapical seta, tarsus III with two robust, peglike preapical setae with 2 or 3 pairs of peglike setae more proximal in position, and tarsus IV with 1 blunt peglike preapical seta; most other leg setae setaceous and normally developed.

Male: (Figs. 124-125) Gnathosomal and hypostomal setae slender and setaceous. Ventral setae, except adanal setae, rather long and slender, each extending well beyond base of adjacent posterior seta; holoventral plate broad between

Figs. 124-125. Laelaps myomys n. sp., male. (124) venter; (125) dorsum. scale = 100µ.
coxae II and III, greatly narrowing between coxae IV, and greatly expanded posterior to coxae IV; expanded area between genital setae and anal orifice bearing 5 pairs of slender setaceous setae; adanal setae of medium length, extending slightly beyond base of postanal seta; adanal setae set at level of posterior third of anal orifice; postanal seta considerably longer than adanal setae. Metapodal plates inapparent. Apparently fused to lateral extensions of holoventral plate; unarmed venter bearing 6 to 8 pairs of setaceous setae adjacent to holoventral plate. Peritreme extending to anterior of coxa II. Dorsal plate bearing 39 pairs of slender setaceous setae; anterior and lateral dorsal setae distinctly longer than posterior central setae. Soft integument of opisthosoma bearing approximately 6 to 8 pairs of setaceous setae. Both proximal and distal setae of coxa I setaceous, proximal seta considerably longer and longer than small, slender distal seta; seta pd 1 of femur I somewhat longer than seta ad 1; anterior seta of coxae II and III and seta of coxa IV setaceous with coxa IV seta somewhat smaller; posterior seta of coxa II long and setaceous, but posterior seta of coxa III shorter and more spinelike; no blunt, pre-apical setae on tarsi II, III, or IV; however, some tarsal setae may be rather robust and spinelike; most other leg setae setaceous and normally developed; however, some often shorter and spinelike.

**Type material.**

*Myomys daltoni*

Senegal: Sedhiou, Casamance Region: female holotype, male allotype, and 8 female paratypes (RMD 2385); 2 female paratypes (RMD 2386).

**Additional collection records.**

*Nycteris macrota*

Gambia (Kudang): 1 female (RMD 2519-27): AMP

*Tatera Kempii*

Upper Volta (Fo): 1 female (REV 3755): AMP

*Cricetomys gambianus*

Upper Volta (Konankira): 1 female (REV 3279): AMP

*Mastomys natatoris*

Upper Volta (5 km. N. Boussouma): 1 female (REV 1545-46): AMP

*Myomys daltoni*

Gambia (Kudang): 4 females (RMD 2517): 1 female (RMD 2518): 1 female (RMD 2568): 1 female (RMD 2570): 1 female (RMD 2573): 1 female (RMD 2585): AMP

Ghana (Damongo, Northern Region): 1 female (TJM 1173); 1 female (TJM 1188): 1 female (TJM 1215): 1 female and 1 dny. (TJM 1220): 1 female (WPM 50): 1 female (WPM 69): 1 female (WPM 103): AMP

Ivory Coast (T yenka): 4 females and 1 dny. (1 WR 876): 1 male, 1 female and 1 dny. (LWR 878): 1 male and 1 female (LWR 1611): (Fetekro): 1 female (LWR 1679): 2 females (LWR 1680-81): 4 females (LWR 1682-84): 1 female (LWR 1691): 1 male and 3 females (LWR 1693): AMP

Nigeria (Panyam Fish Farm, Northern Region): 1 male and 3 females (HWS 5058): 2 males and 1 female (HJH 1588): (1 mi S Kabwira, Northern Region): 4 females (HWS 4588): 6 males and 7 females (HWS 4610): AMP

Senegal (6 km E Kaolack, Sine-Saloum Region): 1 female (RMD 1547): (Koussam: Oriental Region): 1 female (RMD 1804): 2 females (RMD 1847): AMP

Upper Volta (Dio): 1 male and 4 females (REV 1710): 1 female (REV 1714): 1 female (REV 1843): (9 km NE Barga): 1 female (REV 1917): (6 km SE Sequene): 5 females (REV 2130): (Ougaron): 5 females (REV 3049): 4 females (REV 3050): 1 female (REV 3052): 1 female (REV 3066): 1 female (REV 3067): (5 km SW Kontoura): 5 females (REV 4147): 1 female (REV 4148): 3 females (REV 4169): 2 females (REV 4170): 2 females (REV 4173): 4 females (REV 4190): 1 female (REV 4193): (Sideradougou): 2 females (REV 4271): (Djipologo): 1 female (REV 4414): AMP

**Remarks.**—*L. myomys* n. sp. differs from most other closely related taxa by the three blunt, peglike preapical setae on tarsus II rather than two such setae; however, it is similar to *L. brazzae* in this one character but differs in several others. This taxon is considerably smaller than other taxa of this subgroup, and it is easily separated from *L. brazzae* by the shape of the external plate, i.e., posterior margin only slightly invaginated without prominent posterior projections.

*L. myomys* has been collected only from northwest Africa south of the Sahara primarily on *Myomys daltoni*. Only a very few single collections are reported from other host species.

**Laelaps (Laelaps) malacumys** n. sp.

Figs. 126-132

Holotype. female: type locality: Belekoum, Ivory Coast: in U.S. National Museum, Washington, D.C.
Figs. 126-130. *Laelaps malacomys* n. sp., female. (126) venter; (127) dorsum, scale = 100µ; (128) ventral view of tarsus II; (129) ventral view of tarsus III; (130) ventral view of tarsus IV, scale = 50µ.
**Description.** — Female: (Figs. 126-130) Dorsal plate length 509 μ, width 339 μ. Gnathosomal setae rather long and quite robust basally; medial hypostomal setae quite long, slender, and setaceous, reaching distinctly beyond base of gnathosomal setae; other hypostomal setae smaller and setaceous. Posterior margin of sternal plate slightly invaginated, invagination extending no further than level of 3rd sternal setae; setae st. 1 of moderate length, reaching halfway between 2nd and 3rd sternal setae; sternal setae as well as 4 pairs of genital setae all of moderate length and setaceous. Anterior flap of genital plate slightly overlapping posterior margin of sternal plate; distance between 1st genital setae equal to distance between 4th genital setae; distance between 2nd genital setae subequal to distance between 3rd genital setae; greatest width of genital plate at both level of 2nd and 3rd genital setae. Anal plate roundly triangular, approximately as wide as long with anterior margin straight to slightly rounded; adanal setae very small, almost minute, yet somewhat robust; adanal setae set at level of posterior third of anal orifice; postanal setae much larger, robust, and spinelike to almost peglike. Unarmed venter bearing 10 to 12 pairs of mostly short, setaceous setae, some almost spinelike; metapodal plates irregularly oval, slightly longer than wide. Peritreme extending anteriorly to posterior of coxa I. Dorsal plate bearing 39 pairs of setaceous setae; most dorsal setae of medium length; length usually no greater than distance between adjacent setae; subterminal setae (J5) of moderate length, extending to or slightly beyond posterior margin of dorsal plate. Approximately 10 pairs of setaceous setae bordering dorsal opisthosoma on soft integument. Proximal seta of coxa I rather long, robust, and spinelike; distal seta of coxa I quite short, robust, and peglike; a number of ventral setae of leg I short, robust, and peglike or spinelike; seta pd 1 and ad 1 of femur I subequal in length and rather robust; anterior seta of coxae II and III of moderate length, somewhat robust and spinelike; seta of coxa IV slender and setaceous; posterior seta of coxae II and III rather robust and peglike, with seta of coxa II considerably larger than that of

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Figs. 131-132. *Laelaps malacomys* n. sp., male. (131) venter; (132) dorsum, scale = 100μ.
coxa III: tarsi II, III, and IV each with 2 or 3 moderately robust, blunt, peglike setae; most other leg setae setaceous and normally developed; however, some ventral leg setae often short, robust, and spine-like or peglike as those on venter of leg I.

**Male:** (Figs. 131-132) Gnathosomal and hypostomal setae setaceous; medial hypostomal setae long and slender reaching almost to base of gnathosomal setae; gnathosomal setae rather short and setaceous. Ventral setae, except adanal setae, rather long and slender, each extending well beyond base of adjacent posterior seta: holoventral plate rather broad between coxae II and III, greatly narrowing between coxae IV, and greatly expanded posterior to coxae IV; expanded area between genital setae and anal orifice bearing 5 pairs of slender, setaceous setae; adanal setae relatively short, extending to or slightly beyond base of postanal seta; adanal setae set at level of posterior third of anal orifice; postanal seta at least twice as long as adanals and slender. Metapodal plate inapparent, apparently fused to lateral extensions of holoventral plate; unarmed venter bearing approximately 8 pairs of setaceous setae adjacent to holoventral plate. Peritreme extending to level of anterior of coxa II. Dorsal plate bearing 39 pairs of setaceous setae; dorsal setae all of moderate length, each extending to or slightly beyond base of adjacent posterior seta; subterminal setae (J5) of medium length, extending well beyond posterior margin of dorsal plate. Both proximal and distal setae of coxa I setaceous, proximal seta somewhat longer than distal seta; seta pd 1 of femur I slightly longer than seta ad 1; anterior seta of coxae II and III and seta of coxa IV of medium length and setaceous; posterior seta of coxa II of medium length and setaceous, but enlarged basally; posterior seta of coxa IV short, relatively robust, and spine-like; preapical setae of tarsi II and III may be somewhat enlarged and spine-like; most other leg setae setaceous and normally developed; however, some may be shorter and somewhat spine-like.

**Type Material.**

*L. malacomyis edwardsi*;
Ivory Coast (Belekoum): female holotype (LWR 573); male allotype, and 9 female paratypes (LWR 581): 1 female paratype (LWR 584): AMP

**Additional Collection Records.**

*Hipposideros commersoni*
Ivory Coast (Yabrasso): 1 female (LWR 1528): AMP

*Aethomys chrysophilus*
Rhodesia (20 mi N Salisbury. Mashonaland): 1 female (SWG 1747): AMP

*Lemmiscoys striatus*
Ivory Coast (Fetekro): 1 female (LWR 1739): AMP

*Mus setulosus*
Ivory Coast (Kabin): 1 female (LWR 763): AMP

*L. malacomyis edwardsi*
Ghana (Adamso. Ashant Region); 2 females (TJM 1136): AMP

Ivory Coast (10 mi WNW Soubre): 3 females (LWR 1443): 2 females (LWR 1449): 1 female (LWR 1451): 1 female (LWR 1457): 23 females and 2 males (LWR 1477): (Niebe): 17 females (JWL 3061): AMP

*Llemiscoys longipes*
Ghana (Adamso. Ashant Region): 1 female (WPM 12): AMP

Ivory Coast (10 mi WNW Soubre): 4 females (LWR 1450): 1 female (LWR 1452): 19 females (LWR 1460): 13 females (LWR 1462): 2 females (LWR 1476): 5 females (LWR 1479): (Niebe): 10 females (JWL 3049): 4 females (JWL 3060): 7 females (JWL 3070): AMP

**Remarks.**—*L. malacomyis* is tentatively placed in subgroup C of major group II; however, it differs in several major characters: gnathosomal setae robust and longer than medial hypostomal setae; proximal seta of coxa I robust and long; some ventral leg setae short, blunt, and peglike, especially on leg I; dorsal setae more robust than normal; and peritreme longer, extending anteriorly to posterior of coxa I. In the numerical taxonomic analysis *L. malacomyis* clustered with subgroup B of major group III because of the similar robust body setae; however, it is most similar to taxa of major group II in other prominent characters, such as the form of the setae of coxa I (blunt, peglike distal seta and elongate, setaceous proximal seta).

This mite parasitized *Lemmiscoys* species, with but few exceptions, in north-west Africa south of the Sahara. Single collections have been made from several other host species.

**Major Group III**

The six taxa of this major group are characterized by the presence of two
blunt, peglike setae (both proximally and distally) on coxa I. Even though these species share this one character in common, they form a rather diverse group, differing from each other in many morphological characters.

Subgroup A

The two taxa of this subgroup (L. vansomereni and L. acomys) differ from subgroup B in having simple, setaceous gnathosomal setae rather than robust, spinelike or peglike gnathosomal setae. L. vansomereni and L. acomys differ from each other in several significant characters: the shape of the sternal plate differs greatly, as well as the shape of the anal plate.

Laelaps (Laelaps) vansomereni Hirst

Figs. 133-139

Laelaps vansomereni Hirst, 1923, Ann. Nat. Hist. 12(67):690. (Holotype: Busiú, S. Bugishu, Uganda; British Museum [Natural History], London); Hirst, 1925, Proc. Zool. Soc. Lond. 4:35; Zumpt, 1950, S. Afr. J. Med. Sci. 15:78; Radford, 1950, Parasitology 40(304):369; Keegan, 1956, J. Egypt. Publ. Hlth. Assoc. 31(6):256; Tipton, 1960, Univ. Calif. Publ. Ent. 16(6):284-285.

DESCRIPTION.—Female: (Figs. 133-137) Dorsal plate length 656 μ, width 466 μ. Gnathosomal and hypostomal setae setaceous; medial hypostomal setae of moderate length, reaching only about half distance to gnathosomal setae. Posterior margin of sternal plate slightly invaginated, invagination reaching no further than level of 3rd sternal setae; setae st. 1 of moderate length, reaching about halfway between setae st. 2 and st. 3. Anterior flap of genital plate overlapping posterior margin of sternal plate only slightly if at all; distance between 1st genital setae distinctly less than distance between 4th genital setae, and distance between 2nd genital setae slightly less than distance between 3rd genital setae; greatest width of genital plate at level of 3rd pair of genital setae. Anal plate somewhat broadly oval in general shape, width greater than length, with margins broadly rounded; anal setae rather robust and spinelike, length extending well beyond base of postanal seta; anal orifice located near anterior margin of anal plate, with anal setae set about halfway between anal orifice and postanal seta; postanal seta distinctly longer than adanal seta and relatively robust. Unarmed venter bearing approximately 18 pairs of mostly setaceous setae, 6 pairs adjacent to genital and anal plates plus approximately 10 to 12 pairs near or on posteriolateral body margins: metapodal plates generally oval in shape. Peritreme extending to level of middle or anterior of coxa II. Dorsal plate bearing 39 pairs of setaceous setae; most dorsal setae relatively long, length equal to or slightly greater than distance between adjacent setae; subterminal setae (J5) reaching to or slightly beyond posterior margin of dorsal plate. About 12 pairs of setae bordering dorsal opisthosaoma on soft integument. Both proximal and distal setae of coxa I enlarged, robust, and peglike, with proximal seta considerably more robust than distal seta; setae pd 1 and ad 1 of femur I usually subequal in length; anterior seta of coxae II and III, and seta of coxa IV setaceous, yet somewhat robust basally; posterior seta of coxae II and III greatly enlarged, robust, and peglike; tarsi II, III, and IV each with 3 or 4 blunt, robust, preapical setae; most other leg setae setaceous and normally developed, some often rather spinelike.

Male: (Figs. 138-139) Gnathosomal and hypostomal setae setaceous; medial hypostomal setae of moderate length, reaching almost to base of gnathosomal setae. Ventral setae, except adanal and postanal setae, rather long and slender, each extending well beyond base of adjacent posterior seta; holoventral plate rather broad between coxae II and III, quite narrow between coxae IV, and moderately expanded posterior to coxae IV; expanded area between genital setae and anal orifice bearing 5 pairs of setaceous setae; adanal setae of medium length, extending almost to base of postanal seta; adanal setae set at level near middle of anal orifice; postanal seta rather slender and setaceous, and only slightly longer than adanal seta; unarmed venter bearing approximately 12 to 15 pairs of setaceous setae adjacent to holoventral plate, all rather slender with more posterior and marginal setae longer. Metapodal plates rather elongate. Peritreme extending to middle of coxa I. Dorsal plate bearing 39 pairs of setaceous
Figs. 133-137. *Laelaps rausmereni* Hirst, female: (133) venter; (134) dorsum, scale = 100μ; (135) ventral view of tarsus II; (136) ventral view of tarsus III; (137) ventral view of tarsus IV, scale = 50μ.
setae; length and position of setae approximately as in female. Soft integument of opisthosoma bearing approximately 6 to 8 pairs of setaceous setae. Both proximal and distal setae of coxa I setaceous, proximal seta considerably longer and much more robust than slender, shorter distal seta; setae pd 1 and ad 1 of femur I rather short and robust, with ad 1 seta somewhat longer than pd 1 seta; anterior seta of coxae II and III of medium length, rather robust, and spinelike; posterior seta of coxa II of medium length and somewhat setaceous, slightly robust; posterior seta of coxae III short, robust, and spinelike; and seta of coxae IV shorter and much more setaceous; 3 preapical setae of tarsus II short, robust, and peglike; some other seta of tarsi II and III shorter, rather robust, and spinelike; most other leg setae setaceous and normally developed; however, some may be shorter and rather spinelike.

**Collection records**

*Elephantulus intufi*
- Southern Africa; 2 coll. (8 females); AMP

*Suncus etruscus*
- Southern Africa; Zumpt, 1961

*Suncus varilla*
- Southern Africa; Zumpt, 1950

*Rhinolophus elitoris*
- South Africa; 1 coll. (6 females); AMP

*Cryptomys hottentotus*
- South Africa; 1 coll. (2 females); AMP

*Gerbillus paua*
- Botswana; 1 coll. (1 female); AMP

*Tatera leucogaster*
- South Africa; 2 coll. (11 females; 1 male, 2 ny.); AMP

*Tatera agra*
- Southern Africa; Zumpt, 1961

*Aethomys chrysophilus*
- Rhodesia (Bulawayo); Zumpt, 1950
- Rhodesia; 22 coll. (127 females; 1 ny.); AMP
- South Africa (Pretoria, Transvaal); Zumpt, 1950
- South Africa (Mfongos, Zululand); Hirst, 1925
- South Africa (Vaalwater, Nylstroom Transvaal); Taufflieb, 1964
- South Africa (Naboomspruit, Transvaal); Taufflieb, 1964
- South Africa (ORS); 1 coll. (18 females); AMP
- South Africa; 50 coll. (308 females, 4 males); AMP

*Aethomys namaquensis*
- Southern Africa; Zumpt, 1950

*Aethomys selindensis*
- Rhodesia; 4 coll. (38 females); AMP

*Dasymys helukus*
- Uganda (Kampala); Tipton, 1960
Lemnisconomys griselda
South Africa; 1 coll. (3 females); AMP

Mastomys coucha
Southern Africa; Zumpt, 1950
Sudan (Torit, Equatoria); 1 female; Keegan. 1956

Mastomys natalensis
Rhodesia; 1 coll. (1 female); AMP
South Africa: 17 coll. (40 females, 2 males, 11 ny.); AMP
Southern Africa; Zumpt, 1961

Rhabdomys pumilio
South Africa; 5 coll. (5 females); AMP

Saccostomus campestris
Southern Africa; Zumpt, 1950
South Africa (ORS): 1 coll. (1 female); AMP
South Africa; 1 coll. (1 female); AMP

“Rodent”
Uganda (Busiu, So. Bugishu): Hirst. 1923
Uganda (Bumungi, Bugwe): Hirst, 1925

“Rats”
Kenya (Okwara’s Camp): Hirst, 1925

Unknown host
Rhodesia; 1 coll. (1 female); AMP
South Africa; 14 coll. (25 females, 1 male. 2 ny.); AMP

Remarks.—L. vansomereni may be separated from all other taxa of major group III by the following characters: gnathosomal and hypostomal setae setaceous; genital plate quite broad throughout with 1st genital setae considerably closer together than 4th pair; anal plate wider than long; and adanal setae robust and spinelike.

This taxon has been recorded from a variety of different hosts in southern Africa, with more collections from Aethomys species and Mastomys species than from all others.

Laelaps (Laelaps) acromys n. sp.

Figs. 140-145

Holotype, female; type locality: Dunblaine, Manicaland, Rhodesia; in U.S. National Museum, Washington, D.C.

Description.—Female: (Figs. 140-143) Dorsal plate length 574 μ, width 421 μ. Gnathosomal and hypostomal setae setaceous; medial hypostomal setae medium length, extending slightly half distance to gnathosomal setae; gnathosomal setae of medium length and rather robust. Posterior margin of sternal plate considerably invaginated, distinctly beyond level of 3rd sternal setae; anterior margin of sternal plate arched considerably; setae st. 1 extending to invaginated posterior margin of sternal plate; sternal setae as well as 4 pairs of genital setae relatively long and somewhat robust. Anterior flap of genital plate not reaching to posterior margin of sternal plate; distance between 1st genital setae distinctly less than distance between 4th genital setae; distance between 2nd genital setae distinctly less than distance between 3rd genital setae; greatest width of genital plate at level slightly anterior to 3rd pair of genital setae. Anal plate elongate, distinctly longer than wide; adanal setae of moderate length but very robust and spinelike; postanal seta somewhat longer and equally robust and spinelike; adanal setae set at level somewhat posterior to anal orifice. Unarmed venter bearing 6 pairs of setaceous setae, anteriormost 5 pairs of moderate length, and single posterior pair quite long and slender; metapodal plates small, oblong-oval. Peritreme extending to level of middle or anterior of coxa II. Dorsal plate bearing 39 pairs of setaceous, rather robust setae; most dorsal setae of medium length, length slightly less than distance between adjacent setae; subterminal setae (J5) quite small, not reaching to posterior margin of dorsal plate. Nine pairs of medium length setaceous setae border dorsal opisthosoma on soft integument. Proximal and distal setae of coxa I rather large, robust, and peglike; one seta on venter of femur I rather robust and spinelike; seta pd 1 of femur I somewhat longer than seta ad 1; anterior seta of coxae II and III and seta of coxa IV setaceous; posterior seta of coxae II and III rather large, robust, and peglike; coxae II and III each with one slightly robust, spinelike seta; most other leg setae setaceous and normally developed; however, some, particularly femur of each leg, often shorter and somewhat spinelike.

Male: (Figs. 144-145) Gnathosomal and hypostomal setae setaceous; medial hypostomal setae of moderate length, reaching slightly more than half distance to base of gnathosomal setae; gnathosomal setae short, setaceous. Ventral setae, except adanal and postanal setae, rather long and somewhat robust, each extending well beyond base of adjacent posterior seta; holoventral plate broad between coxae II and III, narrowing considerably between coxae IV, and considerably expanded posterior to coxae IV; expanded area between genital setae and anal orifice.
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Figs. 140-143. *Laelaps aconyts* n. sp., female. (140) venter; (141) dorsum, scale = 100\mu; (142) ventral view of tarsus II; (143) ventral view of tarsus III, scale = 50\mu.

bearing 4 pairs of setaceous setae; adanal setae of medium length and quite robust and spinelike; postanal seta somewhat longer but equally as robust and spinelike; adanal setae set at level somewhat posterior to anal orifice. Metapodal plates small and oval. Unarmed venter bearing 5 or 6 pairs of setaceous setae adjacent to holoventral plate, 2 pairs considerably longer than others. Peritreme extending to anterior of coxa II and rather broad throughout. Dorsal plate with 31 pairs of setaceous setae; length and position of setae approximately as in female. Soft integument of opisthosoma bearing approximately 6 pairs of setaceous setae.

Proximal and distal setae of coxa I rather robust and peglike; seta pd 1 of femur I slightly longer than seta ad 1; anterior seta of coxae II and III and seta of coxa IV slender and setaceous; posterior seta of coxae II and III rather robust and peglike; one preapical seta of tarsi II and III somewhat robust and spinelike; most other leg setae setaceous and normally developed; however, some, particularly on femora, often short and spinelike.

**Type Material**

*Acomys spinosissinus*

Rhodesia (Dunblaine, Manicaland); female holotype, male allotype, 8 female paratypes (SWG 2120-22); 8 female paratypes (SWG 2129): AMP
Figs. 144-145. *Laelaps acomys* n. sp., male. (144) venter; (145) dorsum, scale = 100μ.

**Additional Collection Records**

*Acomys spinosissineus*

Rhodesia (3 mi NE Mt. Selinda, Farfell Farm, Manicaland): 2 females (HWS 5406-58); 1 female HWS 55486-87);
1 female (HWS 5470); (Chirinda Forest, Manicaland) 3 females (HWS 5293);
2 females (SWG 1560); (Nyamkarara River, Manicaland) 7 females (SWG 1899-1900); 5 females (SWG 1901-03);
3 females (SWG 1946-49); 7 females (SWG 1968-72); 5 females (SWG 2147-49); 9 females (SWG 2158-61);
7 females (SWG 2174-76); 5 females (SWG 2176-78); AMP

Unknown host
Rhodesia; 1 female (SWG 2181): AMP

**Remarks.**— *L. acomys* differs from all other *Laelaps* species in several unique characters: anterior margin of sternal plate strongly arched; posterior margin of sternal plate deeply invaginated; anal plate distinctly longer than wide; and anal setae and postanal setae robust and spine-like or peglike.

This species is known only from *Acomys spinosissineus* in Rhodesia. It no doubt occurs on this host throughout southern Africa.

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**Subgroup B**

The four species of this subgroup (*L. paraspinosus, L. bocquieri, L. spinifer*, and *L. breviperitremus*) all bear robust, spine-like or peglike gnathosomial setae, but share few other characters in common. This is a rather diverse group in many morphological characters; however, most clustered together in the numerical taxonomic analysis.

*Laelaps (Laelaps) spinifer* Taufflieb and Mouchet

Figs. 146-149

*Laelaps spinifer* Taufflieb and Mouchet, 1956.
Ann. Parasit. 31(3):302. (Holotype: Yaounde, French Cameroon; Institut Pasteur, Paris); Tipton. 1960, Univ. Calif. Publ. Ent. 16(6): 282.

**Description.**— Female: (Figs. 146-149) Dorsal plate length 438 μ, width 285 μ. Gnathosomal setae short, robust, and peglike; medial hypostomal setae long, extending at least to base of gnathosomal setae; other two pairs of hypostomal setae short, setaceous. Posterior margin of ster-
nal plate irregular and only slightly invaginated medially; setae st. 1 of moderate length, reaching to level of setae st. 3 but not to posterior margin of sternal plate. Anterior flap of genital plate overlapping posterior one-third of sternal plate; distance between 1st genital setae slightly less than distance between 4th genital setae, distance between 2nd genital setae distinctly greater than distance between 3rd genital setae; greatest width of genital plate at level of 2nd pair of genital setae. Anal plate broadly triangular, consider-

ably wider than long, with rounded anterior margins; adanal setae of medium length, extending to or almost to base of postanal seta; adanal setae set at level of posterior third of anal orifice; postanal seta somewhat longer than adanals and rather robust and spinelike. Unarmed venter bearing 10 to 15 pairs of rather robust setae, 5 or 6 pairs immediately adjacent to genital and anal plates, and 5 to 10 pairs near or on posterior lateral body margins; metapodial plates elongate-oval, about twice as long as wide. Peritreme
extending to level of middle or anterior of coxa II. Dorsal plate bearing 39 pairs of setae, more anterior and lateral setae somewhat robust, setae 1f and r+ rather small and spinelike, and subterminal setae (J5) very small and setaceous; terminal setae (Z5) longer than any other dorsal setae. Eight to 10 pairs of setae border dorsal opisthosoma on soft integument, anterior-most setae short and spinelike, with posterior-most setae longer and more setaceous. Both proximal and distal setae of coxa I very robust, blunt, and peglike; seta pd 1 of femur I somewhat longer than ad 1; anterior seta of coxa II and III somewhat enlarged and spinelike; posterior seta of coxa II and III quite robust, blunt, and peglike; seta of coxa IV small and setaceous; tarsus II with two blunt preapical setae, tarsus III with one blunt preapical seta, and tarsus IV with several somewhat spinelike preapical setae; most other leg setae setaceous and normally developed.

Collection records

Arvicanthis rufinus
French Cameroon (Yaounde); 6 females; Taufflieb and Mouchet, 1956
Lophuromys aquilus
Congo-Leopoldville (Lwiro, Kivu); 2 females; Taufflieb, 1964
Lophuromys sikapusi
French Cameroon (Yaounde); Zumpt, 1961

Remarks.—L. spinifer possesses a number of short, spinelike setae ventrally and laterally posterior to coxa IV. It may be distinguished from other taxa by the robust, spinelike gnathosomal setae; posterior margin of the sternal plate irregularly straight; anal plate unusually wide, broadly triangular in general shape; rather long Z5 setae but with tiny J5 setae; and rather short posterior central dorsal setae.

L. spinifer has been collected from two Lophuromys species and Arvicanthis rufinus in French Cameroon and Congo-Leopoldville.

Laelaps (Laelaps) parapinosus Tipton
Figs. 150-156

Laelaps paraculis Hirst (not Berlese, 1904 or Berlese, 1910), 1923, Ann. Nat. Hist., 12(67): 691 (Holotype: South Africa; British Museum [Natural History], London).

Laelaps parapinosus Tipton, 1960, Univ. Calif. Publ. Ent. 16(6):278-280.

Description.—Female: (Figs. 150-154). Dorsal plate length 543 μ, width 550 μ. Gnathosomal setae stout, robust, and spinelike to peglike; hypostomal setae setaceous, with medial hypostomal setae long, reaching to beyond base of gnathosomal setae. Posterior margin of sternal plate somewhat invaginated, invagination reaching no further than level of 3rd sternal setae; setae st.1 rather long, reaching almost to posterior margin of sternal plate. Anterior flap of genital plate overlapping posterior margin of sternal plate only slightly if at all; distance between 1st genital setae distinctly greater than distance between 4th genital setae, and distance between 2nd genital setae distinctly greater than distance between 3rd genital setae; greatest width of genital plate at or slightly posterior to level of 2nd pair of genital setae. Anal plate roughly triangular, as wide as long, with anterior margins rounded; adanal setae robust and spinelike and of moderate length, extending almost to base of postanal seta; adanal setae set at level near posterior end of anal orifice; postanal seta somewhat longer than adanal setae and rather robust. Unarmed venter bearing approximately 50 pairs of mostly setaceous setae, some more anterior setae rather short and stout with more posterior setae much longer. Metapodal plates oval. Peritreme extending to level of middle of coxa II. Dorsal plate bearing 38 pairs of setaceous setae, setae 1s3 absent; most dorsal setae of medium length, length slightly less than distance between adjacent setae; central dorsal setae shorter than lateral and posterior marginal setae; subterminal setae (J5) reaching to or slightly beyond posterior margin of dorsal plate, with terminal setae (Z5) quite long. Approximately 18 pairs of setae bordering dorsal opisthosoma on soft integument. Both proximal and distal setae of coxa I greatly enlarged, robust, and peglike or spinelike; ventral setae of trochanter I enlarged and spinelike with proximal posterolateral seta much more robust than others; setae 1d and ad 1 of femur I subequal in length, with pd 1 seta somewhat longer; anterior seta of coxa II and III and seta of coxa IV relatively short, stout, and spinelike to peglike; posterior seta of coxa II and III greatly enlarged, robust, and peglike; ven-
Figs. 150-154. *Laelaps paraspinosus* Tipton, female. (150) venter; (151) dorsum, scale = 100μ; (152) ventral view of tarsus II; (153) ventral view of tarsus III; (154) ventral view of tarsus IV, scale = 50μ.
tral anterolateral margin of coxa IV with serrated, acute, spurlike process; tarsi II, III, and IV each with 4 to 6 rather robust, blunt to pointed preapical setae; most other leg setae setaceous and normally developed; however, some often rather robust and spinelike.

**Male:** (Figs. 155-156) Gnathosomal setae short, robust, and spinelike; hypostomal setae setaceous with medial hypostomal setae longer than others, yet reaching about half distance to gnathosomal setae. Ventral setae, except anal and postanal setae, rather long, each extending in length well beyond base of seta immediately posterior; holoventral plate rather narrow between coxae IV and throughout entire length, although somewhat expanded posterior to coxae IV; expanded area between genital setae and anal orifice bearing 4 pairs of setaceous setae; adanal setae relatively short, robust, and spinelike, length less than distance to postanal seta; postanal seta robust and spinelike, and somewhat longer than adanal setae. Unarmed venter bearing 35 to 40 setaceous setae adjacent to holoventral plate, with an additional 15 to 20 setae on postierolateral margin, setae closest to holoventral plate and coxae IV shorter with most posterior and lateral setae quite long. Metapodal plates rather elongate, Peritreme extending to level of middle of coxa II. Dorsal plate bearing 37 pairs of setaceous setae, setae px2 and px3 absent; length and position of setae as in female. Soft integument of opisthosoma bearing 15 to 20 pairs of setaceous setae. Both proximal and distal setae of coxa I enlarged, robust, and peglike or spinelike, subequal in length; proximal posterolateral setae of trochanter I enlarged, robust, and peglike; setae pd 1 and ad 1 of femur I subequal in length and somewhat enlarged; anterior seta of coxae II and III and seta of coxa IV rather short, robust, and peglike; posterior seta of coxae II and III quite enlarged, robust, and peglike; ventral anterolateral margin of coxa IV serrated with slender spur; tarsi II, III, and IV each with 4 to 6 blunt, peglike to spinelike preapical setae; most other leg setae setaceous; however, some may be spinelike.

**Collection records**

*Myosorex varius*
South Africa (Roxton, Transvaal);
Tipton, 1960

*Aethoniys namaquensis*
South Africa (ORS); 1 coll. (1 female);
AMP

*Arricanthis dorsalis*
South Africa; Hirst, 1923

*Lemmiscornys griselda*
South Africa; Zumpt, 1961
Rhobomys pumilio
South Africa: Zumpt 1961
Otomys sp.
South Africa (Pilgrims Rest. Transvaal); Tipton, 1960
Otomys irroratus
South Africa (Grahamstown); Hirst, 1925
South Africa (Van Riebeeck Nat. Res., Pretoria); 1+ coll; AMP Zumpt
Collection
South Africa; 1 coll. (7 females, 2 ny): AMP

REMARKS.—L. paraspinosus bears several rather unique characters which distinguish it from all other Laelaps species: a great many setae ventrally posterior to coxae IV, lateral to genital and anal plates, and posterolateral to dorsal plate; all coxal setae and some ventral leg setae short, robust, and spinelike or peglike; dorsal setae px 3 absent with some dorsal setae positioned differently from other Laelaps species.

This taxon is known only from South Africa and has been collected from several different hosts, primarily Otomys species.

Laelaps (Laelaps) bocquieri Taufflieb
Figs. 157-163
Laelaps bocquieri Taufflieb, 1962. Aecarologia 1. IV. Fasc. 4:497-499 (Holotype: Brazzaville, Congo; Pers. coll. of R. Taufflieb, Dakar, Senegal).

DESCRIPTION.—Female: (Figs. 157-161) Dorsal plate length 574 μ, width 365 μ. Gnathosomal setae very robust and peglike; lateral hypostomal setae robust and peglike; medial hypostomal and distal hypostomal setae slender, short, and setaceous. Posterior margin of sternal plate slightly invaginated, invagination reaching no further than level of 3rd sternal setae; setae st. 1 of moderate length, reaching slightly more than half-way between setae st. 2 and st. 3. Anterior flap of genital plate overlapping posterior margin of sternal plate to level of 2nd pair of sternal pores; distance between 1st genital setae and 4th genital setae subequal; distance between 2nd genital setae distinctly greater than distance between 3rd genital setae; greatest width of genital plate at level of 2nd genital setae. Anal plate somewhat oval in general shape, longer than wide, with anterior and lateral margins rounded; anal setae slender and of moderate length but not extending to base of postanal seta; anal setae set at level slightly posterior to middle of anal orifice. Unarmed venter bearing 5 pairs of setaceous setae adjacent to genital and anal plates, no setae on posterior and lateral margins of body; metapodal plate small, oval. Peritreme extending to level of middle or anterior of coxa I. Dorsal plate bearing 30 to 32 pairs of mostly setaceous setae; all dorsal setae except setae r 1, r 2, s 1, and Z 5, extremely minute; setae r 2 short and spinelike, setae r 1 rather robust, and setae s 1 and Z 5 short and setaceous; position of setae, particular setae absent, not determined because of extremely small size of setae present. Only one pair of setae apparently bordering dorsal opisthosoma on soft integument. Both proximal and distal setae of coxa I extremely robust and peglike; seta ad 1 of femur I rather short and spinelike, seta pd 1 of femur I about twice as long and more setaceous; anterior seta of coxae II and III quite robust and spinelike; posterior seta of coxa II more setaceous; posterior seta of coxa III quite robust and peglike; seta of coxa IV slender and setaceous; all preapical setae of tarsus II setaceous, most with slightly enlarged bases; tarsi III and IV each with one or two blunt preapical setae and several other pairs on tarsi blunt or spinelike; many other leg setae short and spinelike to setaceous.

Male: (Figs. 162-163) Gnathosomal setae short, extremely robust, and peglike; lateral hypostomal setae somewhat robust, recurved, and peglike; medial and distal hypostomal setae slender, setaceous, and of medium length. Ventral setae, except anal and postanal setae, of moderate length, extending in length slightly beyond base of setae immediately posterior; holoventral plate rather broad between coxae II and III, somewhat narrowing between coxae IV, and slightly expanded posterior to coxae IV; expanded area between genital setae and anal orifice bearing only 1 pairs of setaceous setae; anal setae slender and of moderate length, extending distinctly beyond base of postanal seta; anal setae set near level of middle of anal orifice; postanal seta considerably more robust and longer than anal setae. Metapodal plates rather small, elongate-oval; unarmed venter bearing 4 pairs of setaceous setae. Peritreme extending to middle or anterior of coxa I. Dorsal plate setae as in female.
Figs. 157-161. *Laelaps bocquieri* Taullieb, female. (157) venter; (158) dorsum, scale = 100μ; (159) ventral view of tarsus II; (160) ventral view of tarsus III; (161) ventral view of tarsus IV. scale = 50μ.
Both proximal and distal setae of coxa I greatly enlarged, robust, and peglike; seta ad 1 of femur I short, robust, and spinelike; seta pd 1 at least twice as long and rather robust; anterior seta of coxae II and III somewhat enlarged and spinelike; posterior seta of coxa II of moderate length and setaceous; posterior seta of coxa III rather short, robust, and peglike; seta of coxa IV slender and setaceous; tarsus I with 1 blunt preapical seta, tarsus II with 3 moderately long, blunt setae, 1 being preapical, and tarsus IV with 4 blunt setae, 2 being preapical; other leg setae mostly setaceous; however, some short and spinelike.

**Collection records**

*Chryssochloris leucorrhina*

Congo (Brazzaville); 24 females, 18 males; Taufflieb, 1962

**Remarks.**— *L. bocquieri* differs from all other *Laelaps* species in several unique characters: gnathosomal and lateral hypostomal setae short, robust, and peglike; both setae of coxa I, anterior seta of coxa II, and both setae of coxa III robust and peglike or spinelike; posterior seta of coxa II long and setaceous; seta ad 1 of femur I short and spinelike with seta pd 1 twice as long; almost all dorsal setae minute, setae Z5, r1, and s1 short and setaceous and setae r2 short and spinelike.

*L. bocquieri* has been reported only from *Chryssochloris leucorrhina* in the Congo.

**Laelaps (Laelaps) breviperitremus**

(Garrett and Strandtmann)

Figs. 164-167

*Tur breviperitremus* Garrett and Strandtmann, 1967, *J. Med. Ent.* 4(2):240-246 (Holotype: Clanwilliam, South Africa; U. S. National Museum, Washington, D.C.)

*Laelaps breviperitremus*: Furman. 1972, *BYU Sci. Bull.*, Biol. Ser. 17(3):1-58.

**Description.**— *Female*: (Figs. 164-165) Idiosoma length 890 μ. Gnathosomal setae short, robust, and spinelike; hypostomal setae mostly setaceous, with medial hypostomal setae shorter, reaching approximately halfway to base of gnathoso-

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*Figs. 162-163. Laelaps bocquieri* Taufflieb, male. (162) venter; (163) dorsum, scale = 100μ.

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nal setae. Posterior margin of sternal plate moderately invaginated, at least to level of 3rd sternal setae; all 4 pairs of sternal setae short, robust, and spinelike; anterior flap of genital plate overlapping posterior margin of sternal plate very slightly if at all; genital plate expanded considerably posterior to coxae IV and set very close to anal plate with posterior margin invaginated to accommodate anal plate; 3 pairs of genital setae rather short, robust, and spinelike, and only first 3 pairs set on genital plate; distance between 1st genital setae much less than distance between 4th genital setae, and distance between 2nd genital setae distinctly less than distance between 3rd genital setae; greatest width of genital plate at level of 3rd genital setae. Anal plate roundly triangular, almost as wide as long; anal setae of moderate length, extending somewhat beyond base of postanal seta; anal setae at level slightly posterior to middle of anal orifice; postanal seta very large, rather long and robust. Unarmed venter bearing approximately 12 to 14 pairs of setaceous setae, all rather long and most barbed; metapodal plates irregularly oval, slightly longer than wide. Peritreme very short, extending no further than posterior of coxa II. Forty-one pairs of setae associated with dorsal plate; more anterior setae short, robust, and spinelike, with posterior and posterior marginal setae longer and more setaceous; subterminal setae (5) long and slender with terminal setae somewhat longer and more robust. Approximately 12 pairs of slender, setaceous setae border dorsal opisthosoma of soft integument. Both proximal and distal setae of coxa I robust, blunt, and peglike, with proximal seta somewhat larger; setae ad I and ad 1 of femur I subequal in length; proximal posterior seta of trochanters I and II short, robust, and peglike; anterior seta of coxae II and III of moderate length and setaceous, yet somewhat robust basally; seta of coxa IV short and III rather short, robust, and peglike; tarsi II, III, and IV each with 3 to 5 blunt, peglike preapical setae; most other leg setae setaceous and normally developed; however, some may be shorter and rather spinelike.

Male: (Figs. 166-167) Gnathosomal and hypostomal setae setaceous, with gnathoso-

mal setae somewhat more robust; median hypostomal setae of moderate length, reaching almost to base of gnathosomal setae. Ventral setae, except adanal and postanal setae, rather long and slender, extending well beyond base of adjacent posterior setae; holoventral plate rather broad between coxae II and III, greatly narrowing between coxae IV, and greatly expanded posterior to coxae IV; expanded area between genital setae and anal orifice bearing 5 pairs of setaceous setae; adanal setae of moderate length, extending well beyond base of postanal seta; adanal setae set near middle of anal orifice; postanal setaceous; posterior seta of coxae II and seta somewhat longer than adanal but much more robust and spinelike. Meta-podal plates inapparent, apparently fused to lateral extension of holoventral plate; unarmed venter bearing approximately 10 to 12 pairs of slender setaceous setae adjacent to holoventral plate. Peritreme short, extending no further than posterior of coxa II. Dorsal plate bearing 40 pairs of setaceous setae; most dorsal setae of moderate length, usually greater than distance between adjacent setae; subterminal seta (15) of medium length, extending well beyond posterior margin of dorsal plate, but considerably shorter than terminal setae. Both proximal and distal setae of coxa I setaceous, proximal seta somewhat longer than distal seta; setae pd 1 and ad 1 of femur I subequal in length; anterior seta of coxae II and III, posterior seta of coxae II and III, and seta of coxa IV all setaceous, but some may be robust basally; some preapical setae of tarsi II, III, and IV robust and spinelike; most other leg setae setaceous and normally developed; however, some may be shorter and rather spinelike.

Collection records

*Acanthus subspinulosus*

South Africa (Pakhuis Pass, Clanwilliam, Transvaal); 28 females (type specimens); Garrett and Strandmann, 1967.

South Africa (Goudveld, Cape Prov.); 29 females, 1 male. 3 ny; Garrett and Strandmann, 1967.

Remarks.—Garrett and Strandmann (1967) originally placed *L. breviperitemus* in the genus *Tur* because of many morphological characters possessed in common with *Tur* which differ from any other *Lactaps* species. Some of these distinguish-
Figs. 164-165. *Laelaps breviperitremus* (Garrett and Strandtmann). female. (164) venter; (165) dorsum; redrawn from Garrett and Strandtmann (1967).

Figs. 166-167. *Laelaps breviperitremus* (Garrett and Strandtmann). male. (166) venter; (167) dorsum, redrawn from Garrett and Strandtmann (1967).
ing characters are: very short peritreme, extending to posterior of coxa II; many short, robust, spinelike setae ventrally and dorsally; only three pairs of setae on genital plate; greatly expanded genital plate; plus other less obvious phenotypic differences.

*L. breviperitremus* is known only from *Acomys subspinous* in South Africa.

**Host-Parasite Relationships**

For the most part, species of *Laelaps* in Africa are associated with myomorph rodents and more particularly rodents of the subfamily Murinae. However, there are some exceptions to this statement. For example, *L. transvaalensis* and *L. paraspinosus* were collected from *Otomys* sp. (subfamily Otomyinae) more frequently than from other hosts, but they were collected from murine rodents as well. *L. brandbergensis* has been collected principally from *Petromus* sp. (subfamily Dendromurinae), but again some specimens were collected from murine rodents. *L. congoicola*, *L. moucheti*, *L. aethiopicus*, and *L. boqueri* are known only from single type collections in which the hosts were not identified beyond “rat” or “rodent” or the specific identification of the host cannot be confirmed. In the northern part of Africa gerbils (Gerbillinae) are frequently associated with species of *Laelaps*, but the *Laelaps* species involved are ubiquitous and are associated with such a variety of hosts that the true host-parasite relationship is obscure. Contaminations which may have occurred in the field or laboratory may account for other unusual associations recorded in the list given below. Specimens which were actually found on nonmurine hosts likely represented spurious associations.

New collection records of species of *Laelaps* from the African Mammal Project. (ORS = Orange River Survey)

**Order Insectivora**

*Superfamily Erinaceoidea*

*Family Erinaceidae*

*Subfamily Erinaceinae*

*Atelerix albiventris*

*L. keegani - Upper Volta*

*Superfamily Macroscelidioidae*

*Family Macroscelididae*

*Elephantulus myurus*

*L. fritzumpti - South Africa (ORS)*

*L. liberensis - South Africa (ORS)*

*Elephantulus rupestris*

*L. fritzumpti - South Africa (ORS)*

*Macroscelides proboscideus*

*L. fritzumpti - South Africa (ORS)*

*L. liberensis - South Africa (ORS)*

*L. simillimus - South Africa (ORS)*

*L. transvaalensis - South Africa (ORS)*

**Superfamily Soricoidea**

*Family Soricidae*

*Subfamily Crocidurinae*

*Crocidura hirta*

*L. liberensis - Rhodesia*

*Crocidura sp.*

*L. keegani - Upper Volta*

*L. liberensis - Ghana*

*L. roubaudi - Nigeria*

*Sylvisorex gemmeus*

*L. lavieri - Ghana*

**Order Chiroptera**

*Suborder Megachiroptera*

*Family Pteropodidae*

*Subfamily Pteropodinae*

*Hypsugo aridus*

*L. lavieri - Ivory Coast*

*L. liberensis - Ivory Coast*

*Suborder Microchiroptera*

*Family Nycteridae*

*Nycteris arge*

*L. lavieri - Upper Volta*

*Nycteris hispida*

*L. liberensis - Mauritania*

*Nycteris macrotis*

*L. liberensis - Senegal*

*Family Rhinolophidae*

*Subfamily Rhinolophinae*

*Rhinolophus clivosus*

*L. vansomereni - South Africa*

*Rhinolophus sprinkii*

*L. liberensis - Rhodiesia*

*Subfamily Hipposiderinae*

*Hipposideros caffer*

*L. lavieri - Ivory Coast*

*Hipposideros eaffe*

*L. benoit - Ivory Coast*

*L. lavieri - Ivory Coast*

*L. setzeri - Ivory Coast*

*Hipposideros commersoni*

*L. malacomys - Ivory Coast*

*Hipposideros cyclops*

*L. lavieri - Ivory Coast*

*Family Vespertilionidae*

*Subfamily Vespertilioninae*

*Eptisicus capensis*

*L. liberensis - South Africa (ORS)*

*Scotophilus nigrata*

*L. setzeri - Ivory Coast*

*Family Molossidae*

*Tadarida leonis*

*L. liberensis - Senegal*

*Tadarida major*

*L. grenieri - Upper Volta*

*L. liberensis - Upper Volta*

*Tadarida nigra*

*L. simillimus - South Africa*

*Tadarida punctata*

*L. liberensis - Togo*
Order Primata
Family Lorisidae
Subfamily Galaginae
Galago senegalensis
L. liberiensis - Upper Volta
Family Cercopithecidae
Subfamily Cercopithecinae
Cercopithecus mitis
L. liberiensis - Rhodesia
Erythrocebus patas
L. liberiensis - Upper Volta
Order Lagomorpha
Family Leporidae
Lepus saxatilis
L. liberiensis - Botswana
Order Rodentia
Suborder Hystriomorphia
Superfamily Bathyergoidea
Family Bathyergidae
Cryptomys hottentotus
L. liberiensis - Botswana, South Africa.
Family Thryonomyidae
Thryonomys swinderianus
L. liberiensis - Rhodesia
Superfamily Octodontoidea
Family Petromyidae
Petromus typicus
L. transvaalensis - South Africa (ORS)
Suborder Myomorpha
Superfamily Muroidea
Family Cricetidae
Subfamily Gerbillinae
Desmodillus auricularis
L. fritzumpti - South Africa (ORS), Rhodesia.
L. liberiensis - South Africa (ORS)
Desmodillusia brueni
L. liberiensis - Upper Volta
Gerbillus paeba
L. fritzumpti - South Africa (ORS), Rhodesia.
L. liberiensis - South Africa (ORS)
L. transvaalensis - South Africa
L. vansomereni - South Africa
Family Tatera brandsi
L. fritzumpti - South Africa (ORS)
Tatara gambiana
L. liberiensis - Senegal
Tatera guttatae
L. liberiensis - Guinea
Tatera kempi
L. keegani - Dahomey, Ivory Coast, Upper Volta.
L. myomys - Upper Volta
L. roubaudi - Ivory Coast
Tatera leucogaster
L. fritzumpti - South Africa (ORS), Rhodesia.
L. latieri - South Africa (ORS).
L. liberiensis - South Africa (ORS).
L. vansomereni - Botswana.
L. similimus - South Africa
L. transvaalensis - South Africa
L. vansomereni - South Africa
Taterillus gracilis
L. liberiensis - Upper Volta
Family Muridae
Subfamily Dendromurinae
Dendrotriton melanotis
L. liberiensis - South Africa (ORS)
Malacothrix typicus
L. liberiensis - South Africa (ORS)
Steatonyx caurinus
L. liberiensis - Ivory Coast
Petromyscus collinus
L. brandbergensis - South Africa (ORS)
L. fritzumpti - South Africa (ORS)
Subfamily Murinae
Acomys caurinus
L. liberiensis - Ghana
L. setzeri - Ghana
Acomys spinossimus
L. acomys - Rhodesia
Aethomys chrysophilus
L. fritzumpti - South Africa (ORS), Rhodesia.
L. latieri - South Africa (ORS).
L. liberiensis - South Africa (ORS), Rhodesia.
L. malacomys - Rhodesia
L. similimus - South Africa, Rhodesia.
L. tillae - South Africa
L. transvaalensis - South Africa
L. vansomereni - South Africa (ORS), Rhodesia.
L. zumpti - Rhodesia
Aethomys namaquensis
L. brandbergensis - South Africa (ORS)
L. fritzumpti - Botswana.
L. liberiensis - South Africa (ORS)
L. similimus - South Africa (ORS)
L. paraspinosus - South Africa (ORS)
Aethomys selindensis
L. vansomereni - Rhodesia
Arvicanthis niloticus
L. keegami - Ghana, Ivory Coast, Nigeria, Senegal.
L. liberiensis - Ghana, Ivory Coast, Nigeria.
Cricetomys emini
L. liberiensis - Upper Volta
Cricetomys gambianus
L. liberiensis - Nigeria
L. myomys - Upper Volta
Dasymys fori
L. roubaudi - Nigeria
Dasymys incomptis
L. liberiensis - Rhodesia
L. roubaudi - Ivory Coast
Deplomys defus
L. liberiensis - Ghana
L. paraspinosus - Ivory Coast
Grammomys dolichurus
L. liberiensis - Upper Volta
Hybomys trivirgatus
L. greneri - Ivory Coast
Hylocomys alleni
L. liberiensis - Togo
Hylocomys sp.
L. liberiensis - Ghana
Lenniscoyllum barbatus
L. greneri - Ghana, Upper Volta
Lenniscoyllum grisea
L. liberiensis - South Africa
L. similimus - South Africa, Rhodesia.
L. tillae - South Africa, Rhodesia
L. vansomereni - South Africa
Lemniscomys macrurus
L. grenieri - Ivory Coast
L. laviieri - Ivory Coast
Lemniscomys striatus
L. grenieri - Ghana, Ivory Coast
L. laviieri - Togo
L. liberiensis - Nigeria, Togo
Lophuromys sikapusi
L. grenieri - Nigeria
L. laviieri - Ghana
L. lavoipierrei - Ghana, Ivory Coast, Nigeria
L. liberiensis - Ghana

Malacomys edwardsi
L. malacomys - Ghana, Ivory Coast
Malacomys longipes
L. liberiensis - Ivory Coast
L. malacomys - Ghana, Ivory Coast
L. parashirmimus - Ivory Coast
L. setzeri - Togo

Mastomys albicaudatus
L. liberiensis - South Africa (ORS)
Mastomys erythroleucus
L. liberiensis - South Africa
Mastomys natalensis
L. frizumptii - South Africa (ORS)
L. laviieri - Ghana, South Africa (ORS)
L. lavoipierrei - Ivory Coast, Upper Volta
L. liberiensis - Botswana, Rhodesia, South Africa (ORS), Dahomey, Ghana, Ivory Coast, Nigeria, Senegal, Togo, Upper Volta
L. myomys - Upper Volta
L. setzeri - Togo
L. simillimus - South Africa (ORS)
L. tillae - South Africa
L. transvaalensis - South Africa (ORS)
L. vansomereni - South Africa, Rhodesia
Mus haussa
L. laviieri - Nigeria
Mus minutoides
L. benoiti - Ghana, Rhodesia
L. frizumptii - South Africa (ORS)
L. laviieri - Ghana, Ivory Coast, South Africa (ORS), Rhodesia
L. liberiensis - South Africa (ORS)
L. zumptii - South Africa (ORS), Rhodesia

Mus muscoides
L. benoiti - Ghana, Ivory Coast
L. kregani - Ghana
L. laviieri - Ghana, Ivory Coast, Upper Volta
L. lavoipierrei - Ghana
L. liberiensis - Senegal, Togo
L. setzeri - Togo
L. thamnomys - Togo

Mus setulosus
L. benoiti - Ghana, Ivory Coast
L. laviieri - Ghana, Ivory Coast
L. malacomys - Ivory Coast
Myomys daltoni
L. liberiensis - Ghana, Ivory Coast, Senegal, Upper Volta
L. myomys - Ghana, Ivory Coast, Nigeria, Senegal, Upper Volta
L. transvaalensis - Senegal

Praomys tullbergi
L. benoiti - Ghana, Togo
L. grenieri - Nigeria, Togo
L. laviieri - Ghana, Ivory Coast
L. lavoipierrei - Ivory Coast
L. liberiensis - Ghana, Nigeria, Togo
L. roubaudi - Ghana
L. setzeri - Ghana, Ivory Coast, Senegal, Togo
L. thamnomys - Togo

Rattus rattus
L. nuttalli - Madagascar, Mauritius
L. setzeri - Ivory Coast

Rhabdomys pumilio
L. frizumptii - South Africa (ORS)
L. liberiensis - South Africa (ORS)
L. peregrinus - South Africa (ORS)
L. simillimus - South Africa
L. tillae - South Africa
L. transvaalensis - South Africa
L. vansomereni - South Africa (ORS)
Sacrotonus canpestris
L. frizumptii - South Africa (ORS)
L. laviieri - South Africa (ORS)
L. liberiensis - South Africa (ORS)
L. tillae - Rhodesia
L. transvaalensis - South Africa
L. vansomereni - South Africa (ORS)

Thallomys paedulus
L. frizumptii - South Africa (ORS)
Thammomys rutillus
L. liberiensis - Togo
L. thamnomys - Ivory Coast, Togo
Uranomys oweni
L. grenieri - Senegal
Uranomys ruddi
L. grenieri - Ivory Coast
L. lavoipierrei - Ghana
L. liberiensis - Ivory Coast

Subfamily Otomyninae
Otomys angoniensis
L. transvaalensis - Rhodesia, South Africa (ORS)
Otomys irradians
L. liberiensis - South Africa (ORS)
L. parashirmosus - South Africa
L. transvaalensis - South Africa
Parotomys brantsi
L. frizumptii - South Africa (ORS)

Suborder Sciuromorpha

Superfamily Sciuroidea
Family Sciridae
Subfamily Sciurinae
Funisciurus pyrrhopus
L. liberiensis - Ivory Coast

Order Carnivora
Family Mustelidae
Subfamily Mustelinae
Ictonyx striatus
L. laviieri - South Africa (ORS)
L. liberiensis - South Africa (ORS)
Family Viveridae
Subfamily Viverinae
Genetta servalina
L. liberiensis - Senegal
Genetta villersi
L. laevior - Ivory Coast
L. liberienis - Ivory Coast

Subfamily Herpestinae
Culicoides obscurus
L. liberienis - Ivory Coast
Herpestes sauquinius
L. liberienis - Rhodesia

Family Felidae
Subfamily Felinae
Felis lybica
L. keegani - Upper Volta

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