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A Parasite the Supposed Cause of Some Cases of Epilepsy. [*Gastrophilus epilepsalis* n. sp.]. Jour. App. Micr., 3: 1089-1090; Can. Ent., 32: 263-264.
- 1901 Revision of the Genus *Catocala*. Can. Ent., 33: 12-14.
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- 1902 The Yellow-Winged Catolacae. Can. Ent., 34: 95-98.
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- 1906 Bitter Rot and San Jose Scale. Trans. Ill. St. Hort. Soc., New Ser., 40: 429-434.
- 1914 The Butterflies of the Eastern United States, 4th Edition, 429 pp., J. B. Lippincott Co., Phila.
- 1916 A New Species of *Catocala* [*julietta*]. Can. Ent., 48: 72.

An Annotated List of the Ants of Arizona (Hymen.: Formicidae).

By A. C. COLE, JR., Dept. of Entomology, Univ. of Tenn.

From the summits of Arizona's many heavily timbered mountains to the floors of her vast deserts and valleys is a wealth of insect life, including numberless ants. The variety of ant life is surpassed only by the number of teeming colonies of each species.

Much of the state is desert. Sandy, dry and unbroken soil lies in the north and a moister region occupies the centre. These areas are especially rich in ant species. In the desert the struggle for existence has been most severe and the survivors of past periods have well established and distributed themselves in a hostile environment. Certain habitat restrictions have limited the spread of many species, so that some of them are found in rather small and isolated areas. These

"pockets" are continually being discovered, and it is chiefly through the results of these "finds" that a sizable state list has been made possible.

I shall not attempt to discuss any ant extensively, or to annotate those species which have been collected by investigators other than myself. The notes appearing herein are original. Notes on ants which are merely listed have been heretofore published, and may be gleaned from the works of Wheeler, Smith, Olsen, Cole and others.

That this list is probably by no means complete has been foreseen and recognized by the writer. It may be considered merely a starting point to which additional data may be appended as time goes on. I have drawn freely from the publications of Drs. Wheeler, Smith and Olsen. To those who have made possible this contribution to the fauna of Arizona, I am gratefully indebted.

Subfamily PONERINAE.

1. *STIGMATOMMA PALLIPES* subsp. *ARIZONENSE* Wheeler. Huachuca Mts. (W. M. Mann).
2. *PONERA OPACICEPS* Mayr. Grand Canyon (Wheeler).
3. *ODONTOMACHUS HAEMATODA* subsp. *DESERTORUM* Wheeler. Tucson (Wheeler); Phoenix (Cole). A few workers of this interesting subspecies were running about at night in a grassy lot in Phoenix. The nest was not located.
4. *O. HAEMATODA* subsp. *CONINODIS* Wheeler. Huachuca Mts. (Wheeler, Mann).
5. *O. CLARUS* Roger. Huachuca Mts. (C. Schaeffer).

Subfamily DORYLINAE.

6. *ECITON (ACAMATUS) OSLARI* Wheeler. Nogales (Oslar).
7. *E. (A.) ARIZONENSE* Wheeler. Nogales (Oslar).
8. *E. (A.) MEXICANUM* (F. Smith). Nogales (Oslar).
9. *E. (A.) HARRISI* (Haldeman). Nogales (Oslar); Palmerlee (Schaeffer).

Subfamily MYRMICINAE.

11. *PSEUDOMYRMA PALLIDA* F. Smith. Huachuca Mts. (Schaeffer).
12. *MYRMECINA GRAMINICOLA* subsp. *AMERICANA* Emery. Grand Canyon (Wheeler).
13. *M. GRAMINICOLA AMERICANA* var. *BREVISPINOSA* Emery. Grand Canyon (Wheeler).

14. *MONOMORIUM MINIMUM* Buckley. Grand Canyon (Wheeler, Cole); Prescott (Wheeler); Jacobs Lake (Cole).

At Bright Angel Point on the south rim of the Grand Canyon, I found this species inhabiting small nests in the dark, rather dry porous soil beneath rocks. Winged castes were in the nests on July 20, 1931. The ground was deeply strewn with needles of *Pinus ponderosa*. Spruce, cedar and some *Artemisia* were present.

15. *SOLENOPSIS AUREA* subsp. *AMBLYCHILA* Wheeler. Huachuca Mts. (Wheeler).

16. *S. HUACHUCANA* Wheeler. Huachuca Mts. (Wheeler).

17. *S. MOLESTA* (Say). Flagstaff, Williams (Cole). The colonies were small and were all beneath flat stones.

18. *S. MOLESTA* var. *VALIDIUSCULA* Emery. Williams (Cole). One large colony was found beneath a rock in a yellow pine forest.

19. *S. GEMINATA* (Fabricius). Phoenix (Wheeler); Tucson (Fenner).

20. *S. GEMINATA* subsp. *RUFA* (Jerdon). Tempe (Wheeler).

21. *S. XYLONI* (McCook). Phoenix, Huachuca Mts., Oracle, Texas Pass (Wheeler); Kingman, Peach Springs, 16 Mi. S. of Prescott (Cole).

At Kingman and Peach Springs were small nests adjacent to fence posts in fine dry soil. Near Prescott the ants inhabited many small crater nests in a sandy arroyo. The colonies were large. Associated vegetation consisted chiefly of *Pinus ponderosa* seedlings, *Opuntia* and several grasses.

22. *S. XYLONI* var. *MANIOSA* (Wheeler). Yuma, Tempe, Yucca, Gila Bend Mts., Benson (Wheeler); Thatcher (R. V. Chamberlin); Tucson (Wheeler, Cole); Douglas (Cole).

A hole in the fine sand near Douglas marked the nest of a medium-sized colony of this ant. Long files of workers extended to and from the nest opening. At Tucson one colony inhabited a nest beneath a flat rock in the dry desert.

23. *S. XYLONI* subsp. *AUREA* (Wheeler). Yuma, Grand Canyon, Phoenix, Casa Grande, Pinaleno Mts., Coyote Mts. (Wheeler).

24. *S. XYLONI* subsp. *AMBLYCHILA* (Wheeler). Huachuca Mts. (Wheeler).

25. *PHEIDOLE CERES* Wheeler. Grand Canyon (Wheeler).

26. *P. KINGI* subsp. *TORPESCENS* Wheeler. Tucson (Wheeler).

27. *P. TEPICANA* subsp. *CAVIGENIS* Wheeler. Huachuca Mts. (Wheeler).
28. *P. FIMBRIATA* Roger. Nogales (Oslar).
29. *P. VIRAGO* Wheeler. Tucson (Wheeler).
30. *P. SPADONIA* Wheeler. Tucson (Wheeler).
31. *P. MILITICIDA* Wheeler. Hereford (Wheeler, Mann); Benson (Wheeler).
32. *P. VINELANDICA* Forel. Grand Canyon (Wheeler); Tuba City, Douglas (Cole).

A few minute crater nests of this species were observed along a small stream at Navajo Springs, near Tuba City. The area was very rocky and protected by high cliffs on the east. Vegetation was abundant, and consisted chiefly of *Opuntia*, *Yucca*, grasses and *Ephedra*. The soil was moist near the stream but very dry elsewhere.

33. *P. VINELANDICA* subsp. *BUCCALIS* Wheeler. Ash Fork, Prescott (Wheeler).
 34. *P. VINELANDICA* subsp. *CEREBROSIOR* Wheeler. Tucson (Wheeler).
 35. *P. VINELANDICA* *LONGULA* var. *CASTANEA* Wheeler. Huachuca Mts. (Wheeler); Tuba City (Cole). Workers and soldiers of this variety were collected from a small nest beneath a rock at Navajo Springs, near Tuba City.
 36. *P. CALIFORNICA* subsp. *MICULA* Wheeler. Huachuca Mts. (Wheeler).
 37. *P. CRASSICORNIS* subsp. *VALLICOLA* Wheeler. Huachuca Mts. (Wheeler).
 38. *P. COCKERELLI* Wheeler. Prescott (Cockerell, Wheeler); Tempe (F. H. Simmons).
 39. *P. DESERTORUM* Wheeler. Ash Fork, Prescott, Grand Canyon (Wheeler); Phoenix, Tucson (Wheeler, Cole); Seligman, 40 Mi. S. Prescott (Cole).
- A few workers were foraging in the desert near Seligman. South of Prescott I collected workers from a small crater mound of sand. At Phoenix and Tucson populous colonies were beneath stones on the sandy desert plains.
40. *P. DESERTORUM* var. *MARICOPA* Wheeler. Grand Canyon (Wheeler).
 41. *P. BARBATA* Wheeler. 20 Mi. E. Needles, California (Cole). Three workers of *P. barbata* were found near a road east of Needles. The nest was not located.
 42. *P. XEROPHILA* subsp. *TUCSONICA* Wheeler. Phoenix, Tucson, Douglas, 30 Mi. E. Kingman (Cole); Tucson (Wheeler).

43. *P. XEROPHILA TUCSONICA* var. *GILVESCENS* Wheeler. Phoenix, Tucson (Wheeler); Tucson (Cole).

44. *P. PROSERPINA* Wheeler. Tempe (Wheeler).

45. *CREMATOGASTER LINEOLATA* Say. Grand Canyon (Wheeler, Cole); Flagstaff (Cole).

46. *C. LINEOLATA* var. *CERASI* Fitch. Seligman (Cole).

47. *C. LINEOLATA LAEVIUSCULA* var. *CLARA* Mayr. Arizona (Emery); Kingman, Douglas (Cole).

48. *C. LINEOLATA* subsp. *COARCTATA* Mayr. Tucson (Wheeler).

49. *C. ARIZONENSIS* Wheeler. Tucson, Phoenix (Wheeler).

50. *STENAMMA* (*APHAENOGASTER*) *fulvum* var. *TEXANUM* Emery. Grand Canyon (Wheeler).

51. *APHAENOGASTER TEXANA* Emery. Grand Canyon (Wheeler).

52. *A. TEXANA* var. *FURVESCENS* Wheeler. Huachuca Mts. (Wheeler, W. M. Mann).

53. *A. SUBTERRANEA* subsp. *OCCIDENTALIS* Emery. Jacobs Lake (Cole).

54. *NOVOMESSOR COCKERELLI* (Ern. André). Benson, Santa Catalina Mts., Gila Bend Mts., Hereford, Oracle, Tempe, Yucca (Wheeler); Florence (C. D. Lebert); Huachuca Mts. (Biedermann); Tucson (Wheeler, Cole); Kingman, Prescott, Phoenix, Douglas (Cole).

55. *N. ALBISETOSUS* (Mayr). Pinaleno Mts., Texas Pass (Wheeler); Huachuca Mts. (Wheeler, Creighton); Bisbee (L. C. Murphree); Bonita (J. C. Bradley); Globe (H. C. Markman); Nogales (Osler, Murphree); 55 Mi. S. Prescott, Phoenix (Cole); Baboquivari Mts., Coyote Mts.

The nests found by the writer were beneath flat rocks with small pebbles distributed around the entrances.

56. *VEROMESSOR ANDREI* (Mayr). Phoenix, 10 Mi. E. Needles, Calif. (Cole). The nests at both localities were of the usual crater mound type, each with a single large entrance surrounded by chaff.

57. *V. PERGANDEI* (Mayr). Nortons, Tempe, Casa Grande, Gila Bend Mts., Santa Catalina Mts., Yucca, Yuma (Wheeler); Ft. Mojada (J. Henderson); Tucson (Wheeler, G. von Krockow, E. A. Carpenter, N. C. Skinner, Cole); Phoenix (Cole).

The mound observed at Tucson was large and symmetrical, about 6 inches high and 18 inches in diameter, and in a very dry section of the desert. There was a large central opening at the bottom of each deep crater.

(To be continued.)

- 2) As *Pseudoclavellaria marginata* L. is the genotype of *Cimbex* Ol., the genus we hitherto have called *Cimbex* will be without a name and I propose therefore to call it *Neocimbex* n. n. with *Tenthredo* (*Cimbex*) *lutea* L. as genotype.
- 3) With *Lyda pratensis* as genotype, the genus *Lyda* will be restored and is no longer a synonym of *Pamphilus*.

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(Continued from page 101)

58. *POGONOMYRMEX APACHE* Wheeler. North Miller Canyon, Huachuca Mts. (Wheeler).

59. *P. BARBATUS* subsp. *RUGOSUS* Emery. Grand Canyon, Tempe, Florence, Jerome (Wheeler); Cactus Plain (F. H. Snow); Tucson (Wheeler, Cole); Tuba City, Cameron, Douglas, 40 Mi. S. Prescott, 74 Mi. S. Phoenix (Cole).

The nests at all localities visited by the writer were flat craters, 8 to 10 inches in diameter, in coarse sand. Several colonies were aggregated in each area, which was invariably dry desert.

60. *P. BARBATUS* subsp. *CURVISPINOSUS* Cole. 36 Mi. S. Prescott (Cole). This is the locality of the type. The ants were in a flat mound of pebbles in the center of the federal highway.

61. *P. BARBATUS* var. *FUSCATUS* Emery. Oracle, Pinaleno Mts., Tempe, Bowie (Wheeler).

62. *P. BARBATUS* var. *MOLEFACIENS* Buckley. Pinaleno Mts., Jerome, Benson, Oracle, Hereford, Palmerlee, Palmarcoles (Wheeler); Huachuca Mts. (Wheeler, Biedermann, W. M. Mann); Tempe, Prescott (Cockerell); Kit's Peak (Clark & A. N. S. P.); Phoenix (Wheeler, Cole); Tucson, Douglas (Cole).

63. *P. BARBATUS* var. *NIGRESCENS* Wheeler. Gila Bend Mts., Casa Grande, Bowie, South Catalina Mts. (Wheeler).

64. *P. CALIFORNICUS* Buckley. Grand Canyon, Yuma, Phoenix, Yucca, Welton, Tempe, Nortons (Wheeler); Wilcox (A. K. Fisher); Kingman, Cameron, Tuba City, Prescott, Tucson, Douglas (Cole).

The nests observed by the writer varied from large crater mounds of pure sand in a stream margin area of *Opuntia*,

Yucca, Kochia and Ephedra near Tuba City, to flat sandy craters in an arroyo with seedling pines and grasses near Prescott.

65. *P. CALIFORNICUS* var. *ESTEBANIUS* Pergande. Tucson, Tempe, Florence, Gila Bend Mts., Yucca, Yuma (Wheeler); Thatcher (R. V. Chamberlin); Phoenix (Wheeler, Cole); 25 Mi. E. Needles, Calif. (Cole).

66. *P. CALIFORNICUS* var. *HINDLEYI* Forel. Thatcher (R. V. Chamberlin).

67. *P. CALIFORNICUS* subsp. *BARNSEI* M. R. Smith. Maricopa Co. (O. L. Barnes).

68. *P. CALIFORNICUS* subsp. *MARICOPA* Wheeler. Pinalino Mts., Phoenix, South Catalina Mts., Benson, Tucson, Yuma, Nortons, Welton, Dragoon Mts. (Wheeler); Sanford, Graham Mts., Ash Creek (E. G. Holt); Huachuca Mts. (W. M. Mann); Coyote Mts. (Clark & A. N. S. P.); Douglas (Cole).

69. *P. DESERTORUM* Wheeler. Tucson and desert east, Benson, Tempe (Wheeler); Thatcher (R. V. Chamberlin); Bowie (Cornell Univ. Exped.); Kingman (Cole).

70. *P. DESERTORUM* var. *FERRUGINEUS* Olsen. Tucson (Pergande, P. Klingenberg).

71. *P. HUACHUCANUS* Wheeler. Huachuca Mts., South Catalina Mts., Dragoon Mts., Oracle (Wheeler); Seligman (Cole).

72. *P. OCCIDENTALIS* Cresson. Huachuca Mts., Ash Fork, Pinaleno Mts. (Wheeler); Grand Canyon, Prescott (Cole, Wheeler); Williams, Peach Springs, Seligman, Cameron, The Gap, Marble Canyon, Flagstaff (Cole).

73. *P. SIMILIS* Olsen. Oracle (Wheeler).

74. *P. (EPHEBOMYRMEX) PIMA* Wheeler. Tucson, Phoenix, South Catalina Mts., Bowie, Casa Grande, Tempe, Florence (Wheeler).

75. *P. (E.) TOWNSENDI* Wheeler. Fort Grant, Pinaleno Mts. (Cornell Univ. Exped.); Tucson (Wheeler).

76. *MYRMICA MEXICANA* Wheeler. Grand Canyon (Wheeler); San Francisco Mts. (W. M. Mann).

77. *M. BREVINODIS* var. *SULCINODOIDES* Emery. Prescott (Cole).

78. *M. MUTICA* Emery. Jacobs Lake (Cole).

79. *M. SCABRINODIS* Nylander. Grand Canyon (Wheeler).

80. *M. SCABRINODIS LOBICORNIS* var. *GLACIALIS* Forel. Grand Canyon (Wheeler); San Francisco Mts. (W. M. Mann).

81. *M. SCABRINODIS LOBICORNIS* var. *FRACTICORNIS* Emery.

Flagstaff, Williams (Cole).

82. *LEPTOTHORAX NITENS* Emery. Grand Canyon (Wheeler).

83. *L. NEOMEXICANUS* Wheeler. Grand Canyon (Wheeler).

84. *L. CURVISPINOSUS RUGATULUS* var. *COCKERELLI* Wheeler. Huachuca Mts. (Biedermann, Mann, Wheeler).

85. *XIPHOMYRMEX SPINOSUS* subsp. *INSONS* Wheeler. Huachuca Mts. (Wheeler).

86. *X. SPINOSUS* subsp. *WHEELERI* Forel. Huachuca Mts. (Wheeler).

87. *X. SPINOSUS* subsp. *HISPIDUS* Wheeler. Tucson, Phoenix (Wheeler).

88. *ATTA (TRACHYMYRMEX) ARIZONENSIS* Wheeler. Huachuca Mts. (Wheeler); Palmerlee (C. Schaeffer).

89. *A. (T.) DESERTORUM* Wheeler. Tucson (Wheeler).

90. *A. (MOELLERIIUS) VERSICOLOR* Pergande. Yucca (Wheeler); Tucson (Fenner, Wheeler); 30 Mi. E. Kingman, 36 Mi. S. Prescott, Phoenix (Cole).

Subfamily *DOLICHODERINAE* Lund.

91. *LIOMETOPUM APICULATUM* Mayr. Huachuca Mts. (Biedermann); Grand Canyon (Cole).

92. *L. APICULATUM* subsp. *LUCTUOSUM* Wheeler. Grand Canyon (Wheeler, Cole); Prescott (Wheeler).

93. *DORMYRMEX PYRAMICUS* Roger. Grand Canyon (Wheeler, Cole); Jacobs Lake, Prescott, Tucson, Williams, Flagstaff (Cole).

I found numerous colonies of this ant at all the localities cited. Some were beneath rocks, others occupied small mounds of sand or other finely-divided soil particles. At Grand Canyon the small nests were on mound faces of *Pogonomyrmex occidentalis* Cresson, and at Prescott they were scattered between nests of *Myrmecocystus mexicanus horti-deorum* McCook. All were in rather moist habitats.

94. *D. PYRAMICUS* var. *BICOLOR* Wheeler. Grand Canyon, 16 Mi. S. Prescott, Douglas, Phoenix, Tucson (Cole).

This pretty variety of *D. pyramicus* inhabits more zeric places than does the typical species. Its small crater mounds are constructed in sand.

95. *TAPINOMA SESSILE* Say. Grand Canyon (Wheeler, Cole); Huachuca Mts. (Wheeler, Biedermann).

96. *IRIDOMYRMEX ANALIS* André. Grand Canyon (Wheeler); Marble Canyon, 47 Mi. S. Prescott, Phoenix (Cole). *I. analis* lives in very small crater nests of fine sand.

97. *I. PRUINOSUS* var. 12 Mi. E. Needles, Calif. (Cole).

98. *FORELIUS MACCOOKI* Forel. 30 Mi. E. Kingman, Cameron, 36 Mi. S. Prescott (Cole).

This ant appears superficially to be identical with *Iridomyrmex analis* André, and it inhabits similar places. The ant lives in aggregations of minute sandy craters in the drier parts of the desert. The workers are very aggressive.

Subfamily CAMPONOTINAE.

99. *PRENOLEPIS IMPARIS* Say. Grand Canyon (Wheeler, Cole); Huachuca Mts. (W. M. Mann).

100. *P. IMPARIS* var. *ARIZONICA* Wheeler. Huachuca Mts. (W. M. Mann).

101. *P. (NYLANDERIA) GUATEMALENSIS* Forel. Grand Canyon (Wheeler).

102. *LASIVS BREVICORNIS* Emery. Prescott, Flagstaff (Cole).

103. *L. NIGER* var. *AMERICANUS* Emery. Grand Canyon (Wheeler, Cole); Williams (Cole).

104. *L. NIGER* var. *SITKAËNSIS* Pergande. Flagstaff (Cole). This ant was rather common beneath small stones on the grassy forest floor of a yellow pine and Englemann spruce forest.

105. *L. NIGER* var. *NEONIGER* Emery. Flagstaff (Cole).

106. *L. UMBRATUS* subsp. *SUBUMBRATUS* Viereck. Williams (Wheeler).

107. *L. (ACANTHOMYOPS) INTERJECTUS* subsp. *ARIZONICUS* Wheeler. Huachuca Mts. (Wheeler, Biedermann, W. M. Mann).

108. *FORMICA SANGUINEA* subsp. *SUBNUDA* Emery. San Francisco Mts. (W. M. Mann).

109. *F. SANGUINEA* subsp. *PUBERULA* Emery. Graham Mts. (E. G. Holt).

110. *F. RUFA* subsp. *OBSCURIPES* Forel. Thatcher (R. V. Chamberlin); Williams. Flagstaff (Cole).

111. *F. PERPILOSA* Wheeler. Tucson, Benson (Wheeler, Cole); Tempe (Cockerell); Cameron, Douglas (Cole).

At Cameron I saw many crater nests in very sandy soil. The colonies were populous and contained much brood. The nests were scattered between mounds of *Pogonomyrmex barbatus* subsp. *rugosus* Emery.

112. *F. FORELIANA* Wheeler. Huachuca Mts. (Biedermann).

113. *F. FUSCA* L. San Francisco Mts. (W. M. Mann).

114. *F. FUSCA* var. *SUBSERICEA* Say. Williams (Cole).

115. *F. FUSCA* var. *SUBAENESCENS* Emery. Prescott (Cole).

At this place there were many earthen mounds, about 4 inches

in diameter with single central openings, in a forest of young pine.

116. *F. FUSCA* var. *ARGENTEA* Wheeler. Grand Canyon, Williams (Wheeler); Graham Mts. (E. G. Holt); San Francisco Mts. (A. K. Fisher); Huachuca Mts. (H. A. Wenzel).

117. *F. FUSCA* var. *NEORUFIBARBIS* Emery. Grand Canyon (Wheeler).

118. *F. FUSCA* var. *GELIDA* Emery. Grand Canyon (Wheeler).

119. *F. NEOGAGATES* Emery. Ash Fork (Wheeler); Grand Canyon, Williams (Wheeler, Cole); Flagstaff (F. E. Pratt).

120. *F. NEOGAGATES LASIOIDES* var. *VETULA* Wheeler. Prescott (Cole).

121. *F. SUBPOLITA* Mayr. Grand Canyon (Wheeler, Cole). I was surprised to find but one colony of this species in the Coconino Forest, for the place is decidedly within the ant's normal range and the habitat is a suitable one. An examination of the literature failed to indicate the ant's presence in other Arizona localities.

122. *F. RUFIBARBIS* var. *GNAVA* Buckley. Grand Canyon, Phoenix, Prescott, Tempe, Tucson, Benson, Huachuca Mts. (Wheeler); Huachuca Mts. (W. M. Mann).

123. *F. COMATA* Wheeler. Flagstaff (Cole).

124. *F. MOKI* Wheeler. Prescott, Grand Canyon (Wheeler).

125. *MYRMECOCYSTUS MEXICANUS* var. *HORTI-DEORUM* McCook. Cameron, Prescott, Phoenix (Cole).

Apparently this ant is an occasional invader of the true desert, inasmuch as it was found near Phoenix. Its pebble mounds are usually constructed on rocky ridges at much higher elevations.

126. *M. MELLIGER* Forel. Grand Canyon (Wheeler).

127. *M. MELLIGER* var. *SEMIRUFUS* Emery. Yucca (Wheeler); Phoenix, Tucson (Wheeler, Cole); The Gap, Marble Canyon, Cameron, 57 Mi. N. Cameron, Tuba City (Cole).

This is probably one of the most common desert ants. Its shallow crater nests of sand are almost everywhere in dry areas. Workers are very active.

128. *M. MELLIGER SEMIRUFUS* var. *TESTACEUS* Emery. Phoenix (Wheeler, Cole).

129. *M. MELLIGER SEMIRUFUS* var. *ROMAINEI* Cole. Cameron (M. Romaine).

130. *M. MELLIGER* var. *JESUITA* Wheeler. Cameron (Cole).

131. *M. MELLIGER* subsp. *MIMICUS* Wheeler. Jerome, Tempe, Yucca, Ash Fork (Wheeler); Tucson, Phoenix

(Wheeler, Cole); 30 Mi. E. Kingman, 16 Mi. S. Prescott (Cole).

This ant is typically a desert dweller. It constructs shallow crater mounds 8 to 10 inches in diameter. The colonies observed by the writer were large and contained no repletes.

132. *M. MELLIGER* subsp. *MENDAX* Wheeler. Grand Canyon (Wheeler).

133. *M. MELLIGER* subsp. *ORBICEPS* Wheeler. Ash Fork, Tucson (Wheeler); Cochise Co. (Biedermann).

134. *CAMPONOTUS SCHAEFFERI* Wheeler. Palmerlee (C. Schaeffer); Huachuca Mts. (Biederman, Osler).

135. *C. ACUTIROSTRIS* var. *CLARIGASTER* Wheeler. Grand Canyon (Wheeler).

136. *C. SAYI* Emery. Prescott, Phoenix (Wheeler); Graham Mts. (E. G. Holt).

137. *C. FALLAX* subsp. *RASILIS* Wheeler. Arizona (Wheeler).

138. *C. FALLAX RASILIS* var. *PAVIDUS* Wheeler. Arizona (Wheeler).

139. *C. MATULATUS* subsp. *VICINUS* Mayr. Grand Canyon (Wheeler); Flagstaff, Prescott, Williams (Cole).

This form nests beneath logs at higher elevations in the State.

140. *C. MACULATUS VICINUS* var. *LUTEANGULUS* Wheeler. Huachuca Mts. (Wheeler).

141. *C. MACULATUS VICINUS* var. *NITIDIVENTRIS* Emery. Grand Canyon (Wheeler, Cole); Flagstaff, Prescott (Cole).

This ant is common at higher elevations and almost invariably nests beneath rocks. It is a typical pine forest insect.

142. *C. MACULATUS VICINUS* var. *INFERNALIS* Wheeler. Williams (Wheeler).

143. *C. MACULATUS* subsp. *MACCOOKI* Forel. Grand Canyon (Wheeler); Prescott (Cole).

144. *C. MACULATUS* subsp. *SANSABEANUS* Buckley. Huachuca Mts. (Wheeler).

145. *C. MACULATUS SANSABEANUS* var. *TORREFACTUS* Wheeler. Grand Canyon (Wheeler).

146. *C. MACULATUS* subsp. *BULIMOSUS* Wheeler. Huachuca Mts. (Wheeler, Mann, Biedermann).

147. *C. FUMIDUS* var. *FESTINATUS* Buckley. Arizona (Wheeler).

148. *C. FUMIDUS* var. *SPURCUS* Wheeler. Huachuca Mts. (Wheeler).

149. *C. VAFER* Wheeler. Huachuca Mts. (Wheeler).

150. *C. ACUTIROSTRIS* var. *CLARIGASTER* Wheeler. Grand

Canyon (Wheeler).

151. *C. OCREATUS* subsp. *PRIMPILARIS* Wheeler. Huachuca Mts., Nogales (Wheeler, Mann, Biedermann).

152. *C. MINA* subsp. *ZUNI* Wheeler. Tucson (Wheeler).

153. *C. (COLOBOPSIS) ULCEROSUS* Wheeler. Huachuca Mts. (Wheeler).

Marked Migrant Butterflies (Lepid.: Nymphalidae).

Under this title, in the *Entomologist's Record and Journal of Variation* (London), for October, 1936, Mr. T. Bainbrigge Fletcher, formerly Imperial Entomologist for India, comments on the absence of information on the actual movements of individuals and continues: "To attain this necessitates the marking of individual butterflies in such a way that each individual may be recognizable at any time or place. . . . After trials of several methods, . . . I have marked individuals with numbers on small labels applied directly to the wing. The process is quite simple. After netting, the specimen is examined for sex and any individual peculiarities (condition, chips, splits or tears of the wings, markings, etc.), which are noted in a register; a small patch on the upper surface of the right fore wing is then rubbed clear of scales and a small label is attached to this bare patch with Canada balsam; the butterfly is then placed in a glass-bottomed box for a few minutes, to allow the adhesive to harden, and it is then released. The label, which does not incommode its flight in the least, is written in waterproof Indian ink on tracing paper, a small sheet of labels being written up and each one cut off as required. . . . Any combination of letters or of numbers can be used, provided that each marker has his distinct series. It is desirable to descale the portion of the wing to which the label is to be applied, as in some of my earlier experiments, in which I did not descale, I found that the labels sometimes became detached by being pulled off with the patch of the underlying scales; since practising descaling I find that the label is very rarely lost. . . . During this season I have marked up to date (27. ix. 36) 67 *V. atalanta*, 7 *V. cardui* and 1 *V. io*. Of the *V. cardui* one individual remained here and was seen frequently for ten days after release. Of the *V. atalanta* six remained for two or three days, . . . one for seven days and one for twelve days; so that only three individuals out of seventy-five remained for any appreciable period, all the rest flying off again at once or almost at once."