THE SPECIES OF PSEUDOMASARIS ASHMEAD

(Hymenoptera, Masaridae)

BY

O. W. RICHARDS

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THE SPECIES OF PSEUDOMASARIS ASHMEAD
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WHEN ATTEMPTING TO REVISE the family Masaridae (Richards, 1962), I became interested in the genus *Pseudomasaris*. At that time only limited material was available, but, on a visit to the Department of Entomology and Parasitology, University of California, Berkeley, it became possible for me to see for the first time a really large number of specimens.

No key to the species of *Pseudomasaris* seems to have been published since that of Bradley (1922). Subsequently, one new species has been added and four more are recognized here. Also, the much more extensive material now available necessitates a different treatment of some of the other species.

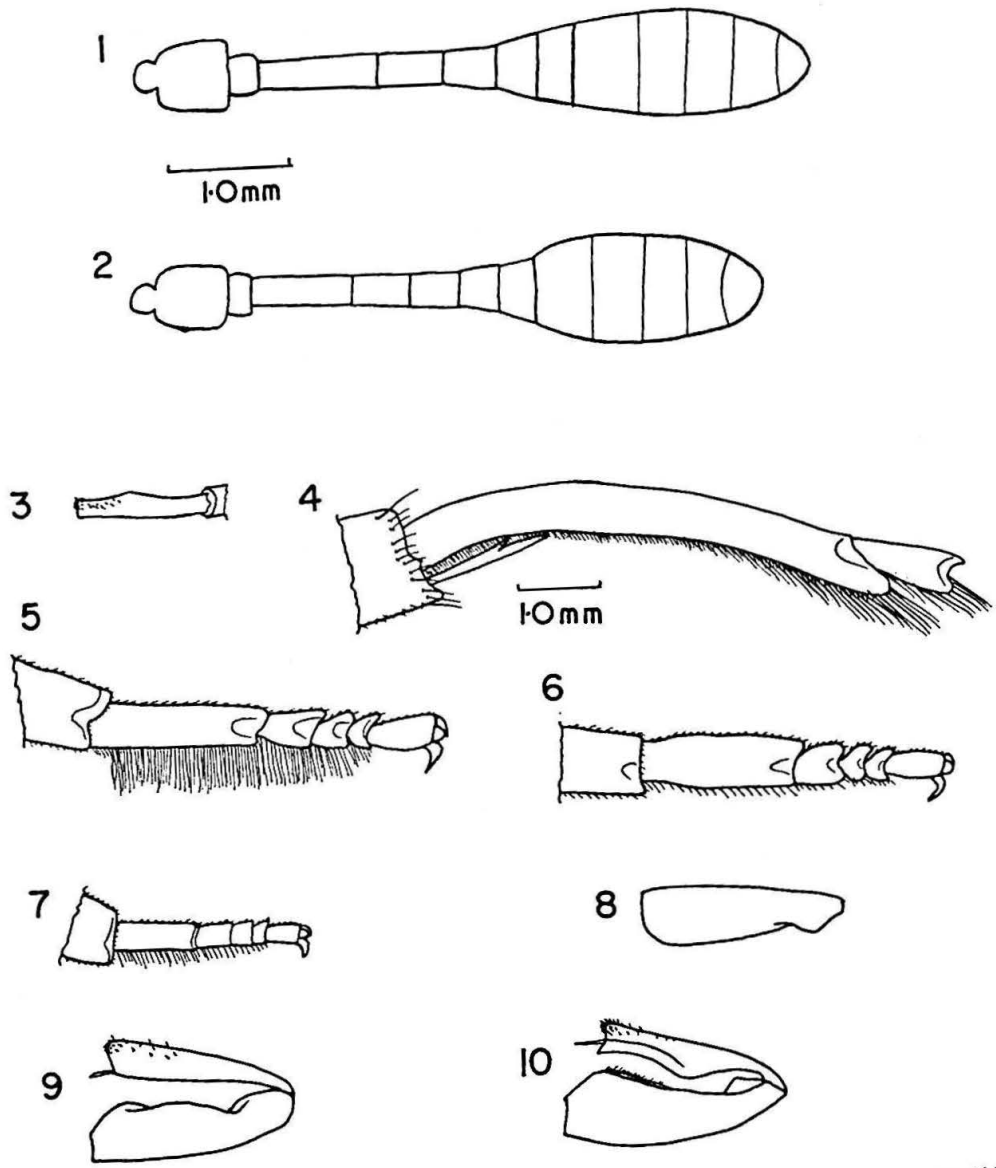
In my account United States records are arranged alphabetically by states, and counties are arranged alphabetically under the state. No more detailed information is given unless the specimen is a new record for the state, and hence is not recorded in one of the following papers: Bequaert, 1929, 1940, 1943; Cooper, 1952; Cooper and Bequaert, 1950; Krombein *et al.*, 1958; Muesebeck *et al.*, 1951.

For permission to borrow specimens and for help in examining them I am much indebted to the following: University of California, Berkeley campus (Dr. Ray F. Smith, Dr. J. W. MacSwain, and Dr. P. D. Hurd, Jr.); Davis campus (Dr. R. M. Bohart); California Academy of Sciences (Dr. E. S. Ross and Mr. G. I. Stage); the Academy of Natural Sciences, Philadelphia (Dr. J. A. G. Rehn); U. S. National Museum (Dr. K. V. Krombein); British Museum (Natural History) (Dr. I. H. H. Yarrow), Mr. R. R. Snelling, Mr. R. W. Thorp (private collections). I am particularly indebted to Dr. Bohart for allowing me to include the descriptions of his new species and for other help.

In the notes on individual species, the distributional records are based on specimens which I have examined personally unless otherwise indicated. A few labels refer to untraced localities, but it is unlikely that many of these would constitute new county records. The number of specimens examined is noted, since it gives some indication of the relative commonness of the species and also of the facility with which each sex is obtained, although doubtless not of the sex ratio. Cooper (1952) has given some evidence that most species are really oligolectic, and that too was my own experience in the field, but where there is definite evidence of unusual plants being visited it seems important to record it. I have therefore noted all the flower records from the locality labels. I have also contributed a number of new records from my own captures of seven of the species.

I received much kind help in the identification of the flowers from the Department of Botany, University of California, Berkeley, particularly from Miss A. M. Carter and Mrs. H. K. Sharsmith; Dr. Lincoln Constance was good enough to identify the species of *Phacelia*. I thought it useful to give some indication, also,

The author was Visiting Professor of Entomology in the Department of Entomology and Parasitology, January 1–June 30, 1961. Currently Professor, University of London, Imperial College of Science and Technology.



Figs. 1–10. Fig. 1. *Pseudomasaris michenerí* R. M. Bohart ♀, antenna. Fig. 2. *P. maculifrons* (Fox) ♀, antenna. Fig. 3. *P. edwardsii* (Cress.) ♀, dorsal view of left mid tibia. Fig. 4. *P. vespoides* (Cress.) ♂, posterior view of first two segments of hind tarsus. Fig. 5. *P. vespoides* (Cress.) ♂, posterodorsal view of right fore tarsus. Fig. 6. *P. edwardsii* (Cress.) ♂, posterodorsal view of right fore tarsus. Fig. 7. *P. maculifrons* (Fox) ♂, posterodorsal view of right fore tarsus. Fig. 8. *P. marginalis* (Cress.) ♂, posterior view of mid femur. Fig. 9. *P. coquilletti* Rohw. ♂, anterior view of mid femur and tibia. Fig. 10. *P. zonalis* (Cress.) ♂, anterior view of mid femur and tibia.

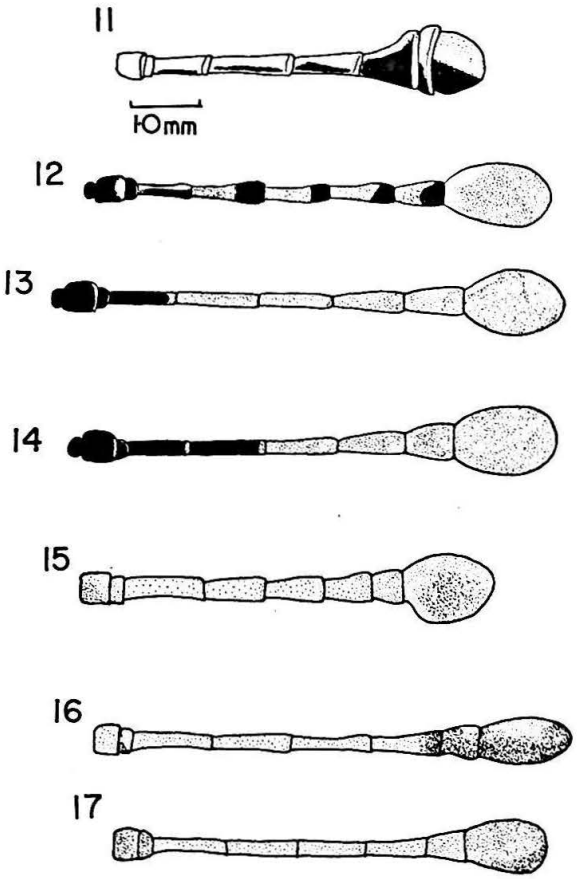
of altitudinal distribution and times of occurrence. The brief account of the biology of *Pseudomasaris coquilletti* Rohwer describes a colony near San Francisco shown me by Dr. E. S. Ross, who took color photographs of it; Mr. J. W. Siddorn has kindly reproduced them in black and white (except for pl. 1, by Dr. Ross).

The following abbreviations are used for the collections in which specimens are preserved: B.M. (British Museum, Natural History); C.A.S. (California Academy of Sciences); C.I.S. (California Insect Survey, University of California, Berkeley);

U.C.D. (University of California, Davis campus, Department of Entomology); U.S.N.M. (United States National Museum).

KEY TO THE SPECIES OF PSEUDOMASARIS

1. Females 2
   Males 15
2. A sharp transverse ridge just above antennal sockets; clypeus strongly rugose transversely; fore basitarsus as long as mid basitarsus ..... *vespoides* (Cress.)
   No ridge above antennal sockets; clypeus punctate or shagreened, not rugose; fore basitarsus wider and much shorter than mid basitarsus 3
3. Mid femur flattened beneath and with a more or less distinct anteroventral ridge, distinctly wider at base than at apex (least so in *edwardsii*); color black and sulfur-yellow (or in some forms of *zonalis* whitish), frons with a pale spot above clypeus (except in some females of *zonalis*); angles of propodeum distinctly dentate 4
   Mid femur rounded beneath with no anteroventral ridge, scarcely wider at base than at apex (except *wheeleri*) 6
4. Mid tibia almost always with a distinct anterior prominence near middle (fig. 3); humeri with an obtuse anterior ridge; yellow of upper orbits not produced toward ocelli; propodeal spines longer than in *zonalis* (Cress.) and yellow markings more extensive; metapleuron usually with a small yellow spot; size intermediate ..... *edwardsii* (Cress.)
   Mid tibia with no anterior prominence 5
5. Larger; humeri rounded; yellow of upper orbits produced toward ocelli; metapleuron usually with a large yellow dorsal spot ..... *coquilletti* Rohw.
   Smaller; humeri with an obtuse anterior ridge; propodeal spines usually shorter than in the other two species; yellow of upper orbits not produced toward ocelli; metapleuron often with no or with a minute yellow spot; pale markings sometimes whitish in northeastern part of its range ..... *zonalis* (Cress.)
6. Clypeus closely and rather coarsely punctured; propodeum strongly dentate; large species 7
   Clypeus finely and rather indistinctly punctured; smaller species 8
7. Color rather orange-yellow, bands of gastral tergites II–V feebly emarginate in front or covering whole segment; mesoscutum less closely punctured posteriorly. New Mexico and eastward ..... *occidentalis* (Cress.)
   Color black and sulfur-yellow, bands of gastral tergites II–V deeply tri-emarginate or spotted in front; mesoscutum more closely punctured and duller posteriorly. California ..... *wheeleri* J. Beq.
8. Propodeum lamellate rather than dentate; if dentate the tooth very short; thorax with long dense hairs; not red-marked 9
   Propodeum with angles strongly dentate; thorax less densely pubescent; except in *macswaini*, nearly always with some markings reddish, at least on first and second segments of gaster 10
9. Markings whitish yellow; clypeus, scape, mesopleuron, scutellum, and gaster ventrally black. Region of Rocky Mountains and northward ..... *marginalis* (Cress.)
   Markings sulfur-yellow; clypeus, scape, mesopleuron, scutellum, and gaster ventrally with yellow markings. Sierra Nevada, California, and Utah ..... *macneilli* R. M. Bohart
10. Smaller species with whitish markings; frons dull; mesoscutum closely punctured 11
    Species with yellow markings 13
11. Smaller; frons with no central white mark; mandibles with a white spot; punctures of frons, especially between eye and ocelli, fewer and smaller; punctures of mesepisternum smaller and denser. California (Inyo Co.) and Arizona (Yuma Co.) at low or moderate elevations ..... *basirufus* Rohw.
    Slightly smaller; mandibles brown; punctures of frons larger and more numerous, of mesepisternum larger and less dense 12



Figs. 11–17. Views of antenna. Fig. 11. *Pseudomasaris edwardsii* (Cress.) ♂. Fig. 12. *P. basirufus* Rohw. ♂. Fig. 13. *P. maculifrons* (Fox) ♂. Fig. 14. *P. micheneri* R. M. Bohart ♂. Fig. 15. *P. marginalis* (Cress.) ♂. Fig. 16. *P. coquilletti* (Rohw.) ♂. Fig. 17. *P. zonalis* (Cress.) ♂.

12. Antennal club appearing longer; segment VI about 1.5 times as broad as long, broader than length of segment IV (fig. 1); frons occasionally with no central white spot. California, Inyo Mountains above 5,000 feet ..... *micheneri* R. M. Bohart
Antennal club appearing shorter; segment VI 1.3 times as broad as long or less, not broader than length of segment IV (fig. 2); frons with a central white spot. California and Utah to New Mexico and Mexico at lower elevations ..... *maculifrons* (Fox)
13. Smaller, black and yellow species, without red; frons duller, mesoscutum more closely punctured; mandibles largely yellow. Southern California ..... *macswaini* R. M. Bohart
Larger, black and yellow species, pronotum partly red; frons pronotum, and mesoscutum more shining; mandibles brown 14
14. Mesoscutum more shining, with coarser and sparser punctures; gaster with wider complete bands both above and below. New Mexico ..... *phaceliae* Rohw.
Mesoscutum rather more closely and finely punctured; gaster with narrower bands, those on tergites I–II interrupted centrally, on sternites only that on II at all complete. Arizona and Texas ..... *texanus* (Cress.)
15. Anterior basitarsus with a long posterior fringe (fig. 5); posterior basitarsus curved, distally lobed (fig. 4); antennal club concave beneath and longer than segment III;

a more or less marked keel above antennal sockets; gastral tergite VII nearly always with a pair of small dorsal tubercles as well as the two pairs of more ventral ones ..... *vespoides* (Cress.)

Anterior basitarsus with or without a short fringe; posterior basitarsus usually nearly straight, not lobed; antennal club convex beneath or else much shorter; no keel above antennal sockets; the extra dorsal pair of tubercles on gastral tergite VII absent (or indicated in *macswaini*) 16

16. Antennal segments VI–VII wider than the short club, which is concave beneath (fig. 11); eyes widely separated and not reaching hind margin of vertex; fore basitarsus without posterior fringe (fig. 6) ..... *edwardsii* (Cress.)

Antennal segments VI–VII less widened, narrower than club 17

17. Eyes reaching posterior margin of head, approximated on vertex so that they closely approach posterior ocelli and are not themselves separated by more than 3 times diameter of latter (figs. 19–21); fore basitarsus with a short but distinct posterior fringe (fig. 7) 18

Eyes not reaching posterior margin of head, not so approximated and only in *wheeleri* approaching posterior ocelli; process of gastral sternite III hook-like behind 23

18. Gastral tergite VII ending in a subconical process; process of gastral sternite III narrow, ventral surface nearly linear, anteriorly with 2 small teeth, posteriorly in profile forming a hook (fig. 23); antennal segments III–IV reddish with white apices, IV distinctly widened at apex; eyes separated by rather less than 3 times diameter of a posterior ocellus (fig. 19); pale markings white, red restricted to gaster and often not well developed. California and Arizona ..... *basirufus* Rohw.

Gastral tergite VII ending in a squarish process, usually with minute teeth on each side; process of gastral sternite III triangular in ventral view, not toothed in front; antennal segment IV not widened at apex 19

19. Usually smaller species; process of gastral sternite III normally widely triangular (fig. 25); antennal club a little longer, segments VI–VII usually little widened, flagellum not conspicuously annulated beneath 20

Usually larger species; gaster yellow with some red markings; gastral tergite VII without minute dorsal tubercles; process of gastral sternite III narrowly triangular (fig. 24); antennal club a little longer, segments VI–VII distinctly widened, flagellum annulated beneath 22

20. Markings whitish, gaster nearly always with some red; eyes separated by about 1.5 times diameter of posterior ocelli or less; head and thorax more shining; gastral tergite VII without minute dorsal tubercles 21

Markings yellow, gaster without red; eyes separated by 2–3 times diameter of posterior ocelli; head and thorax duller; gastral tergite VII with a pair of minute dorsal tubercles ..... *macswaini* R. M. Bohart

21. Antennal segment VI only slightly widened at apex, just wider than segment III; segment VII not more than half as broad as long (fig. 13); eyes separated by about an ocellar diameter (fig. 20) ..... *maculifrons* (Fox)

Antennal segment VI distinctly widened at apex, twice as wide as segment III; segment VII two-thirds as broad as long (fig. 14); eyes separated by at least 1.5 times ocellar diameter (fig. 21) ..... *micheneri* R. M. Bohart

22. Eyes separated by 1.5 times diameter of posterior ocelli or less; process of gastral sternite III narrower (fig. 24); mesoscutum more closely punctured; yellow gastral bands narrower ..... *texanus* (Cress.)

Eyes separated by rather more than 3 times diameter of posterior ocelli; process of gastral sternite III wider; mesoscutum less closely punctured; yellow gastral bands wider ..... *phaceliae* Rohw.

23. Mid femur simple though thickened; antennal segment VII twice as long as broad or rather longer, club convex beneath; large species 24

Mid femur more or less emarginate beneath or with a tubercle near its apex posteriorly; fore basitarsus without posterior fringe; antennal segment VII less than 1.5 times as

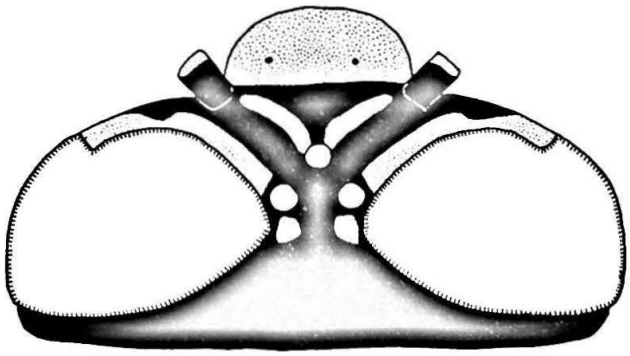


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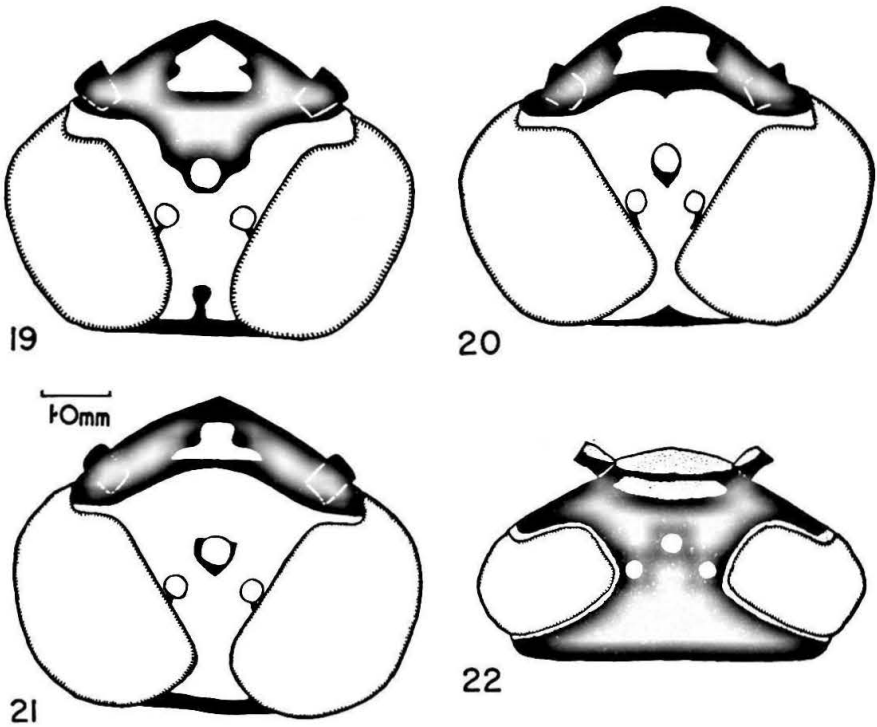
Fig. 18. *Pseudomasaris wheeleri* J. Beq. ♂, head in dorsal view.



Figs. 19–22. Head in dorsal view. Fig. 19. *Pseudomasaris basirufus* Rohw. ♂. Fig. 20. *P. maculifrons* (Fox) ♂. Fig. 21. *P. micheneri* R. M. Bohart ♂. Fig. 22. *P. zonalis* (Cress.) ♂.

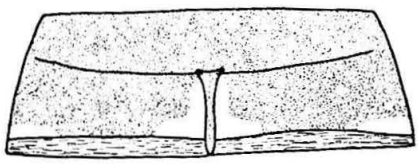
long as broad; process of gastral sternite III with ventral surface flat or slightly concave, without anterior teeth 25

24. Eyes approximated on vertex where separated by 3 times diameter of a posterior ocellus which they almost touch (fig. 18); process of gastral sternite III with ventral surface slightly concave, without anterior teeth; more dorsal process of gastral tergite VII longer and with a dorsal carina; fore basitarsus and mid tibia as in *occidentalis*. California ..... *wheeleri* J. Beq.

Eyes not approximated on vertex where separated by at least 5 times diameter of a posterior ocellus which they do not nearly touch; process of gastral sternite III with ventral surface grooved and with 2 blunt anterior teeth; more dorsal process of gastral tergite VII shorter and not keeled 24

25. Mid tibia in front view strongly dilated at about middle; fore basitarsus with a short fringe of hairs; antennal club shorter and broader. New Mexico, Kansas, and Texas *occidentalis* (Cress.)

Mid tibia simple; fore basitarsus without a fringe; antennal club longer and narrower; species very largely orange-brown. Mexico ..... *cazieri* R. M. Bohart



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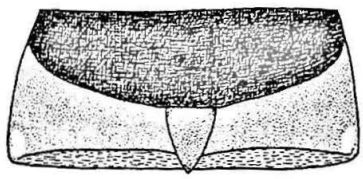

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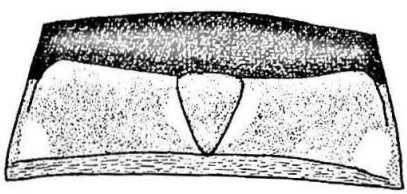

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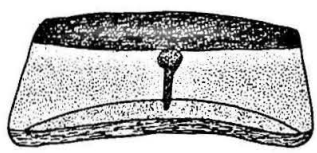

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Figs. 23–26. Ventral views of third gastral sternite. Fig. 23. *Pseudomasaris basirufus* Rohw. ♂. Fig. 24. *P. texanus* (Cress.) ♂. Fig. 25. *P. maculifrons* (Fox) ♂. Fig. 26. *P. zonalis* (Cress.) ♂.

26. Antennal segment VI hardly more than twice as long as broad at apex, antennae conspicuously black annulated beneath only (fig. 15); mid tibia simple, mid femur with a slight tubercle behind at apex 27

Antennal segment VI at least 3 times as long as wide at apex; mid femur emarginate beneath 28

27. Markings whitish yellow, pleuron and scutellum black, venter of gaster mainly black; antennal club concave beneath; tubercle behind mid femur larger. Region of Rocky Mountains and northward ..... *marginalis* (Cress.)

Markings sulfur-yellow, mesopleuron and scutellum with large yellow spots, venter of gaster mostly yellow; antennal club flattened beneath. Sierra Nevada, California, and Utah ..... *macneilli* R. M. Bohart

28. Larger; antennal segments VI–VII gradually widening to the less well-defined club which is hardly wider than segment VII (fig. 16); mid tibia somewhat thickened, not emarginate (fig. 9) ..... *coquilletti* Rohw.

Smaller; antennal segments VI–VII less widened, club better defined, clearly wider than segment VII (fig. 17); mid tibia anteriorly emarginate (fig. 10) ..... *zonalis* (Cress.)

NOTES ON THE SPECIES

1. *Pseudomasaris occidentalis* (Cresson)

Masaris occidentalis Cresson, 1871:348, ♀; Cresson, 1872*b*: 231, ♂
Pseudomasaris occidentalis, Ashmead, 1902:221.

Type locality.—TEXAS: Bosque Co. [see note under *P. texanus* (Cresson)].

Examined, 3 ♂ 9 ♀, including ♂ ♀ paratypes. The species is not well represented in collections.

Distribution.—KANSAS: Marshall Co. (Bequaert, 1940). NEW MEXICO: San Miguel Co., Bernalillo or Torrance Co. (Bequaert, 1940). TEXAS: Bosque Co.

2. **Pseudomasaris cazieri** R. M. Bohart, new species

"*Male.*—Length 20 mm. Black, extensively marked with yellow grading into reddish brown; primarily yellow are: clypeus, inner orbital line, posterior pronotal margin, propodeal tooth, tibiae and tarsi, irregular subapical band across tergite I, spots on III, IV-VII mostly; primarily reddish brown are: mandible, antenna except black on club above, labrum, outer orbital line, pronotum mostly, tegula, wing bases, quadrate posterior scutal spot, scutellum, propodeal tooth basally, blotchy spots on tergites including bands across II–III, legs from femora to coxa, venter of abdomen mostly; wings brownish yellow on basal one-half, then brown with a purplish tint, Pubescence fulvous, abundant and as long as 0.5 to 0.7 times length of flagellomere I on head, thorax, and basal two-thirds of tergite I; pubescence of fore basitarsus dense, shorter than distal breadth of segment, not fringe-like; wings with dense microsetae, especially in median, submarginal, and marginal cells. Punctation fine to moderate, mostly close; clypeus with coarse separated punctures, finer apically. Flagellomeres I–V and club with length ratios 1.0:1.0:0.9:0.9:0.7:2.0, respectively, I–IV rather uniform and slender, V about 1.7 times as long as broad, club 2.5 times as long as broad; least interocular distance 6 times lateral ocellus diameter, lateral ocellus about 1 diameter from eye; scutellum with a dull longitudinal ridge, definitely humped above scutum in profile; propodeal tooth small, obtuse; legs essentially simple; sternite II with an irregular sharp subapical transverse ridge; process of ternite III narrow, not broader anteriorly than posteriorly, deeply saddled in profile; tergite VII ending dorsally in a pair of broadly rounded, essentially parallel, dorsoventrally flattened lobes surrounding a little more than a semicircle; tergite VII ventrally with a furrow ending in a pair of small blunt teeth; aedeagus not constricted laterally in distal one-half, clasper densely pubescent, hair longer beneath than above where it is not confined to a definite distal area by a carina.

"*Holotype male.*—Palos Colorados, Durango, Mexico, 8,000 feet elevation, August 5, 1947 (M. A. Cazier). In the collection of the American Museum of Natural History, New York.

"*Systematics.*—Closely related to *occidentalis* but differing in many details such as the more slender antennal club, greater ocellocular distance, more humped scutellum, unfringed fore basitarsus, simple mid tibia, narrower process of sternite III, very different distal lobes of tergite VII, nonconstricted aedeagus, and pubescence of clasper shorter above than below and not restricted to distal area by an oblique carina."

3. *Pseudomasaris wheeleri* J. Bequaert

(Fig. 18)

Pseudomasaris wheeleri J. Bequaert, 1929:61, figs. A–K, ♂ ♀.

Type locality.— CALIFORNIA: Riverside Co., Palm Springs.

Examined, 60 ♂, 74 ♀, including ♂ ♀ paratypes.

Distribution.—CALIFORNIA: Inyo, Kern, Lake, Los Angeles, Mariposa, Napa, Riverside, Sacramento, San Benito, San Bernardino, San Diego, Tulare, Ventura, and Yolo counties. MEXICO, Baja California: Sierra San Pedro Martir, 2 mi. W. Sanja, 6,500 ft., June 2, 1958, ♂; 2 mi. W. Socorro, 6,000 ft., May 27, 1958, ♂, and 3,000 ft., June 4, 1958, ♀ (J. Powell); Sierra San Pedro Martir, Las Encinas, 6,000 ft., June 3, 1958, 4 ♂ (Powell and Patterson, C.I.S.), and 65 mi. S. San Felipe, June 10, 1960, ♀ (R. D. Gehring, Snelling coll.).

Altitudinal records, available for only 25 specimens, range from 2,000 to 8,000 feet, with more than half of the specimens from 6,000 feet or above. It is surprising that a species which is widespread and not very rare in California should not yet be known from any other state.

Flower records.—Liliaceae, *Yucca* sp. 1 ♀; Hydrophyllaceae, *Eriodictyon californicum* (H. & A.) Greene 3 ♂ 3 ♀, *E. crassifolium* Benth. 1 ♂ 1 ♀, *E. tomentosum* Benth. 2 ♀, *E.* sp. 2 ♀; Scrophulariaceae, *Penstemon spectabilis* Thurb. 1 ♂ 1 ♀, *P.* sp. 1 ♂ 4 ♀; Compositae, *Peucephyllum schotti* Gray 2 ♂ 2 ♀.

The specimens on *Eriodictyon crassifolium* were recorded as *P. coquilletti* by Bradley (1922: 429).

The keel on the dorsal process of gastral tergite VII varies and is sometimes little developed. The extent of the yellow markings varies considerably and they are often more extensive in southern specimens. However, there is so much non-segregable geographic variation in these characteristics that is seems a mistake to recognize a southern subspecies.

TIMES OF OCCURRENCE

	March		April		May		June		July
	1–15	16–31	1–15	16–30	1–15	16–31	1–15	16–30	1–15
♂	1	1	7	6	4	8	21	7	3
♀	0	1	4	8	5	7	22	19	5

4. *Pseudomasaris marginalis* (Cresson)

(Figs. 8, 15)

Masaris marginalis Cresson, 1864:677, ♀.

Pseudomasaris marginalis, von Dalla Torre, 1904:8; Bradley, 1922:424, ♂ ♀.

Type locality.—COLORADO.

Examined, 4 ♂ 25 ♀.

Distribution.—CANADA, Alberta: British Columbia (Cooper and Bequaert, 1950). COLORADO: Boulder; El Paso Co. (Cooper and Bequaert, 1950); ?Fremont Co. (Cooper and Bequaert, 1950, "Echo Lake"); La Plata Co. (Bequaert, 1929); Rio Grande Co. MONTANA: Flathead Co., Glacier National Park, June 1, 1938, ♀ (E. C. van Dyke, C.A.S.). NEVADA: Elko Co., Lamoille Canyon, 7,300 ft., on *Phacelia*, June 18, 1958, 2 ♀ (R. C. Bechtel, U.C.D.). NEW MEXICO: (Bradley, 1922). UTAH: Cache Co. (Cooper and Bequaert, 1950). WASHINGTON: Whitman Co., Pullman, ♀ (U.S.N.M.). WYOMING: Fremont Co., 30 mi. S. of Lander, July 13, 1955, ♀ (G. E. Bohart, U.C.D.); Teton Co., Grand Teton National Park, June 20, 1940, 3 ♀ (G. E. Bohart, U.C.D.).

Males were caught between June 15 and July 28 and females between June 1 and July 8. Altitudinal records are for 7,000–8,000, 10,240, and 10,856 feet. Two females were caught on *Phacelia* sp. and one on *Phacelia sericea* (Grah.) A. Gray (=*Entoca sericea* Graham).

P. marginalis is not common in collections but is a characteristic Rocky Mountain species. It is known by the long, dense black hairs on the head and thorax and by the very reduced pale markings, particularly on the venter of the gaster.

5. **Pseudomasaris macneilli** R. M. Bohart, new species

"*Male.*—Length 11 mm. Black, extensively marked with sulfur yellow as follows: labrum, mandible, clypeus mostly, interantennal spot, inner and outer orbital line, prothorax mostly, tegula, large mesopleural spot, posterior two-thirds of scutellum, postscutellar spot, propodeal tooth, spots on coxae and trochanters, femora partly, tibiae and tarsi almost entirely, broad band on tergites I–VII, and most of venter; antennae with scape, pedicel, and flagellomeres II–IV yellow with orange inner apical spot next to ventral apical black spot, latter progressively larger distally; club orange to brown above, a large black subbasal ventral spot, distal two-fifths all black beneath; wings with reddish veins, yellowed areas, and faint brown clouds. Head and thorax with mostly fulvous short pubescence, many long black hairs; pubescence of abdomen fulvous including sparse hairs toward base of tergite I. Punctation fine, close. Flagellomeres I–V and club with length ratios 1.0:1.0:0.9:0.9:0.7:1.4, respectively; club 1.8 times

as long as broad, nearly flat beneath; I slender, II–IV swollen somewhat distally, V two-thirds as broad as long; least interocular distance 4.5 times lateral ocellus diameter, lateral ocellus 0.6 dimeter from eye; propodeal tooth thin, a little less than a right angle (more obtuse in some paratypes); legs with mid femur flattened beneath, abruptly but slightly expanded at distal one-third, all tibiae flattened beneath; process of sternite III broad and rounded anteriorly, narrow and sharp posteriorly, ventral surface slightly concave, profile not saddle-like; tergite VII ending dorsally in two stout divergent lobes, ventrally in a pair of small blunt teeth; aedeagus with sides nearly parallel, apex a sharp wedge; clasper not obliquely carinate near apex above, ventrally with a group of stout spiculae near inner apex.

"*Female.*—Essentially as in male. Black markings more extensive, antenna yellow to orange beneath, not black-spotted, clypeus with a broadly wedge-shaped yellow spot in middle one-third. Flagellomere IV 1.4 times as broad as long.

"*Holotype male.*—Near Sonora Peak (above Sonora Pass), Tuolumne County, California, 11,000 feet elevation, July 14, 1957 (C. D. MacNeill, C.A.S., San Francisco).

"*Paratypes.*—1 ♂ topotype, July 13, 1951 (S. M. Kappos, U.C.D.); 1 ♂, Scott Mt., Trinity County, California, 5,530 feet elevation, June 4, 1951 (M.F. McClay, U.C.D.); 2 ♂, 4 ♀ topotypes, 10,000 feet elevation, June 29, 1961, on *Hydrophyllum occidentale* (S. Wats.) A. Gray (O. W. Richards, O.W.R., U.C.D., C.I.S.); 1 ♀, same data as type.

"*Metatype.*—1 ♀, American Fork, Utah, June (U.C.D.). This agrees closely but is a little darker and yellow is deeper in tone.

"*Systematics.*—There is an obvious close relationship with *marginalis,* and the female seems to differ only in markings, notably the yellow instead of white, and the maculate instead of all black clypeus and scape. The male of *macneilli,* in addition to color, has the antennal club flat beneath rather than concave and ridged externally. The flagellomeres and the club are somewhat more slender in *macneilli,* also."

In Sonora Pass, on June 29, 1961, I found this species to be not very common, at about 10,000 feet on the Tuolumne side, on or around flowers of *Hydrophyllum.* This was on the sunny east-facing side of a small valley on the north of the road and no other species was present. On the next day, rather more than a thousand feet lower down, *P. zonalis* (Cresson) was visiting the flowers of *Phacelia frigida* Greene, on the edge of the road. In 1960, between August 10 and 18, a party from the University of California (Davis and Berkeley campuses) collected on Sonora Pass. They obtained 7 males and 55 females of *P. zonalis,* but earlier (June 26, 1960) Mr. R. W. Thorp obtained one female of *P. macneilli* (now in his collection). These specimens, however, were not labeled accurately enough in regard to place and flowers visited to speak definitely of habitat.

P. macneilli, although close to *P. marginalis,* could in the female be confused with *P. zonalis,* especially since the anteroventral ridge on the femur of the last-named species is not always conspicuous. *P. macneilli,* however, is larger, yellower (especially beneath the gaster), and has longer hairs and shorter propodeal spines.

6. *Pseudomasaris zonalis* (Cresson)

(Figs. 10, 17, 26)

Masaris zonalis Cresson, 1864:674, ♂ ♀.

Pseudomasaris zonalis, von Dalla Torre, 1904:8.

Pseudomasaris zonalis subsp. *albopictus* R. M. Bohart, 1950:78, ♂ ♀.

Type locality.—COLORADO (*zonalis*). WYOMING: Teton Co., Grand Teton National Park (subsp. *albopictus*).

Examined, 174 ♂ 722 ♀, including ♀ paratypes and several paratypes of the form *albopictus.*

Distribution (including that of form *albopictus*).—CANADA, British Columbia (Bequaert,

1929). CALIFORNIA: Alpine, Butte, Contra Costa, Del Norte, El Dorado, Fresno, Inyo, Kern, Lassen, Madera, Mariposa, Modoc, Mono, Nevada, Placer, Plumas, Riverside, San Bernardino, Santa Clara, Shasta, Sierra, Siskiyou, Trinity, Tulare, Tuolumne, and Ventura counties. COLORADO: Boulder, Denver, Jefferson, and Larimer counties. IDAHO: Bear Lake (Bequaert, 1940), Butte, Franklin, Fremont, and ?Nez Percé counties (Bradley, 1922, "Craig's Mt."). MONTANA: Granite Co., Skalkalo Pass Ham., August 1, 1949, 3 ♀ (R. H. Beamer, U.C.D.). NEBRASKA: Sioux Co. (Bequaert, 1943). NEVADA: Douglas, Humboldt, and Washoe counties. OREGON: Baker, Clackamas, Deschutes, Hood River (Bequaert, 1940), Jefferson, Klamath, Lake (Baequaert, 1940), and Wallowa counties. UTAH: Cache, Duchesne, Morgan, Salt Lake (Bradley, 1922), Summit, Utah, and Wasatch counties. WASHINGTON: Asotin, Jefferson, Pierce, Skagit (Bequaert, 1929), Walla Walla, Whitman, and Yakima counties. WYOMING: Teton Co.

TIMES OF OCCURRENCE

	April		May		June		July		August		September
	1–15	16–30	1–15	16–31	1–15	16–30	1–15	16–31	1–15	16–31	1–15
♂	1	0	7	11	20	35	39	31	18	4	0
♀	0	1	3	32	49	187	165	140	65	40	3

The localities of the following specimens in the British Museum collection are doubtful: North Dakota or Texas: Ward Co., July, *Phacelia* 1 ♀ (W. P. and T. D. A. Cockerell) (there is a Ward Co. in the above two states but in no others); 3 ♀ (F. Smith coll. 72-1879) labeled "Texas."

Altitudinal records are available for 103 specimens, 47 of which came from 10,000–12,000 feet. While nearly all are from 6,000 feet or higher, there is one record from 2,500 feet. I myself rather surprisingly caught a male and female in Contra Costa County, Mitchell Canyon, below 1,000 feet, on May 27, 1961, at flowers of *Phacelia nemoralis* Greene.

Flower records.—Ranunculaceae, *Ranunculus* sp. 1 ♀; Rhamnaceae, *Ceanothus parviflorus* Trel. 1 ♂ 1 ♀; Hydrophyllaceae, *Phacelia frigida* Greene 2 ♂ 7 ♀, *P. hastata* Dougl. 1 ♂ 16 ♀, *P. heterophylla* Pursh. 1 ♂ 2 ♀, *P. humilis* T. & G. 3 ♂ 12 ♀, *P. nemoralis* Greene 1 ♂, 1 ♀, *P.* sp. 6 ♂ 64 ♀; Scrophulariaceae, *Penstemon* sp. 1 ♀; Compositae, *Arnica* sp. 1 ♀, *Encelia farinosa* Grayo 1 ♀, *Grindelia* sp. 1 ♀.

The male of this species is easily recognized by the form of the mid tibia. The process on the third gastral sternite varies in size and shape, but is always Y-shaped, although the stalk may be narrow. The female is sometimes difficult to recognize, as the ridge on the mid femur may be very weak. Such individuals may resemble *P. marginalis* (Cresson) or *P. macswaini* R. M. Bohart. The former is more pubescent, the mid femur is less widened at the base, and the propodeal teeth are even shorter. A few females of *P. edwardsii* (Cresson) lack or almost lack the prominence on the mid tibia and might then run to *P. zonalis* (Cresson). Such females have longer propodeal teeth than in *P. zonalis,* and the humeri are more obtuse in front, less overhanging.

On the average, *P. edwardsii* has more extensive yellow markings, especially on the metapleuron and propodeum, but this does not hold for every specimen. The most southern specimens of *P. zonalis* are often, but not always, very yellow.

Dr. R. M. Bohart described the forms with whitish markings as subspecies *albopictus,* and many specimens of this form, including nearly all the original material, have been examined. There is considerable variation in the shade of yellow; the whiter specimens usually have the pale areas reduced, although the

extent of this is variable. The whitest and least pale-marked specimens occur in the northeast of its range (Wyoming, Idaho, Oregon, and Washington), often at high altitudes. The whitest and least pale-marked specimens seen were 1♂ 4♀ from Humboldt County, Santa Rosa Range, Nevada, June 16, 1960 (A. E. Manke, U.C.D.). The locality, however, where the white form occurs most consistently seems to be the region of Craters of the Moon, Idaho. I found it common there (Blaine Co., near Fish Creek Reservoir, on *Phacelia hastata* Dougl., June 19, 1961), and the only yellow females all turned out to belong to *P. edwardsii* (Cresson). Nevertheless, there is no clear geographical segregation, and Dr. Bohart agrees that the subspecies should now be synonymized.

7. *Pseudomasaris coquilletti* Rohwer

(Pls. 1, 2, *a*; figs. 9, 16)

Pseudomasaris coquilletti Rohwer, 1911:555, ♂ ♀.

Type locality.—CALIFORNIA: Los Angeles Co.

Examined, 55 ♂ 86 ♀, including the type ♀ and ♂ allotype.

Distribution.—ARIZONA: Pima Co. (Cooper and Bequaert, 1950). CALIFORNIA: Amador, Contra Costa,[1] El Dorado, Fresno, Inyo, Los Angeles, Madera, Marin, Mariposa, Merced, Modoc, Mono, Monterey, Napa, Placer, Riverside, Sacramento, San Benito, San Bernardino, San Diego, San Luis Obispo, Santa Clara, Shasta, Siskiyou, Sonoma, Stanislaus, Tulare, Ventura, and Yolo counties. OREGON: Klamath Co., Klamath Lake, Eagle Ridge, Bard Id., May 20, 1924, ♂ (C. L. Fox, U.C.D.). UTAH: (Krombein, 1958).

TIMES OF OCCURRENCE

	March	April		May		June		July
	16-31	1-15	16-30	1-15	16-31	1-15	16-30	1-15
♂	1	20	4	10	10	4	1	1
♀	3	18	5	16	22	6	5	2

The species seems to be found mainly at lower altitudes, but the only positive records are one from 3,000 feet, two from about 2,000 feet, and 14 from about 300 feet.

Flower records.—Rhamnaceae, *Ceanothus* sp. 1 ♂; Onagraceae, *Oenothera* sp. 1 ♀; Hydrophyllaceae, *Phacelia californica* Cham. 2 ♀, *P. cicutaria* Greene 2 ♀, *P. distans* Benth. 6 ♂ 8 ♀, *P. imbricata* Greene 5 ♂, *P.* sp. 14 ♂ 15 ♀.

This species is well differentiated in both sexes; as far as I have seen it is not very variable in color.

Dr. E. S. Ross discovered a colony of this species on the southeast side of a rocky knoll on the hills about 300 feet above Paradise Cove, Marin County, California. He took me to see it on May 10, 1961; a number of females were then active on the flowers of *Phacelia distans* Benth. growing among the rocks. Both sexes of the wasp were visiting the flowers. On May 14, 1961, some were seen also on *Phacelia californica* Cham., but that flower was a good deal less common. By June 11 the *Phacelia* was almost all dead and the wasp activity seemed to be over.

[1] Bequaert (1940) records it from Berkeley, Alameda County, but the record probably pertains to Contra Costa County.

On May 10, Mrs. E. S. Ross found one nest in the re-entrant angle of the boulder. Two cells were full and three empty. A male was photographed by Dr. Ross when it settled on the nest (pl. 2, *a*), and later the closed cells were opened and found to contain two live, unemerged females (pl. 3, *a*). One other nest of five cells, all empty, was found in a similar situation (pl. 3, *b*). In spite of the most careful search, no other nests could be found. Dr. Ross had seen wasps flying in the locality three weeks earlier, but two of the captured females, on May 10 and May 14, respectively, seemed to contain only nectar. Thus the two mysteries which I wished to solve—whether the female swallows the pollen which she stores in the nests, and what differences, if any, the larva shows from other vespoids—were not resolved.

In a valley near Napa, on April 15, 1961 the males were common on *Phacelia imbricata* Greene. This was growing on rocks and low cliffs at the sides of a small stream.

8. *Pseudomasaris edwardsii* (Cresson)

(Figs. 3, 6, 11)

Masaris edwardsii Cresson, 1872*a*:87, ♂ ♀.
Pseudomasaris edwardsii, von Dalla Torre, 1904:8.

Type locality.—CALIFORNIA.

Examined, 169 ♂ 539 ♀.

Distribution.—ARIZONA: Maricopa and Pima counties. CALIFORNIA: Alpine, Butte, Contra Costa, El Dorado, Fresno, Inyo, Kern, Lake, Lassen, Los Angeles (including Santa Catalina Island), Madera, Mariposa, Merced, Modoc, Mono, Monterey, Napa, Nevada, Placer, Plumas, Riverside, San Benito, San Bernardino, San Diego, Santa Clara, Santa Cruz, Shasta, Sierra, Siskiyou, Stanislaus, Trinity, Tulare, Tuolumne, and Yolo counties. COLORADO: (Krombein, 1958). IDAHO: Butte Co., Craters of the Moon, June 20, 1938 (E. C. Van Dyke, C.A.S.), June 19, 1961, 1 ♂ 2 ♀ on *Phacelia hastata* Dougl. (O.W.R.), June 20, 1958, 2 ♂ 5 ♀ (E. I. Schlinger, U.C.D.), Bear Creek Pass, July 26, 1947, 3 ♂ 7 ♀ (R. M. Bohart, U.C.D.); Franklin Co., Cub R. Canyon, July 6, 1960, ♂ ♀ (G. F. Knowlton, U.C.D.). NEVADA: Douglas, Elko, Lyon, Ormsby, and Washoe counties. OREGON: Baker Co., Baker, June 20–30, 1922, 2 ♀ (E. C. Van Dyke, C.A.S.); Clackamas Co., Mt. Hood, June 7, 1927, ♂ (E. C. Van Dyke, C.A.S.); Deschutes Co., Tumalo Res., June 2–23, 1954, 9 ♂ 14 ♀ (E. I. Schlinger and J. C. Downey, U.C.D.); Jefferson Co., Hanson's Resort, July 29, 1929, 1 ♀ (E. C. Van Dyke, C.A.S.), Mt. Jefferson, Pamelia Lake, July 24–August 5, 8 ♀ (J. C. Bridwell, U.S.N.M.), Warm Springs, June 25, 1954, 1 ♀ (W. H. Lange, U.C.D.); Klamath Co., Klamath Lake, Eagle Ridge, May 15–June 16, 1924, 7 ♂ 5 ♀ (C. L. Fox, C.A.S.), Klamath Falls, May 12, 1894, 1 ♀ (C. L. Fox, C.A.S.); Sherman Co., Rufus, June 20, 1955, 1 ♀ (R. M. Bohart, U.C.D.). UTAH: Cache, Morgan, Salt Lake, Utah (Cooper and Bequaert, 1950), and Wasatch counties. WASHINGTON: Spokane (Bradley, 1922), Walla Walla, and Whitman counties. WYOMING: Teton Co., Grand Teton National Park, June, 1940, 1 ♂ (G. E. Bohart, U.C.D.). MEXICO, Baja California: Sierra San Pedro Martir, Las Encinas, and 3 mi. S., 6,000 feet, June 2–3, 1958, 5 ♀ (J. Powell, C.I.S.).

TIMES OF OCCURRENCE

	March		April		May		June		July		August
	1–15	16–31	1–15	16–30	1–15	16–31	1–15	16–30	1–15	16–31	1–15
♂	0	2	16	21	8	20	23	35	23	8	1
♀	1	5	34	69	15	67	90	120	81	23	4

Altitudes, recorded in only 26 specimens, range from 2,000 to 10,000 feet, mostly 7,000 feet or below.

Flower records.—Rhamnaceae, *Ceanothus parviflorus* Trel. 1♂, *Ceanothus* sp. 1♂; Tamaricaceae, *Tamarix gallica* L. 1♀; Onagraceae, *Oenothera* sp. 1♀; Labiatae, *Mentha pulegium* L. 1♀; Hydrophyllaceae, *Phacelia distans* Benth. 9♂ 36♀, *P. imbricata* Greene 1♂ 1♀, *P. hastata* Dougl. 1♂ 2♀, *Phacelia* sp. 12♂ 50♀; Caprifoliaceae, *Symphoricarpos* sp. 1♂; Compositae, *Chaenactis glabriuscula* D. C. 1♀.

The male of this species is very distinct by reason of the peculiar structure of the antennae and the slight swelling on the frons. Typical females with a swelling on the anterior side of the mid tibia rather below the middle are easily recognized, but in some specimens the swelling is very small or virtually absent. These females are difficult to separate from *P. zonalis* (Cresson), but they have longer propodeal spines, more obtuse humeri, and a richer yellow pattern. The pubescence is less developed than in *P. marginalis* (Cresson) and paler. The yellow markings are relatively constant in extent.

9. *Pseudomasaris texanus* (Cresson)

(Fig. 24)

Masaris texanus Cresson, 1871:348, ♂ ♀.
Pseudomasaris texanus, von Dalla Torre, 1904:8.

Type locality.—TEXAS: probably Clifton, Bosque Co.[2]

Examined, 12♂ 34♀.

Distribution.—ARIZONA: Gila (Bequaert, 1940), Maricopa (Bradley, 1922), and Navajo counties. TEXAS: Atascosa (Bequaert, 1940), Bexar, Bosque, Brewster (Cooper and Bequaert, 1950), Corral, McLennan (Bequaert, 1929), Reaver, Sutton, Tom Green, Travis (Bradley, 1922), and Uvalde counties.

Times of occurrence.—The males were captured between April 9 and 29, with one in May and one on July 26, and the females between April 10 and May 17.

Typically, the pale markings of this species are yellow rather than whitish, but there is some variation. It is considerably larger than the other species of this group, except the fellowing one.

10. *Pseudomasaris phaceliae* Rohwer

Pseudomasaris phaceliae Rohwer, 1912:450, ♂ ♀.

Type locality.—NEW MEXICO: Bernalillo and Dona Ana counties.

The type and also one of the females was captured on the flowers of *Phacelia* sp. (Hydrophyllaceae).

More material is obviously required to understand this species, but it seems to be distinct, though close to *P. texanus*.

The type has an orange-yellow color, but this is probably a discoloration and the natural color is sulfur-yellow. The male antennae are exactly as in *P. texanus*: segment I yellow with a narrow black basal ring, II black, III–VII yellow with tip black beneath, especially on IV; VI–VII also black at apex above; segment IV not widened at apex as in *P. basirufus;* segment VI much wider than in *P. maculifrons*, segments VI–VII much wider than in *P. macswaini*, segment VII in particular much widened at apex.

[2] Probably all Belfrage's material came from this locality. See Southwest Rev., 4:381–398, 1929; Ent. News, 44:127–132, 1933; S. W. Geiser, 1937, *Naturalists of the frontier*, pp. 290–308.

11. *Pseudomasaris maculifrons* (Fox)

(Figs. 2, 7, 13, 20, 25)

Masaris maculifrons Fox, 1894:12, ♀.
Pseudomasaris maculifrons, von Dalla Torre, 1904:8.
Pseudomasaris albifrons Rohwer, 1912:451, ♂.
Pseudomasaris zonalis neomexicanus Rohwer, 1912:452, ♀.
Pseudomasaris texanus neomexicanus, Bradley, 1922:415, ♀.
Pseudomasaris rohweri Bradley, 1922:417, ♂.

Type localities.—MEXICO: El Paraiso, Baja California (*maculifrons*); NEW MEXICO: Las Cruces, Dona Ana Co. (*albifrons*); and San Juan Co. (*neomexicanus*). ARIZONA: Quartzite, Yuma Co. (*rohweri*).

Examined, 38 ♂ 81 ♀, including the types of *P. maculifrons*, *P. albifrons*, and *P. zonalis neomexicanus*.

Distribution.—MEXICO, Sonora: between Sonoita and Puerto Penasco, 500 feet, March 25, 1949, ♂ (G. M. Bradt, U.C.D.). ARIZONA: Maricopa, Pima, and Yuma counties. CALIFORNIA: Inyo, Nevada, Riverside, San Bernardino, and San Diego counties. NEVADA: Clark Co. NEW MEXICO: Dona Ana and San Juan counties. UTAH: Beaver Co., Beaver Creek Hills, no date, ♂, June, ♀ (U.S.N.M.) (both det. *P. albifrons* by Miss Sandhouse and *P. phaceliae* by Dr. J. Bequaert. The male is unusually large, but I feel sure of its identification).

TIMES OF OCCURRENCE

	March		April		May	
	1–15	16–31	1–15	16–30	1–15	16–31
♂	5	4	17	3	0	1
♀	22	1	13	37	7	0

The species seems to be a very early one and is found mostly at lower elevations. In Surprise Canyon, Inyo County, it occurred at about 5,000 feet. Its main area of distribution is in the Lower Sonoran Zone.

Flower records.—Rosaceae, *Prunus* sp. 1 ♂; Leguminosae, *Astragalus* sp. 1 ♀; Malvaceae, *Sphaeralcea* sp. 1 ♀; Loasaceae, *Eucnide urens* Parry 1 ♂; Hydrophyllaceae, *Phacelia crenulata* Torr. 1 ♀, *P. distans* Benth. 1 ♂ *P. pachyphylla* Gray 1 ♀, *P.* sp. 13 ♂ 30 ♀; Boraginaceae, *Cryptantha* sp. 2 ♀.

In 1961, the only *Phacelia* seen in Surprise Canyon, where the wasp had been common in earlier years, was *P. crenulata* Torr., but no wasps were seen. A *Pseudomasaris basirufus* from the same locality in an earlier year was captured on *P. pachyphylla* Gray.

After Dr. Bohart had separated the very closely allied *P. micheneri* from the present species, its distinction from *P. basirufus* Rohwer became more clear-cut. Bequaert (1940:38) first noted that the males of *P. rohweri* Bradley corresponded to the females of *P. maculifrons* (Fox). This was also evident in the material I examined from the several long series of each sex collected in more than one locality. There has been a good deal of confusion with *P. basirufus* since some males and apparently all females of that species have commonly been identified as "*P. rohweri*." The males are quite distinct, but the females are very similar apart from color. *P. maculifrons* is clearly larger on the average, with stronger punctures, and the female has a more or less large white spot on the frons which is absent in *P. basirufus*. The amount of red on the gaster is somewhat variable

and is sometimes reduced to narrow apical bands on the first two segments or even virtually absent. In the male, the ventral surface of the process of the third gastral sternite varies from broadly to narrowly triangular. The eyes approach one another more closely than in *P. micheneri* R. M. Bohart, and even more so than in *P. basirufus* Rohwer.

The principal differences in color and size among the three species are given in the accompanying table. Unfortunately, I did not record the data for all the specimens examined.

There seem to be no consistent differences in color among the males. *P. maculifrons* and *P. micheneri* are the only two species in this group in which the hind trochanter and base of hind femur bear relatively long and dense pubescence beneath. The measurements of the few males available are as follows:

CHARACTERS OF MALES OF PSEUDOMASARIS

	maculifrons	*micheneri*	*basirufus*
Number of specimens	17	3	9
Length of forewing	8.5–10.0, mean 9.24	9.0,9.5, 10.0	7.5–10.0, 8.78
Hamuli	15–21, mean 17.76	16, 18, 22	14–21, 17.56

The types of *P. albifrons* Rohwer and of *P. zonalis neomexicanus* Rohwer were examined in the U. S. National Museum. They seem to me to be clearly the sexes of the present species, although this extends its range farther east than it has been recorded before.

12. **Pseudomasaris micheneri** R. M. Bohart, new species

(Figs. 1, 14, 21)

"*Male.*—Length 12 mm. Black, extensively marked with ivory and brown to brownish red; main ivory areas are: flagellomeres III–V beneath, most of club beneath, dull ventral spots on flagellomeres I–II, basal clypeal spot, face above antennae, postorbital line, pronotum largely, spots on propleuron and mesopleuron, pair of anterior wedge-shaped spots on scutum, tegula, posterior scutellar spot, propodeal tooth largely, bands across tergite I and IV–VI, three spots on II–III, bands across sternites IV–V; reddish brown or reddish (variable in paratypes) are: most of flagellomeres III–V and club above, wing veins, legs extensively, mottling on abdominal segments II–V. Body with off-white hair, fairly long on head and thorax, darker toward apex of clypeus, some moderate erect hair on tergite I, wing membrane with sparse microsetae. Punctation fine and close, a little spaced toward front of scutum. Flagellomeres I–V and club with length ratios 1.0:1.2:1.1:1.0:0.8:1.7, respectively; I slender, II swollen in distal two-fifths, III swollen a little distally, IV gradually expanding and twice as broad as apex of I, V stout and two-thirds as broad as long; club nearly flat beneath, 1.6 times as long as broad; least interocular distance 1.5 times lateral ocellus diameter, lateral ocellus nearly touching eye; propodeal tooth blunt, overall about 90 degrees; legs relatively simple, mid tibia flattened beneath, expanded near middle to two-sevenths of length, narrowed distally; process of sternite III stout, rounded posteriorly, broad in front, ventral surface slightly concave; tergite VII dorsally ending in a pair of rather sharp and diverging lobes, tergite VII ventrally ending in a broad tridentate ridge; clasper with moderate pubescence below, less prominent above and restricted to apex by an oblique carina.

"*Female.*—Darker than male; mandible, frons except for three spots, pronotum except for humeral spot and posterior rim, and scutum black; abdomen with less red. Pubescence dark

fulvous. Flagellomere IV 1.5 times as broad as long, and broader than length of II; flagellomere V twice as broad as long.

"*Holotype male.*—Westgard Pass, Inyo County, California, 6,000 feet elevation, June 18, 1942, at *Phacelia* (R. M. Bohart, U.C.D.).

"*Paratypes.*—1 ♂ 40 ♀ topotypes, June 18, 1942 (R. M. Bohart); 2 ♀, May 27 and June 3, 1937 (J. W. Johnson); 1 ♂, Mazourka Canyon, Inyo County, California, 7,000 feet elevation, May 21, 1937 (C. D. Michener). Paratypes in collections of U.C.D., C.I.S., C.A.S., O. W. Richards, and B.M.N.H

"*Metatypes.*—2 ♀, Inyo Mountains, Inyo County, California, June 1, 1937 (E. C. Van Dyke, C.A.S.).

"*Systematics.*—Very closely related to *maculifrons*, differing principally in the antennae. In the male, flagellomere IV of *micheneri* is gradually expanded to twice the breadth of flagellomere I instead of about 1.2 times as in *maculifrons*. Also, V is two-thirds as broad as long in *micheneri* instead of about one-half as in *maculifrons*. In the female, flagellomeres IV–V are also somewhat broader, IV being broader than the length of II and 1.5 rather than 1.1–1.3 times as broad as long. At present *micheneri* is known only from the Inyo Mountain Range where it has been collected at a dark blue *Phacelia* at elevations above 5,000 feet."

I have seen six more females of this species (two now in my collection) in the C.I.S. collection. They were part of the Westgard Pass series.

Certain features of this species are compared with those of its allies on page 300. In my view, there is also a consistent difference in the apparent length of the antennal club in the female, that of *P. maculifrons* being shorter because the flagellum is more sharply marked off from it. The present species appears to inhabit the upper part of the Upper Sonoran Zone or the Transition Zone. So far there is no actual overlap with *P. maculifrons*, although that species seems to reach up to this zone in Surprise Canyon (Panamint Mountains, Inyo Co., California). Most of the range of *P. maculifrons*, like that of *P. basirufus*, is in strictly desert country at lower elevations.

13. *Pseudomasaris basirufus* Rohwer

(Figs. 12, 19, 23)

Pseudomasaris zonalis basirufus Rohwer, 1912:452, ♀.
Pseudomasaris basirufus, Bradley, 1922:421, ♀.
Pseudomasaris bariscipus Bradley, 1922:418, ♂.
Pseudomasaris rohweri, auctt., nec Bradley.

Type localities.—CALIFORNIA: Inyo Co., Death Valley (*basirufus*). ARIZONA: Yuma Co., Quartzite (*bariscipus*).

Examined, 24 ♂ 21 ♀, including the type of *P. basirufus* and paratypes of *P. bariscipus*.

Distribution.—ARIZONA: Yuma Co. CALIFORNIA: Inyo Co.

Times of occurrence.—April 1–15, 6 ♂ 2 ♀; April 16–30, 4 ♂ 10 ♀; May 1–15, 14 ♂ 8 ♀. The species seems to be found mainly at low elevations.

Flower records.—Hydrophyllaceae, *Phacelia crenulata* Torr. 2 ♂, *P. pachyphylla* Gray 1 ♂, *P.* sp. 3 ♂ 9 ♀.

The female of this species has not previously been distinguished from that of *P. maculifrons* (Fox), although many of the males have been labeled "*P. rohweri.*" The female seems always to lack the white frontal spot of *P. maculifrons*, but has a large white area on the mandibles. These and other features are compared with its two closest allies on p. 300. The female of *P. basirufus* differs from that of *P. micheneri*, which may sometimes lack the frontal spot in having antennal seg-

CHARACTERS OF FEMALES OF PSEUDOMASARIS MACULIFRONS, P. MICHENERI, AND P. BASIRUFUS

	maculifrons	*micheneri*	*basirufus*
Number of specimens	16	47	9
Length of forewing	7.0–9.0, mean 7.99 mm.	8.0–9.5, 8.35 mm.	7.0–7.5, 7.22 mm.
Number of hamuli	15–19, mean 17.25	13–22, 17.32	13–20, 17.22
White spots on mandibles	Absent	Absent	Present
White spot on malar area	In 14/16	1/47	9/9
White streak on lower orbit	In 6/16	18/47 but often only a dot	Absent[a]
Triangular spot on clypeus	Well developed	Reduced in 5/47	Well developed
Triangular spot on frons	Large or (1/16) small	Absent 3/47, reduced 9/47	Absent
Anteroventral white dot on pronotum	In 7/16	In 5/47	Absent
White dot on humeral plate	In 9/16	In 3/47	In 8/9
White dot on scutum near tegula	In 16/16	In 33/47	In 9/9
White band on gastral tergite II	Continuous 7/16, forming 3 spots 9/16	Continuous 6/47, forming 3 spots 41/47	Not continuous

[a] In *P. basirufus* it is sometimes difficult to say whether there is a white spot on the malar area or on the lower orbit. In this species, also, the white humeral spot tends to be smaller than in *P. maculifrons*.

ments VI–VII somewhat less broad, although a little broader than in *P. maculifrons*. It is also smaller and the head is less closely punctured. *P. basirufus* has a distribution which is not known to overlap that of *P. micheneri*, but it is often found with *P. maculifrons* as at Surprise Canyon, Inyo County, California, and Quartzite, Yuma County, Arizona. The male is very distinct and the characters vary little, although the total size of the process of the third gastral sternite is somewhat inconstant. The male is the only one in the group in which the third trochanter and base of the hind femur is nearly bare. As usual, the extent of the red areas is variable in both sexes.

14. **Pseudomasaris macswaini** R. M. Bohart, new species

"*Male.*—Length 12 mm. Black, very extensively marked with yellow; tarsi partly brown, wings lightly stained, darkest in marginal cell, stigma orange; principal yellow areas are: scape and flagellomere I above, face except black band at level of antennal bases, postorbital line, pronotum mostly, tegula, large mesopleural spot, broad oval sublateral scutal spots anteriorly, long oval ones adjacent to tegula, small submedian ones well in front of scutellum, broad posterior band around scutellum, a small pair below on upper propodeum, tooth of propodeum largely, legs extensively, and broad bands across abdominal segments; flagellomere V and basal two-thirds of club below, ivory. Pubescence pale fulvous and moderately long on head and thorax, long hairs present but less conspicuous on tergite I, wing membrane with sparse microsetae, fore tarsus with a dense posterior hair fringe. Punctation mostly fine and close, a little spaced toward front of scutum. Flagellomeres I–V and club with length ratios 1.0:1.2:1.1:1.1:0.8:1.4, respectively, I–IV slender, II–IV slightly swollen distally, especially in II, V expanding gradually and 2.2 times as long as broad, club 1.5 times as long as broad, convex above and below; least interocular distance 2.5 times lateral ocellus diameter, lateral ocellus nearly touching eye. Propodeal tooth small, slender, definitely projecting; legs relatively simple, mid tibia flattened beneath, expanded near middle to two-fifths of length, narrowed distally; process of sternite III broad, ending in a nearly equilateral and slightly depressed triangle; tergite VII ending in a pair of narrow, widely separated lobes, each bearing a small subbasal tooth above; tergite VII ventrally ending in a pair of close stout teeth; clasper with moderate pubescence below, less prominent above and restricted to apex by an oblique carina.

"*Female.*—Clypeus with crescentic black spots converging below, black areas of body generally more extensive, flagellomeres I–IV all dark, anterior one-half of scutum dark in five paratypes but with a pair of yellow dots in seven paratypes, scutum with four long oval spots behind middle, outer one adjacent to tegula; scutum with contiguous punctation. Flagellomere IV 1.3 times as broad as long.

"*Holotype male.*—Andreas Canyon, Riverside County, California, April 2, 1955 (J. C. Hall, U.C.D.).

"*Paratypes.*—5 ♂, 12 ♀, collected March 26 to May 1 in California localities as follows: Andreas Canyon, Short Canyon (near Inyokern), at *Phacelia* (J. W. MacSwain, E. G. Linsley); 8 miles N.W. of Randsburg (R. F. Smith); Kramer Hills, San Bernardino County (P. D. Hurd, G. I. Stage); Little Rock, Los Angeles County, Borego Valley, San Diego County, at *Phacelia* (A. A. Grigarick, R. M. Bohart). Paratypes in collections of U.C.D., C.I.S., C.A.S., and O. W. Richards.

"*Systematics.*—Superficially there is a resemblance to *edwardsii*, especially in the female. Here the presence of a yellow scutal spot next to the tegula in *macswaini* seems practically diagnostic. Actually, the species is more closely related to *maculifrons* as evidenced by similar antennal, leg, and genitalic structure in the male, as well as the presence in males of both species of narrowed interocular area (less so in *macswaini*) and ovoid pale spots anteriorly on the scutum. The yellow versus ivory markings and the entirely different abdominal pattern are easy means of separation. In addition, *maculifrons* lacks the minute teeth toward the base of the dorsal lobes of tergite VII in the male."

I have seen these specimens, but can add nothing useful to Dr. Bohart's description.

15. *Pseudomasaris vespoides* (Cresson)

(Figs. 4, 5)

Masaris vespoides Cresson, 1863:69, pl. IV, ♂ ♀.
Pseudomasaris vespoides, von Dalla Torre, 1904:8.
Pseudomasaris vespoides robertsoni Cockerell, 1913:107.

Type locality.—COLORADO: El Paso Co., Pikes Peak (*vespoides*). CALIFORNIA: San Bernardino Co., Redlands (*robertsoni*).

Examined, 229 ♂ 501 ♀, including ♂ and ♀ paratypes of *P. vespoides* and the holotype of *P. v. robertsoni*.

Distribution.—ARIZONA: Coconino, Navajo, and San Juan counties. CALIFORNIA: Alpine, Calaveras, Contra Costa, Del Norte, El Dorado, Fresno, Inyo, Lake, Lassen, Los Angeles, Mariposa, Modoc, Mono, Napa, Nevada, Placer, Plumas, Riverside, San Benito, San Bernardino, San Diego, San Luis Obispo, Shasta, Sierra, Siskiyou, Tehama, Trinity, Tulare, Tuolumne, Ventura, and Yolo counties. COLORADO: Alamosa, Boulder, Delta, El Paso, Gunnison (Bequaert, 1929, Halls Valley, ?county), Jackson, Jefferson, Larimer, Las Animas, Mesa (Cooper and Bequaert, 1950), Mineral (Bequaert, 1929), Montezuma (Bequaert, 1940), Montrose (Bequaert, 1940), Otero (Cooper and Bequaert, 1950), Park, Routt, Saguache, San Miguel, and Teller counties. IDAHO: Bear Lake (Bequaert, 1940), Butte, Nez Percé (Bequaert, 1940), and Valley counties (Bequaert, 1940). MONTANA: Carbon Co., above Red Lodge, 7,500 feet, June 25, 1961, on *Penstemon lyallii* (Gray) Gray, 2 ♀ (O.W.R.); Ravalli Co., Darby, 10 miles S.E. Rye Creek, July 5, 1949, ♂ (H. B. Leach, C.A.S.). NEBRASKA: Sioux Co. (Bequaert, 1943). NEVADA: Elko Co. NEW MEXICO: Sandoval (Bradley, 1922), San Miguel, and Santa Fe counties. OREGON: Baker (Cooper and Bequaert, 1950), Deschutes (Cooper and Bequaert, 1950), Hood River, Klamath, Lake (Bequaert, 1940), Umatilla (Cooper and Bequaert, 1950), and Wallowa counties. SOUTH DAKOTA: Custer and Lawrence counties (Cooper and Bequaert, 1950). UTAH: Beaver, Box Elder, Cache, Clark, Garfield, Kane, Rich, Salt Lake, Utah, Wasatch, and Weber counties. WASHINGTON: Skamania Co., Cook, August 12, 1933, ♀, Underwood, July 14, 1923, ♀ (C. D. Duncan, U.C.D.; Walla Walla Co., Mill Creek, June 9, 1938, 3 ♂ 6 ♀ (E. C. Van Dyke, C.A.S.); Yakima Co., North Yakima, June 5, 1903, ♀ (E. Jenne, U.S.N.M.). WYOMING: Albany, Converse (Bequaert, 1943), Laramie (Cooper and Bequaert, 1950), Park, and Teton (Yellowstone National Park) counties. MEXICO, Baja California: Sierra San Pedro Martir, 3 mi. S. Encinas, 5,000 feet, May 27, 1958, ♂ (J. Powell, C.I.S.).

TIMES OF OCCURRENCE

	April		May		June		July		August
	1–15	16–30	1–15	16–31	1–15	16–30	1–15	16–31	1–15
♂	2	3	4	27	45	67	40	16	1
♀	0	1	3	29	92	200	105	35	14

Altitudes between 1,500 and 11,000 feet were recorded for 50 specimens; at these elevations the records were fairly evenly distributed, although 32 of them were above 6,000 feet.

Flower records.—Ranunculaceae, *Ranunculus* sp. 10 ♂ 2 ♀; Papaveraceae, *Platystemon* (*californicum* Benth.) 2 ♂; Onagraceae, *Clarkia* sp. 1 ♀; Hydrophyllaceae, *Nama parryi* Gray 1 ♂ 1 ♀, *Phacelia* sp. 1 ♀; Scrophulariaceae, *Penstemon alpinus* Torr. 1 ♂, *P. attenuatus* Dougl. 1 ♀, *P. cyaneus* Penn. 2 ♂ 11 ♀, *P. gracilis* Nutt. 2 ♀, *P. heterophyllus* Lindl. 1 ♀, *P. laetus* Gray 1 ♂ 6 ♀, *P. lyallii* (Gray) Gary 2 ♀, *P. secundiflorus* Benth. 1 ♀, *P. spectabilis* Thurb. 12 ♂ 11 ♀, *P.* sp. 23 ♂ 76 ♀; Compositae, *Aster* sp. 1 ♀, "Thistle" 1 ♀.

This is the most distinct of the species of *Pseudomasaris,* and if it were not a single species there might be some grounds for maintaining Bradley's subgenus *Toryna.* However, *P. wheeleri* Bequaert and *P. occidentalis* (Cresson) partially connect it with other species. The additional pair of dorsal tubercles on gastral tergite VII, which Bradley used as a primary recognition character, is somewhat more variable than he realized. I have seen one male (Sonora Pass, Tuolumne Co., California, July 21, 1956, J. Powell, C.I.S.) in which these tubercles were virtually lacking and one in which they were missing on one side. The characters of the male antenna and tarsi are more reliable. The crest above the antennae is often very weak in the male and varies somewhat in the female. In one female (Minnehaha, Colorado, June 15, 1928) on *Penstemon gracilis* F. Lang, C.A.S., the crests are unusually weak. Color is rather variable; southern specimens from lower elevations generally have richer yellow markings, and northern specimens or those from high elevations are blacker. In the darkest specimens, the clypeus is black, the bands of the gastral tergites are all narrow and those on I–III interrupted. I have seen such females from Mono County, California (White Mt., Blanco's Corral; Cottonwood Creek) and Boulder County, Colorado (Gold Hill). Many of the specimens from Butte County, Idaho (Craters of the Moon, June 20, 1938; June 20, 1952), have the pale markings nearly white. Of 4♂ 18♀, 2♂ 13♀ are nearly white, the others pale yellow.

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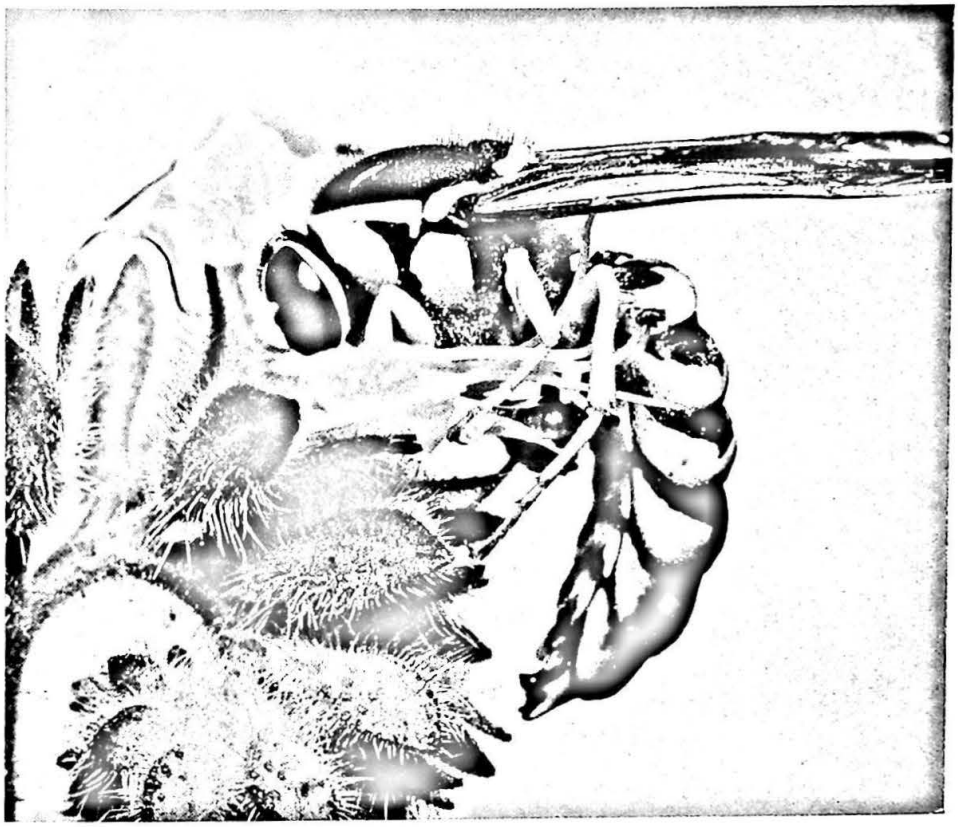
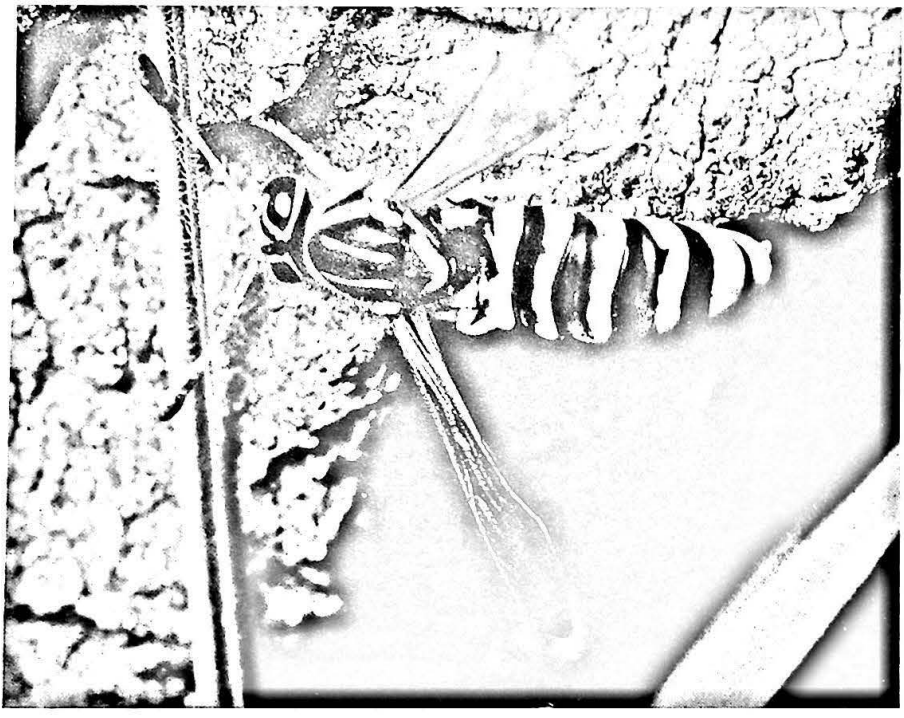
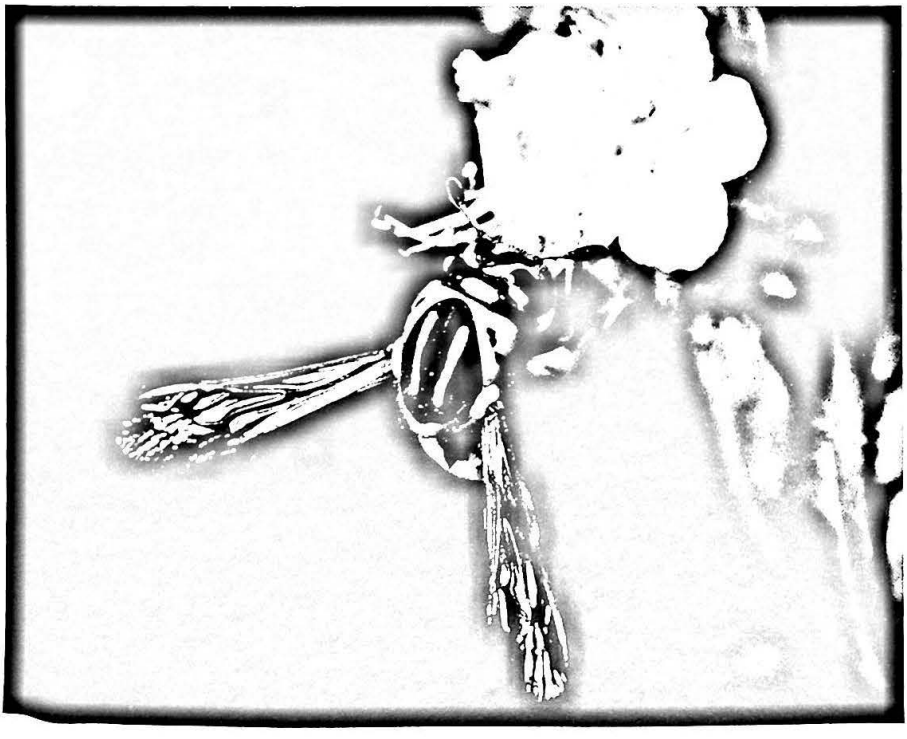
PLATES



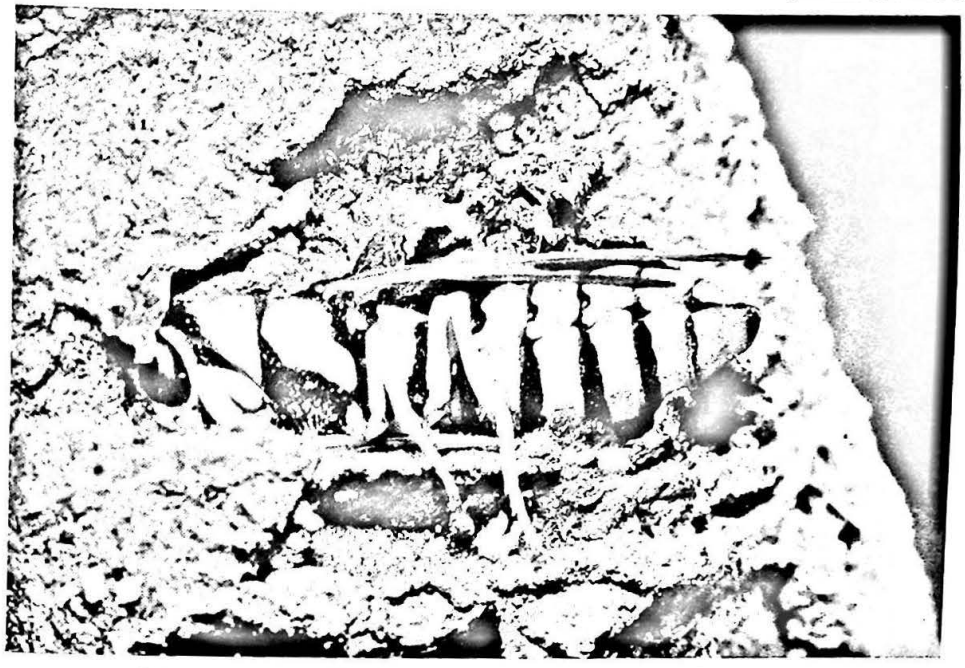
Pseudomasaris coquilletti Rohw. ♂ on flower of *Phacelia distans* Benth.



a. Pseudomasaris coquilletti ♂ settled on an old nest.



b. P. coquilletti ♀ on flower of *Phacelia distans.*



a. Pseudomasaris coquilletti ♀ unemerged, exposed by removing cell wall.

b. A previous year's nest of *P. coquilletti* on a boulder.