

BULLETIN OF THE CALIFORNIA INSECT SURVEY

VOLUME 4, NO. 3.

THE SOCIAL WASPS OF CALIFORNIA

(Vespinae, Polistinae, Polybiinae)

BY

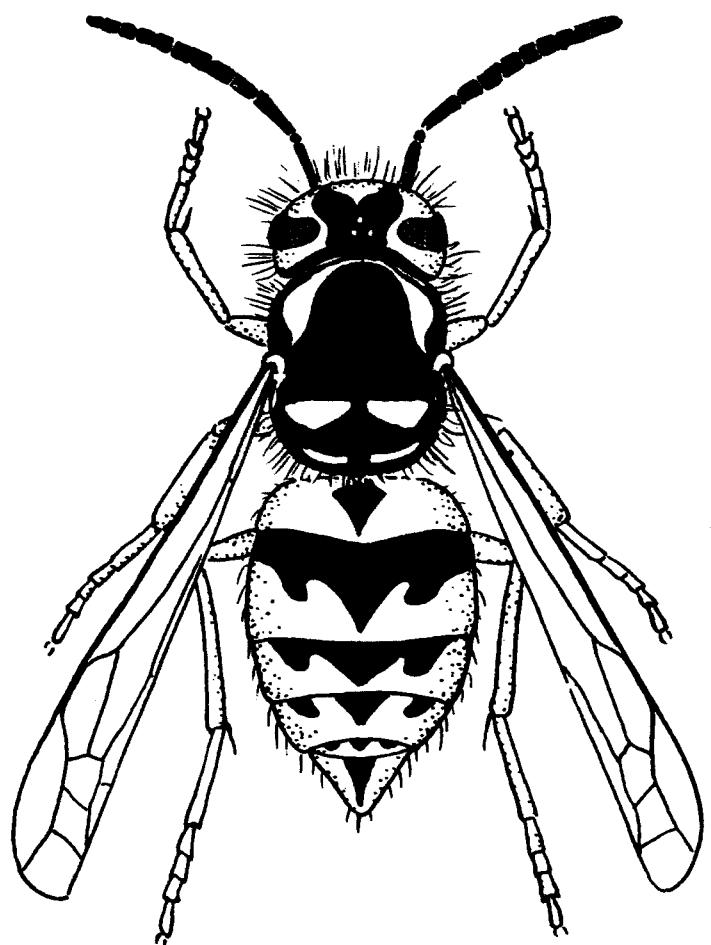
R. M. BOHART and R. C. BECHTEL

(Department of Entomology and Parasitology, University of California, Davis)

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Vespa pensylvanica (Saussure), worker.

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THE SOCIAL WASPS OF CALIFORNIA

(Vespinae, Polistinae, Polybiinae)

By

R. M. Bohart and R. C. Bechtel

INTRODUCTION

The social wasps are undoubtedly one of the most conspicuous groups of insects. This is owing to their moderate to large size, to their various combinations of rather bright black, white, yellowish, and reddish coloration, and to the fact that many of them construct their nests in or near areas of human habitation where they may at times be a great nuisance.

The female social wasps are well known for their stinging ability and their sensitive nature when near their nests. Two of the California forms are particularly troublesome to man, *Vespa pensylvanica* (Saussure) in resort areas and *Polistes apachus* Saussure in orchards and vineyards. Aside from these undesirable characteristics the social wasps can be considered generally beneficial through their habit of feeding their young with macerated caterpillars and similar food of animal origin.

The adult wasps of *Polistes* are often seen in considerable numbers on the flowers of anise, *Foeniculum vulgare*. Adults of *Polistes*, *Mischocyttarus*, and *Vespa* are also found in large numbers around shrubs and trees in search of food for their larvae.

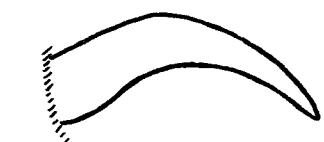
The nests of the social wasps are used only for a single year. Construction is initiated in the spring by an overwintering female which in *Vespa* is of the queen caste. In the other genera there is no appreciable difference between the queens or egg-laying forms and the workers. The nests are made of paperlike material. Those of *Vespa* are multicombed and enclosed in a globular envelope. The nests of *Polistes* and *Mischocyttarus* are single-layered, open-faced, umbrella-shaped, and attached to or supported by a pedicel. The nests of the latter two differ only in size, those of *Mischocyttarus* averaging somewhat smaller. The *Vespa* or yellow-jacket nests may contain as many as 15,000 individuals, composed of males, females, and workers in most

species. The worker, or sterile female, is somewhat smaller than the queen. In the other two genera, however, the nest members rarely exceed 200 and consist of males, females, and workers of the same general size. Males are usually produced toward the end of summer, and egg-laying females overwinter in secluded spots. Favorite hibernation quarters for many species are the spaces beneath the loosened bark of trees and in the attics of buildings.

The California social wasps seem to have arisen in three different ways. First are the extensions from the same or closely related species in Mexico and Central America. In this category are *Mischocyttarus flavitarsis* (Saussure), *Polistes major palmarum* Bequaert, and *P. canadensis navajoae* Cresson. In the second group, which has had the greatest development in the United States, are the two subspecies of *Polistes fuscatus* (Fabricius) and the related species *apachus* Saussure and *hunteri* Bequaert. Finally, all the *Vespa* belong in a third category with closest relationships north into Canada and in the Palearctic region.

Approximately fifty-five species and subspecies of social Vespidae are known from America north of Mexico. Of these, fifteen species and subspecies in three genera appear to have established themselves in California. Two others have been collected occasionally in the extreme southeastern part of the state, but they do not appear to have become established. In general nomenclature we have followed Bohart (1951), but some additional synonymy has been introduced.

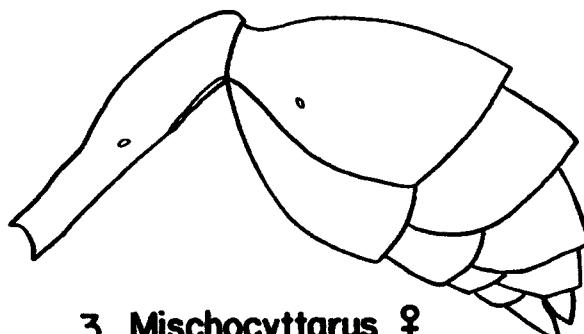
Much of our present knowledge of the taxonomy and habits of American social wasps has resulted from the studies of Bequaert (1932, 1933, 1935, 1936, 1937, 1940, 1943) who has published a series of revisional papers on this group. Other workers who have dealt recently with the California fauna have been Simmons, *et al.* (1948),



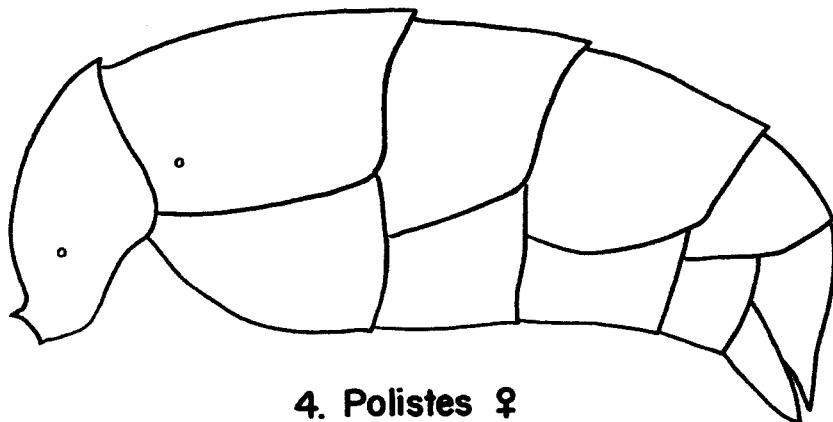
1. *Mischocyttarus* ♀



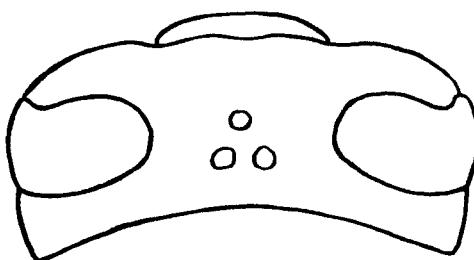
2. *Zethus* ♀



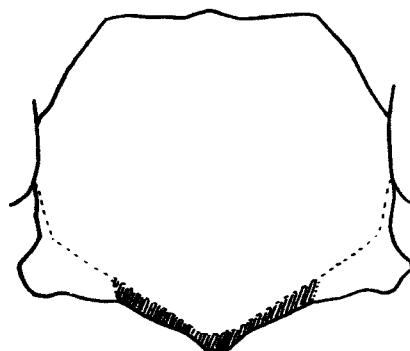
3. *Mischocyttarus* ♀



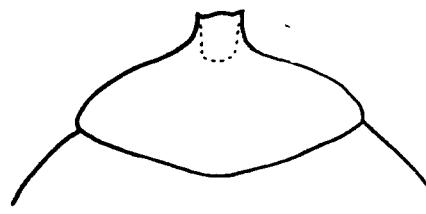
4. *Polistes* ♀



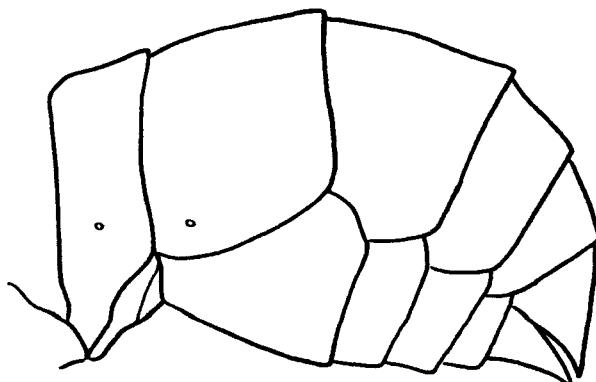
6. *Vespa* ♀



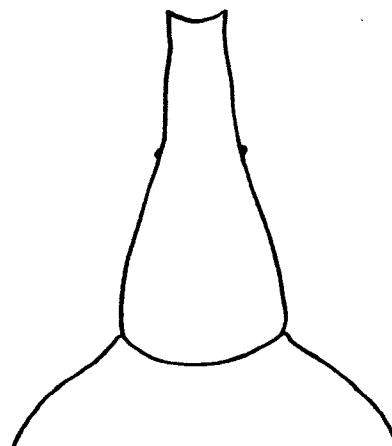
7. *Polistes* ♀



8. *Brachygastra* ♀



5. *Vespa* ♀



9. *Mischocyttarus* ♀

Figs. 1-2, hind tarsal claw. Figs. 3-5, profile of gaster. Fig. 6, dorsal view of head.
Fig. 7, clypeus. Figs. 8-9, dorsal view of gaster toward base.

Bohart (1949, 1951), and Snelling (1954, 1955).

The social vespids can be distinguished from the nonsocial forms by the presence of a cutting or chewing surface near the apex of the mandible rather than along the inner margin.

The most reliable structural characteristics in these wasps are found on the face, antennae, and the genitalia of the males. Color characters, which may be relatively constant in the females, are unreliable in the males.

Distributional records for this report have been taken mainly from the following collections: University of California at Davis (U.C.D.); California Insect Survey, University of California at Berkeley (C.I.S.); University of California at Riverside (U.C.R.); and the California Academy of Sciences (C.A.S.). Certain out-of-state records indicated on the distributional maps were taken from specimens determined by the senior author in collections sent to him for identification during the past twenty years. Otherwise, the data included have been taken from specimens recently examined by us. Broken lines on the maps are intended to indicate the approximate expected limits of distribution. These limits are based on a combination of known records together with faunal and floral distribution data. We wish to express our sincere appreciation to the persons in charge of these collections and to the other individuals who have coöperated in furnishing material upon which this paper is based.

— Postocellar area of vertex at least as long as ocellar triangle in dorsal view Vespa Linnaeus

4(1) First abdominal tergite broader than long (fig. 8) Brachygastra Perty

— First abdominal tergite much longer than broad (figs. 3, 9) 5

5(4). Claws of tarsi simple (fig. 1) Mischocyttarus Saussure (p. 100)

— Claws of tarsi toothed beneath or bifid near apex (fig. 2) Zethus Fabricius

Key to the *Vespula* of the Pacific Coast States

1. Oculomalar space about as long as, or longer than penultimate antennal segment (fig. 11); vertical carina of pronotum, extending up from "pronotal pit", well defined (fig. 11) (*Dolichovespula*) 2

— Oculomalar space at most 1/2 the length of penultimate antennal segment (fig. 10); vertical carina of pronotum absent or faintly indicated below (fig. 10) (*Vespula s. str.*) 5

2(1). Hind metatarsus in female with 5 or more long pale hairs (fig. 26); apicolateral angle of female clypeus sharp (fig. 19); male flagellum all dark; no workers adulterina (Buysson) (p. 87)

— Hind metatarsus in female with 1 or 2 long pale hairs at most (fig. 25); apicolateral angle of female clypeus rounded (figs. 20, 21); male flagellum pale beneath, at least basally 3

3(2). Pale mark on hind margin of pronotum straight, not bent downward along vertical carina . norwegica norwegicoides (Sladen)

— Pale mark on hind margin of pronotum bent downward along vertical carina 4

4(3). Markings whitish, tergite I black; terminal antenna segments in male ridged beneath; male sternite VII deeply emarginate apically (fig. 15). . . maculata (Linnaeus) (p. 88)

— Markings yellow, tergite I maculate; terminal antennal segments in male not ridged beneath; male sternite VII truncate or shallowly emarginate apically (fig. 14)

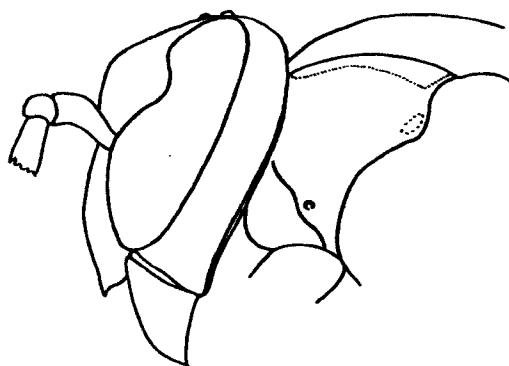
. arenaria (Fabricius) (p. 87)

5(1). Occipital carina in female complete from inferior articulation of mandible to a spot opposite top of compound eye (fig. 10); male tergite VII depressed beyond middle as seen in lateral view (fig. 22); male sternite VII very broadly and shallowly emarginate apically 6

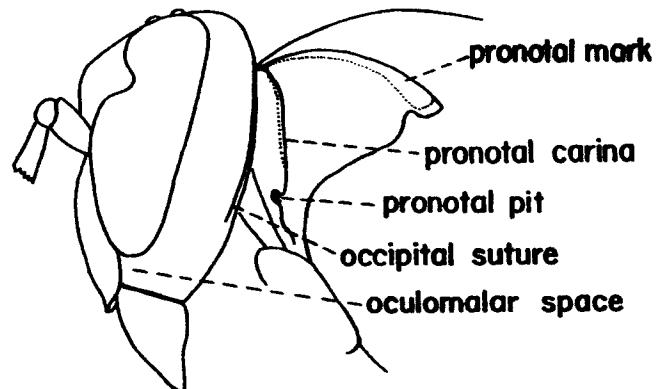
Key to the Genera of Social and Semisocial

Vespidae in North America

1. Second gastral segment not swelling abruptly at or near base in dorsal view 2
- Second gastral segment swelling abruptly at or near base in dorsal view (figs. 8, 9) 4
- 2(1). First abdominal tergite broadly convex in lateral view (fig. 4); clypeus bluntly or sharply pointed (sometimes very narrowly truncate at extreme tip) in front view (fig. 7) Polistes Latreille (p. 91)
- First abdominal tergite vertically truncate on basal 1/2 or more in lateral view (fig. 5); clypeal apex concave (figs. 17-21), truncate (fig. 16) or broadly rounded at apex in front view 3
- 3(2). Postocellar area of vertex shorter than ocellar triangle in dorsal view (fig. 6) Vespula Thompson (p. 77)



10. *vulgaris* ♀

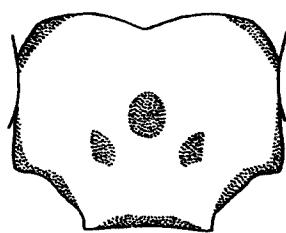


11. *maculata* ♀

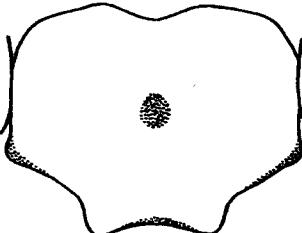


12. *vulgaris* ♂

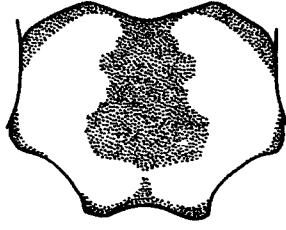
13. *pensylvanica* ♂



16. *atropilosa* ♀



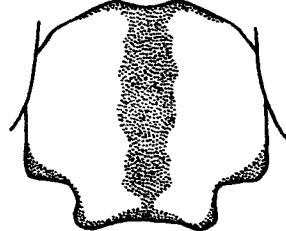
17. *pensylvanica* ♀



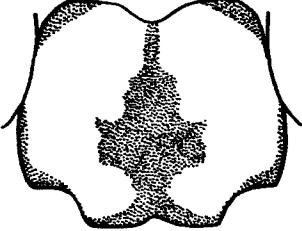
18. *vulgaris* ♀



19. *adulterina* ♀

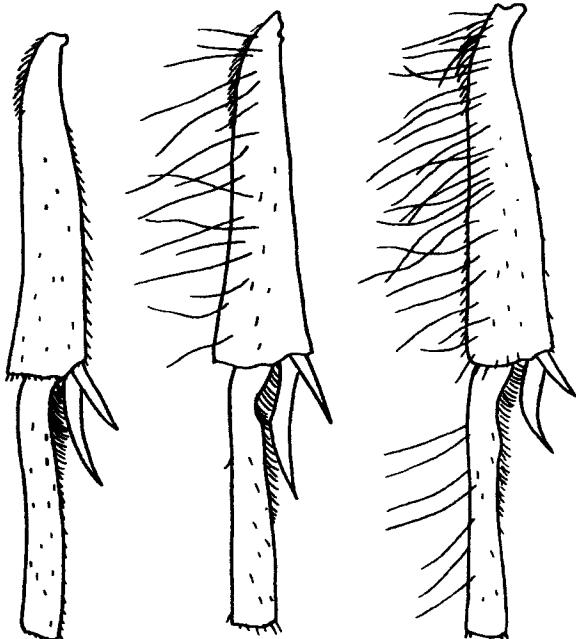


20. *maculata*



21. *arenaria*

22. *pensylvanica* ♂ 23. *sulphurea* ♂



24. *pensylvanica* 25. *arenaria* 26. *adulterina*

Figs. 10-11, profile of head and front part of thorax. Figs. 12-15, dorsal view of seventh tergite. Figs. 16-21, clypeus (black-marked areas stippled). Figs. 22-23, profile of seventh tergite. Figs. 24-26, hind tibia and basitarsus.

- Occipital carina in female disappearing below, not reaching inferior articulation of mandible (fig. 11); male tergite VII evenly convex (fig. 23); male sternite VII narrowed apically, not emarginate. 7
- 6(5). Pale mark on hind margin of pronotum irregular and often triangular; scape yellow beneath in all forms; propodeum with large yellow spots in female; male tergite VII not or hardly emarginate apically (fig. 13). *pensylvanica* (Saussure) (p. 79)
- Pale mark on hind margin of pronotum regular and nearly parallel-sided; scape all dark in female; propodeum all dark or with minute spots in female; male tergite VII with a small but distinct emargination apically (fig. 12). *vulgaris* (Linnaeus) (p. 86)
- 7(5). Hind tibia with numerous long erect hairs scattered over its entire length; no workers *austriaca* (Panzer) (p. 77)
- Hind tibia without long erect hairs or with only a few 8
- 8(7). Mesoscutum with 2 prominent longitudinal yellow stripes. *sulphurea* (Saussure) (p. 84)
- Mesoscutum all black. 9
- 9(8). Markings yellow; band on tergite II not narrowed medially. *rufa atropilosa* (Sladen) (p. 80)
- Markings whitish; band on tergite II narrowed or broken medially. *consobrina* (Saussure) (p. 79)
- pectal suture absent; vertex yellow behind ocelli. *exclamans arizonensis* Snelling (p. 94)
- 4(1). Females and most males with a pair of longitudinal yellow stripes on mesoscutum and a free or nearly free, sublateral yellow spot on tergite II; length of body to apex of second tergite 16-19 mm.; male clypeus practically flat. *apachus* Saussure (p. 91)
- Without a combination of longitudinal yellow stripes on mesoscutum and a free or nearly free sublateral yellow spot on tergite II; male clypeus usually concave or convex 5
- 5(4). Red area of abdominal tergite II nearly equal to, or greater than yellow area; no yellow mesoscutal stripes; body length to apex of second tergite 12-15 mm.; male clypeus distinctly convex; aedeagus in lateral view with very fine, regular teeth (fig. 32) 6
- Red or black area of abdominal tergite II much less than yellow area; male clypeus tending to be convex laterally and concave medially; aedeagus in lateral view with a mixture of coarse and fine teeth (fig. 34) 7
- 6(5). Female with pleuron largely or in part black (at least in specimens from western U.S.); males usually marked as in female but variable (see map 7). *hunteri hunteri* Bequaert (p. 99)
- Female with pleuron reddish, sometimes with black lines along sutures; males usually marked as in female but variable (see map 7). *hunteri californicus* Bohart (p. 97)
- 7(5). Markings essentially black and yellow, mesoscutum usually all black. *fuscatus aurifer* Saussure (p. 94)
- Markings essentially red and yellow; mesoscutum usually red, with or without a median black line or longitudinal yellow stripes *fuscatus centralis* Hayward (p. 97)

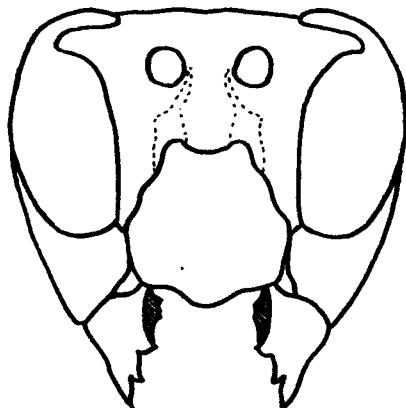
Key to the California Species of *Polistes*

- Male without a median tubercle on sternite VII; female flagellum with a dark median area above, or yellow margin of second tergite expanded medially. 2
- Male with a median tubercle on sternite VII (fig. 29); female flagellum nearly unicolorous above or gradually darkening toward apex, yellow margin of second tergite not expanded medially. 4
- Thorax mostly black, abdomen mostly yellow with some black and orange. *canadensis navajoae* Cresson (p. 94)
- Thorax mostly reddish or reddish brown. 3
- Apical yellow band of second tergite covering about 2/5 of tergite at middle; prepectal suture present, sometimes indistinct (fig. 30); vertex not yellow-marked behind ocelli. *major palmarum* Bequaert (p. 100)
- Apical yellow band of second tergite covering 1/5 or less of tergite at middle; pre-

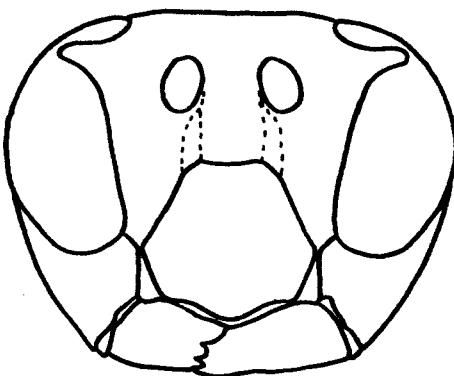
DISCUSSION OF SPECIES

Vespa (Vespula) austriaca (Panzer)

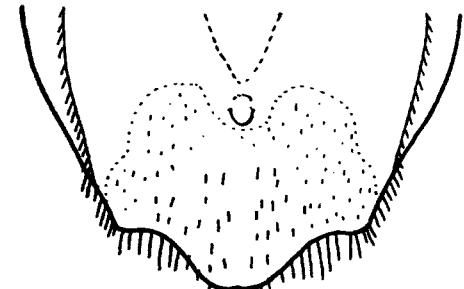
Vespa austriaca Panzer, 1799. Faunae Ins. German., 6, h. 63, pl. 2, ♂, Vienna, Austria. Geographical range: Holarctic; in North America from California, New Mexico, Michigan, and New Jersey north through Canada to Alaska.



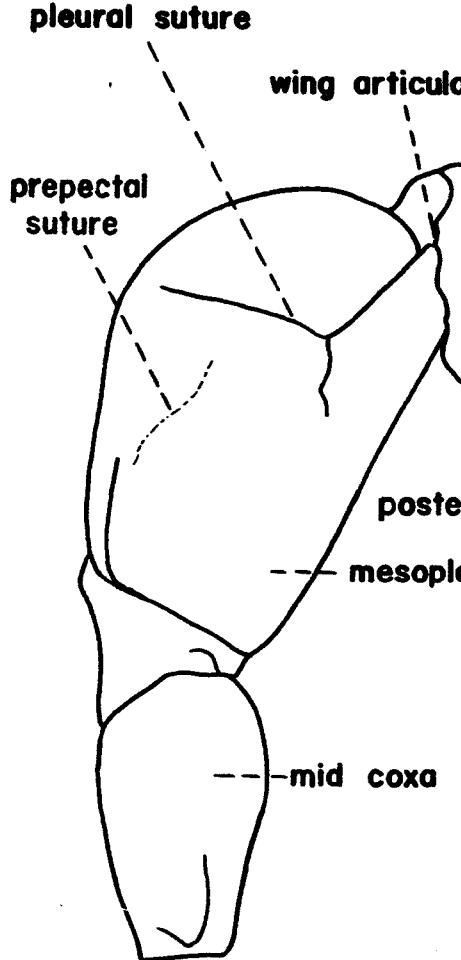
27. *centralis* ♂



28. *californicus* ♂



29. *aurifer* ♂



30. *palmarum* ♀



31. *palmarum* ♂



32. *californicus* ♂



33. *apachus* ♂



34. *aurifer* ♂

Figs. 27-28, face. Fig. 29, seventh sternite. Fig. 30, mesopleuron and mid coxa.
Figs. 31-34, tooth pattern along ventral edge of aedeagus (the four figures drawn to the same scale).

California records:

Mariposa Co.: Yosemite Valley, ♀, VI-28-21 (E. C. Van Dyke, C.A.S.).

Nevada Co.: Fuller Lake, ♀, VII-22-49 (E. I. Schlinger, U.C.D.).

Plumas Co.: Bucks Lake, ♀, VII-1-49 (W. F. Ehrhardt, C.I.S.).

Discussion:

This rare wasp is an inquiline in the nests of *Vespa rufa* (Linnaeus) in Europe and presumably in the nests of *V. rufa atropilosa* in California. Consequently there is no worker caste.

From the scanty records available the distribution appears to be Sierran at moderate elevations. If, however, *austriaca* is an inquiline in the nests of *rufa* subspecies, the expected distribution in California would follow that of *atropilosa* (map 1). We have seen a total of five females collected in June and July.

Vespa (Vespa) consobrina (Saussure)

Vespa consobrina Saussure, 1854. Études Fam. Vespidae, 2:141. Worker, Newfoundland.

Geographical range: Canada and northern United States south to Oregon, Colorado, Michigan, and the mountains of North Carolina. It should occur in California near the Oregon border.

Discussion:

We have seen no examples of this species from California although it was recorded from Redlands by Bequaert (1932). Our most southern records from the Pacific Coast are from Cascadia, Mt. Hood, and Crescent Lake, Oregon. We prefer to treat *consobrina* as a species separate from *rufa* (Linnaeus) because of a slight difference in male genitalia and the consistently different markings.

Vespa (Vespa) pensylvanica (Saussure)
(Figs. 13, 17, 22, 24)

Vespa pensylvanica Saussure, 1857. Stettin Ent. Ztg., 18:117. Cotype ♀, "mountains of Mexico" (locality restricted by Buysson, 1905).

Geographical range: Western United States and Canada east to Alberta, South Dakota, Nebraska, Colorado, and New Mexico. Also in Mexico proper (Mexico City, Ciudad Valle), Baja California (Agua Caliente), and Hawaii (introduced).

California records:

Alameda Co.: Berkeley, ♀, IX-6-36 (C. A. Hamsher, U.C.D.); ♀, III-26-38 (R. M. Bohart,

U.C.D.); ♂, III-25-36 (G. E. Bohart, U.C.D.).

Alpine Co.: Hope Valley, ♀, VII-9-48 (C. Chan, U.C.D.); ♀, VIII-16-49 (P. C. Hutchinson, C.A.S.).

Butte Co.: Yankee Hill, ♀, III-20-28 (H. H. Keifer, C.A.S.).

Calaveras Co.: Mokelumne Hill, ♀ (F. E. Blaisdell, C.A.S.).

Contra Costa Co.: Mt. Diablo, ♀, V-30-51 (E. I. Schlinger, U.C.D.); ♀, IV-21-53 (P. D. Hurd, Jr., C.I.S.); Danville, ♂, XI-9-51 (F. X. Williams, C.A.S.).

El Dorado Co.: Pollock Pines, ♀, VI-16-52 (E. I. Schlinger, U.C.D.); ♀, V-31-54 (E. I. Schlinger, U.C.D.).

Fresno Co.: Mendota, ♀, IX-5-47 (V. M. Stern, C.I.S.); Oak Flat Camp, ♀, VII-3-33 (G. D. Hanna, C.A.S.).

Humboldt Co.: Ford Seward, ♀, VI-3-35 (H. J. Rayner, U.C.D.); Shively, ♀, (E. O. Essig, C.A.S.).

Inyo Co.: Lone Pine, ♀, V-23-37 (N. W. Frazier, C.I.S.).

Kern Co.: Kernville, ♀, VIII-10-52 (T. R. Haig, U.C.D.).

Lake Co.: Blue Lake, ♀, VII-30-49 (H. A. Hunt, U.C.D.); Rattlesnake Island, Clear Lake, ♀, IV-19-54 (R. C. Bechtel, U.C.D.).

Lassen Co.: Hallelujah Junction, ♀, VII-4-52 (R. C. Bechtel, U.C.D.); Bridge Creek Camp, ♀, VII-12-54 (J. C. Downey, U.C.D.).

Los Angeles Co.: Glendale, ♀, VIII-2-52 (W. M. Schlinger, U.C.D.); Big Dalton Dam, ♂, VII-13-50 (W. C. Bentinck, C.I.S.); Tanbark Flat, ♀, VI-20-50 (P. D. Hurd, Jr., C.I.S.); Catalina Island, Avalon, ♀, III-23-? (T. D. A. Cockerell, U.C.R.).

Madera Co.: Mammoth, ♀, VII-13-40 (D. L. Dow, U.C.D.); Bass Lake, ♀, VI-3-42 (A. J. Walz, C.I.S.).

Marin Co.: Stinson Beach, ♀, V-6-51 (E. I. Schlinger, U.C.D.); Bolinas, ♀, III-7-49 (D. Cox, C.I.S.).

Mariposa Co.: Yosemite, ♀, VI-1-31 (E. G. Linsley, U.C.D.); ♀, IX-9-16 (C. L. Fox, C.A.S.).

Mendocino Co.: Yorkville, ♀, V-1-24 (E. P. Van Duzee, C.A.S.).

Modoc Co.: Cedar Pass, ♀, X-11-52 (E. I. Schlinger, U.C.D.); Davis Creek, ♀, VII-13-22 (C. L. Fox, C.A.S.).

Mono Co.: Blanco's Corral, ♀, VII-6-53 (W. D. McLellan, U.C.D.); Silver Lake, ♀, VIII-16-48 (W. E. Kelson, C.I.S.).

Monterey Co.: Big Sur, ♀, V-31-36 (C. A. Hamsher, U.C.D.); Salinas, 10 mi. W., ♀, IV-15-53 (J. G. Rozen, C.I.S.); Carmel, ♂, VII-31-33 (L. S. Slevin, C.A.S.).

Napa Co.: Napa, ♀, VIII-24-53 (E. I. Schlinger, U.C.D.); Mt. St. Helena, ♀, V-7-36 (U.C.D.).

Nevada Co.: Fuller Lake, ♀, VII-22-49 (E. I.

- Schlinger, U.C.D.); Boca, ♀, VII-5-54 (R. C. Bechtel, U.C.D.).
- Orange Co.: Rancho Santa Ana, ♀, VIII-1-50 (P. H. Timberlake, U.C.R.); Brea, ♀, VIII-26-23 (A. J. Basinger, U.C.R.).
- Placer Co.: Alta, ♀, VI-25-33 (R. M. Bohart, U.C.D.).
- Plumas Co.: Bucks Lake, ♀, VI-23-48 (H. A. Hunt, U.C.D.).
- Riverside Co.: Piñon Flat, ♀, VI-27-52 (A. A. Grigarick, U.C.D.); San Jacinto Creek, ♀, IV-7-39 (R. M. Bohart, U.C.D.); Riverside, ♀, III-20-33, ♀, III-11-36, ♂, I-15-39 (P. H. Timberlake, U.C.R.).
- Sacramento Co.: Sloughhouse, ♀, XI-14-49 (H. A. Hunt, U.C.D.); Sacramento, ♂, XI-18-51 (J. C. Hall, U.C.D.).
- San Benito Co.: Pinnacles National Monument, ♀, VII-24-49 (C. D. MacNeill, C.I.S.).
- San Bernardino Co.: Twentynine Palms, ♀, III-29-52 (E. I. Schlinger, U.C.D.); Seven Oaks, ♀, VIII-8-36 (W. C. Reeves, C.I.S.); Forest Home, ♂, IX-2-34 (C. M. Dammers, U.C.R.).
- San Diego Co.: Palomar, ♀, VII-6-47 (G. A. Marsh, C.I.S.); Warner Springs, ♀, IV-10-50 (P. D. Hurd, Jr., C.I.S.); Mt. Laguna, ♂, VII-16-50 (D. Cox, C.I.S.).
- San Francisco Co.: San Francisco, ♀, VI-14-51 (R. C. Bechtel, U.C.D.); ♂, XI-12-26 (E. P. Van Duzee, C.A.S.); Presidio, ♀, IV-3-54 (W. H. Lange, U.C.D.).
- San Joaquin Co.: Corral Hollow, ♂, X-21-46 (R. F. Smith, U.C.D.).
- San Luis Obispo Co.: San Luis Obispo, ♀, IV-26-19 (E. P. Van Duzee, C.A.S.); Morro Bay, ♀, IX-13-28 (L. S. Slevin, C.A.S.).
- San Mateo Co.: Halfmoon Bay, ♀, III-28-53 (W. D. McLellan, U.C.D.); ♀, X-21-49 (R. L. Langston, C.I.S.).
- Santa Barbara Co.: Santa Cruz Island, ♀, VII-19-39 (W. Williams, C.A.S.).
- Santa Clara Co.: Los Gatos, ♀, VII-19-33 (C. A. Hamsher, U.C.D.); San Antonio Valley, ♀, VIII-12-48 (R. F. Smith, C.I.S.).
- Santa Cruz Co.: Mt. Herman, ♀, II-12-49 (W. E. Hazeltine, C.I.S.); Watsonville, ♀, IX-10-38 (F. E. Blaisdell, C.A.S.).
- Shasta Co.: Old Station, ♂, IX-23-51 (J. C. Hall, E. I. Schlinger, U.C.D.); Big Springs, ♀, IV-23-41 (J. R. Fisher, U.C.D.); Hat Creek Ranger Station, ♀, VI-23-47 (C. A. Hanson, C.I.S.).
- Sierra Co.: Gold Lake, ♀, IX-7-51 (D. P. Lawfer, U.C.D.); Sierraville, ♀, VII-9-54 (R. M. Bohart, U.C.D.).
- Siskiyou Co.: McCloud, ♀, IX-12-51 (J. C. Hall, E. I. Schlinger, U.C.D.); Sisson, ♀, VII-25-18 (E. P. Van Duzee, C.A.S.).
- Solano Co.: Ryer Island, ♀, I-8-23 (F. H. Wymore, U.C.D.); Cordelia, ♀, VIII-6-50 (J. N. Simons, C.I.S.).
- Sonoma Co.: Cloverdale, ♀, VIII-24-53 (A. D. Telford, U.C.D.); Asti, 1.5 mi. S., ♀, IV-8-54 (E. I. Schlinger, U.C.D.).
- Stanislaus Co.: Adobe Creek, ♀, IV-20-49 (P. D. Hurd, C.I.S.).
- Sutter Co.: Sutter Buttes, ♀, III-2-53 (D. E. Barcus, U.C.D.).
- Tehama Co.: Mineral, ♀, IX-23-51 (J. C. Hall, E. I. Schlinger, U.C.D.).
- Trinity Co.: Scott Mountain, ♀, VI-4-51 (A. T. McClay, U.C.D.); Trinity Center, ♀, VII-26-54 (J. A. Powell).
- Tulare Co.: Giant Forest, ♀, VII-13-28 (C. L. Fox, C.A.S.); Balch Park, ♀, IX-6-48 (W. D. Murray, C.I.S.).
- Tuolumne Co.: Strawberry, ♀, VI-19-51 (A. T. McClay, U.C.D.); Groveland, ♀, VIII-14-54 (R. H. Goodwin, C.I.S.).
- Ventura Co.: Point Magu, ♂, VII-5-38 (D. L. Dow, U.C.D.); Santa Paula, ♀, VI-1-23 (D. Burk, C.I.S.).
- Yolo Co.: Davis, ♀, IV-21-50 (H. F. Robinson, U.C.D.); ♂, XI-1936 (U.C.D.).
- Discussion:**
- This species is widespread in California with records from fifty-one counties. At times the workers are so numerous that they become a serious threat to picnickers and vacationers. The wasp is found at various elevations, but south of Tehachapi range it is primarily montane. Nests are subterranean. An extensive study of the biology and morphology has been given by Duncan (1939). We have studied 37 males, 459 females, and 547 workers collected in every month in the year. Only token county records are given above.

Vespa (Vespa) rufa atropilosa (Sladen)
(Fig. 16)

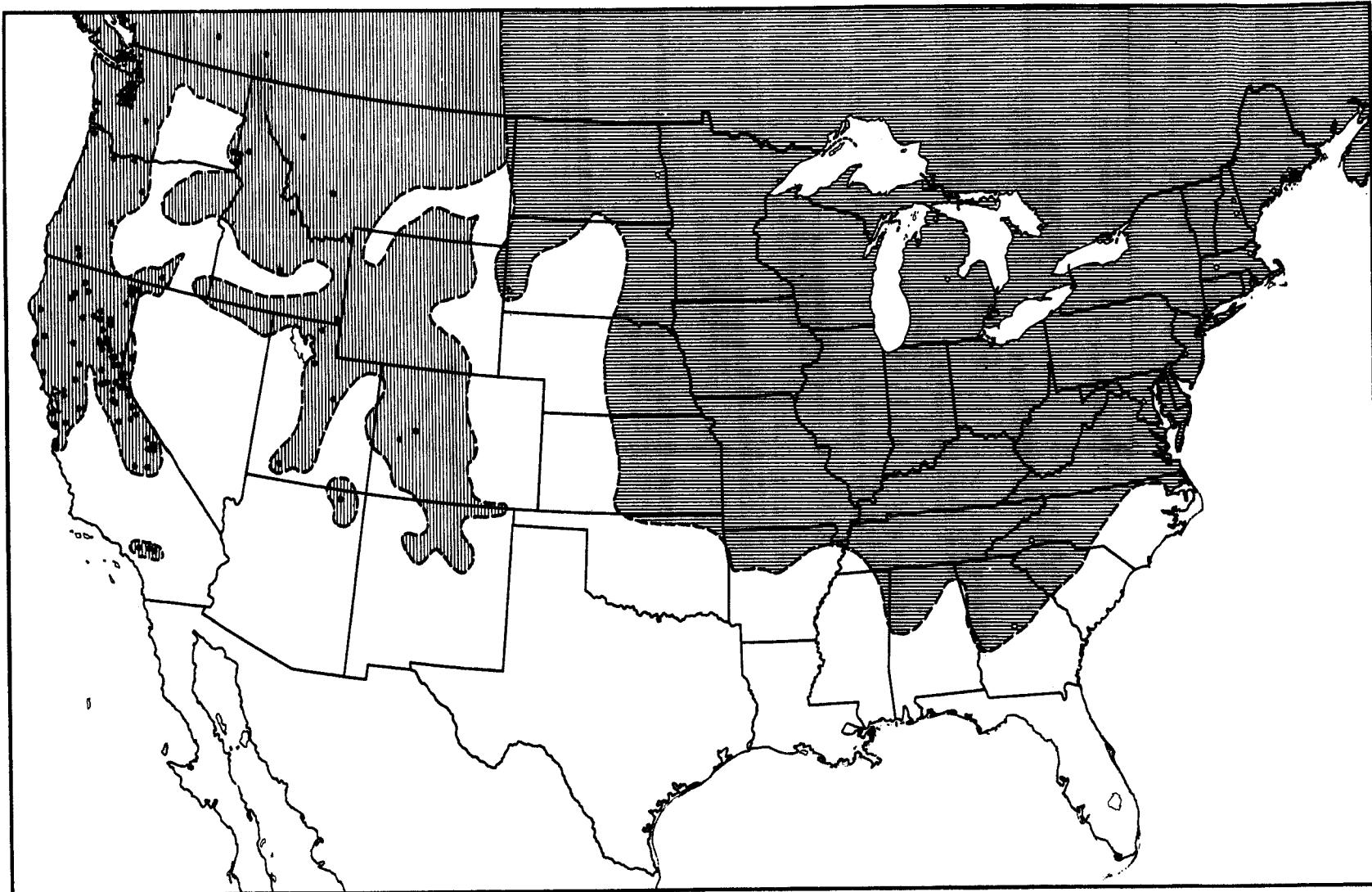
Vespa atropilosa Sladen, 1918. Ottawa Nat., 32:72. Cotype ♀ and workers, Alberta and British Columbia, Canada.

Geographical range: Western Canada and the United States east to Alberta, Montana, Wyoming, Colorado, and Arizona (map 1).

California records:

Alpine Co.: Carson Pass, 8,600 ft., ♀, IX-2-33 (G. E. and R. M. Bohart, U.C.D.); Hope Valley, ♀, VII-9-48 (C. D. MacNeill, C.I.S.).

Amador Co.: Silver Lake, 2 mi. S.W., ♀♀, VIII-20-49 (C. D. MacNeill, C.I.S.).



Map 1. Distribution of *Vespa rufa* (Linnaeus); subspecies *atropilosa* indicated by solid circles, subspecies *vidua* by open circles.

BULLETIN OF THE CALIFORNIA INSECT SURVEY

Contra Costa Co.: Antioch, ♂, IX-10-47 (P. D. Hurd, Jr., U.C.D.); ♀, VIII-21-48 (P. D. Hurd, Jr., U.C.D.); ♀, VI-29-53 (C. D. MacNeill, C.I.S.).

El Dorado Co.: Lake Tahoe, ♀, VI-26-48 (L. W. Isaak, U.C.D.); Camp Sacramento, ♀, V-22-49 (W. F. Ehrhardt, U.C.D.); Snowline Camp, ♀, VII-7-48 (P. D. Hurd, Jr., U.C.D.); ♀, VI-24-48 (S. A. Sher, C.I.S.); Pyramid Peak, 8,600 ft., ♀, VIII-8-12 (E. C. Van Dyke, C.A.S.); Riverton, ♀, VII-7-31 (E. C. Zimmerman, C.A.S.).

Glenn Co.: Artois, ♀, VII-10-52 (J. W. MacSwain, C.I.S.).

Humboldt Co.: Weott, ♀, VII-18-40 (C.I.S.).

Inyo Co.: Bishop, 3 mi. E., ♀, VII-11-53 (W. D. McLellan, U.C.D.); Big Pine, ♀, VII-10-53 (W. D. McLellan, U.C.D.); Westgaard Pass, 3 mi. N., ♀, VI-26-53 (J. W. MacSwain, C.I.S.); Mazourka Canyon, ♀, VII-2-53 (J. W. MacSwain, C.I.S.); Lone Pine, ♀, V-23-37 (N. W. Frazier, C.I.S.).

Lassen Co.: Hallelujah Junction, ♀, VII-4-52 (R. C. Bechtel, U.C.D.); Summit Camp, ♀, VI-28-49 (H. A. Hunt, U.C.D.); Bridge Creek Camp, ♀, VII-9-49 (L. W. Isaak, U.C.D.); Butte Lake, ♀, IX-11-48 (C. D. MacNeill, C.I.S.).

Los Angeles Co.: Pomona, ♀, VII-12-31 (C.I.S.).

Mariposa Co.: Wawona, ♀, VI-6-42 (A. J. Walz, U.C.D.); Yosemite, ♀, V-20-34 (C.A.S.).

Mendocino Co.: Little River, ♀, VIII-23-50 (J. Linsley, C.I.S.); Laytonville, ♀, VI-24-22 (C. D. Duncan, C.A.S.).

Modoc Co.: Likely, ♀, IX-1939 (J. J. duBois, U.C.D.); Juniper Flat, ♀, VII-1939 (J. J. duBois, U.C.D.); Cedar Pass, ♀, VII-3-46 (P. D. Hurd, Jr., C.I.S.); Lake City, ♀, VII-8-46 (P. D. Hurd, Jr., C.I.S.); Davis Creek, ♀, VII-11-22 (C. L. Fox, C.A.S.).

Mono Co.: Bridgeport, ♀♀, VIII-13-52 (G. C. Bechtel, U.C.D.); Topaz Lake, ♀, VII-17-51 (A. T. McClay, U.C.D.); ♀, VII-17-51 (S. M. Kappos, U.C.D.); Cottonwood Creek, ♀, VII-14-53 (W. D. McLellan, U.C.D.); Blanco's Corral, White Mountains, ♀, VII-7-53 (W. D. McLellan, U.C.D.); Mono Lake, ♀, VII-7-53 (J. C. Downey, U.C.D.); Leavitt Meadow, ♀, VII-6-51 (R. W. Morgan, C.I.S.).

Monterey Co.: Carmel, ♀, VII-19-33 (L. S. Slevin, C.A.S.).

Nevada Co.: Fuller Lake, ♀, VII-22-49 (E. I. Schlinger, U.C.D.); Hobart Mills, ♀, VIII-26-48 (R. F. Smith, U.C.D.); Sagehen nr. Hobart Mills, ♀, VII-3-54 (J. C. Downey, U.C.D.); ♀, VII-16-54 (R. M. Bohart, U.C.D.); Boca, ♀, VII-3-54 (R. C. Bechtel, U.C.D.); Truckee, 7 mi. S.E., ♀, VI-24-54 (R. M. Bohart, U.C.D.).

Placer Co.: Dutch Flat, ♀, V-2-54 (E. I. Schlinger, U.C.D.).

Plumas Co.: Bucks Lake, ♀, VII-1-49 (P. D. Hurd, Jr., U.C.D.); Quincy, 4 mi. W., ♀, VII-6-49 (L. W. Isaak, U.C.D.); ♀, VII-4-51 (R. C. Bechtel, U.C.D.); La Porte, ♀, IX-23-51 (E. R. Jaycox, U.C.D.); Keddie, ♀, VII-4-51 (E. I. Schlinger, U.C.D.); Clio, ♀, VIII-23-52 (R. C. Bechtel, U.C.D.); Onion Valley, ♀, VII-6-52 (R. C. Bechtel, U.C.D.); Lake Almanor, ♀, VII-13-34 (E. P. Van Duzee, C.A.S.).

San Bernardino Co.: Mill Creek, ♀, IX-19-37 (P. H. Timberlake, U.C.R.); Sky Forest, San Bernardino Mts., 5,400 ft., ♀, VIII-16-37 (P. H. Timberlake, U.C.R.).

San Joaquin Co.: Tracy, ♀, VI-21-49 (R. F. Smith, U.C.D.).

San Mateo Co.: Kings Mt., ♀, IX-8-48 (P. D. Hurd, Jr., C.I.S.).

Santa Clara Co.: Santa Clara Co., ♂, (C. F. Baker, U.C.R.).

Santa Cruz Co.: Ben Lomond, ♀, VII-4-49 (C. D. MacNeil, C.I.S.).

Shasta Co.: Old Station, ♂♀, IX-23-51 (J. C. Hall, E. I. Schlinger, U.C.D.); Manzanita Lake, Lassen National Park, ♀, V-19-41 (P. D. Hurd, Jr., U.C.D.); Lake Eiler, ♀, VII-9-47 (T. O. Thatcher, C.I.S.); Hat Creek Ranger Station, ♀, VI-25-47 (C. A. Hanson, C.I.S.); Shingletown, ♀, V-21-41 (U.C.D.).

Sierra Co.: Webber Lake, ♀, VIII-4-51 (R. C. Bechtel, U.C.D.); Gold Lake, ♀, VII-8-54 (R. M. Bohart, U.C.D.); Sierraville, ♀, VIII-26-48, (R. F. Smith, C.I.S.); Calpine, ♀, VIII-27-48 (P. D. Hurd, Jr., C.I.S.).

Siskiyou Co.: McCloud, ♀, IX-12-51 (J. C. Hall, E. I. Schlinger, U.C.D.); Shasta City, ♀, V-20-29 (C. C. Wilson, U.C.R.).

Solano Co.: Rio Vista, ♀, VI-2-49 (R. S. Beal, C.I.S.).

Sonoma Co.: Stillwater Cove, ♀♀, V-23-54 (J. C. Downey, U.C.D.).

Sutter Co.: Sutter Buttes, ♀, IV-2-53 (J. C. Hall, U.C.D.).

Trinity Co.: Preacher Meadow, ♀, VII-12-49 (A. T. McClay, U.C.D.); Carrville, ♀, V-30-34 (U.C.D.); Coffee Creek ♀, VI-19-34 (F. R. Platt, U.C.R.).

Tulare Co.: Giant Forest, ♀, VII-12-28 (C. L. Fox, C.A.S.).

Tuolumne Co.: Dodge Ridge, ♀, VII-4-51 (T. R. Haig, U.C.D.); Pinecrest, ♀, VII-18-53 (J. G. Rozen, C.I.S.); Strawberry, ♀, VII-15-51 (J. W. MacSwain, C.I.S.).

Yolo Co.: Davis, ♀, V-8-51 (A. T. McClay, U.C.D.); ♂, IX-28-52 (J. C. Hall, U.C.D.).



Map 2. Distribution of *Vespa sulphurea* (Saussure).

Discussion:

The California habitat of this widespread species is primarily the Sierra and the north coast area as far south as Monterey County. However, it has been taken also in the Great Valley area as far south as San Joaquin County and in the mountains of southern California. Nests are subterranean. We have studied 9 males, 197 females, and 66 workers collected from April through October. We are considering *rufa sladeni* Bequaert as merely a dark form of *atropilosa*. The distributional relationship with the more eastern subspecies, *vidua* (Saussure) (= *acadica* Sladen) is shown on map 1.

Vespa (Vespa) sulphurea (Saussure)
(Fig. 23)

Vespa sulphurea Saussure, 1854. Études Fam. Vespidae, 2:137. Holotype ♀, California

Geographical range: California, southern Oregon, Nevada, Arizona, and Baja California (map 2). California records:

Alameda Co.: Arroyo Mocho, 25 mi. S. Livermore, ♀, VII-30-49 (J. E. Gillaspy, U.C.D.); Tesla, ♀, IX-25-48 (P. D. Hurd, Jr., C.I.S.).

Butte Co.: Richardson Springs, ♀, V-21-44 (E. C. Van Dyke, C.A.S.).

Contra Costa Co.: Antioch, ♀, IX-13-36 (E. C. Van Dyke, C.A.S.).

El Dorado Co.: Pollock Pines, ♀, VIII-19-53 (E. I. Schlinger, U.C.D.); Pleasant Valley, ♀, V-31-54 (J. C. Downey, U.C.D.); Snowline Camp, ♀, VI-24-48 (C. D. MacNeill, C.I.S.); Lake Tahoe, ♀, VII-6-25 (J. D. Gunder, C.A.S.).

Humboldt Co.: Fort Seward, ♀, V-24-35 (H. J. Rayner, U.C.D.).

Kern Co.: Kern Canyon, ♀, V-31-41 (U.C.D.); Frazier Park, ♀, V-18-40 (R. M. Bohart, U.C.D.).

Lake Co.: Kelseyville, ♀, IX-1-53 (E. I. Schlinger, U.C.D.); Pillsbury Lake, ♀, VIII-3-33 (H. S. Gentry, U.C.D.); Lower Lake, ♀, VIII-12-48 (J. E. Gillaspy, U.C.D.); Anderson Springs, ♀, VIII-14-22 (J. E. Cottle, C.A.S.); Clear Lake, ♀, VIII-31-30 (E. P. Van Duzee, C.A.S.).

Los Angeles Co.: Tanbark Flat, ♀, VII-12-52 (E. M. Evans, U.C.D.); ♀, VI-19-50 (J. W. MacSwain, C.I.S.); Littlerock, ♀, IV-11-36 (G. E. and R. M. Bohart, U.C.D.); Big Dalton Dam, ♀, VII-13-50 (W. C. Bentinck, C.I.S.); Claremont, ♀ (C. H. Muzzal, C.A.S.); Voltaire, ♀, IX-5-23 (J. D. Gunder, C.A.S.); Santa Monica, ♀, VII-19-10 (F. C. Clark, C.A.S.).

Marin Co.: Fairfax, ♀, IV-25-20 (C. L. Fox, C.A.S.); Kentfield, ♀, IX-19-22 (C. L. Fox, C.A.S.); San Rafael, ♀, VII-28-22 (F. X. Williams, C.A.S.); Mt. Tamalpais, ♀, VII-8-22 (F. X. Williams, C.A.S.).

Mariposa Co.: Yosemite, ♀, V-25-39 (I. R. Burden, U.C.D.); Wawona, ♀, VI-12-42 (A. J. Walz, C.I.S.).

Mendocino Co.: Hopland, ♀, VIII-31-53 (E. I. Schlinger, U.C.D.); Caspar, ♀, V-11-35 (J. Helfer, C.I.S.).

Monterey Co.: Arroyo Seco, ♀, VII-23-49 (C. D. MacNeill, C.I.S.); Bixby Creek, ♀, VIII-1-49 (M. Wasbauer); Carmel, ♀, V-1-28 (L. S. Slevin, C.A.S.); Paraiso Springs, ♀, IX-29-22 (L. S. Slevin, C.A.S.); ♂, IX-25-19 (L. S. Slevin, C.A.S.).

Napa Co.: Samuel Springs, ♀, V-15-51 (J. C. Hall, U.C.D.); Monticello, ♀, IV-26-49 (R. C. Bechtel, U.C.D.); Napa, ♂, VII-25-51 (D. P. Lawfer, U.C.D.); ♀, VIII-24-53 (E. I. Schlinger, U.C.D.); Knoxville, ♀, IX-1-53 (A. A. Grigarick, U.C.D.).

Nevada Co.: Dutch Flat, ♀, VIII-25-48 (P. D. Hurd, Jr., U.C.D.).

Placer Co.: Cisco, ♀, IV-13-39 (R. M. Bohart, U.C.D.); Loomis, ♀, VII-24-51 (R. C. Bechtel, U.C.D.); Rattlesnake Bridge, ♀, IX-8-29 (C. C. Wilson, U.C.R.).

Plumas Co.: Quincy, 4 mi. W., ♀, VI-25-49 (P. D. Hurd, Jr., C.I.S.); Keddie, ♀, VI-12-41 (F. H. Rindge, C.I.S.).

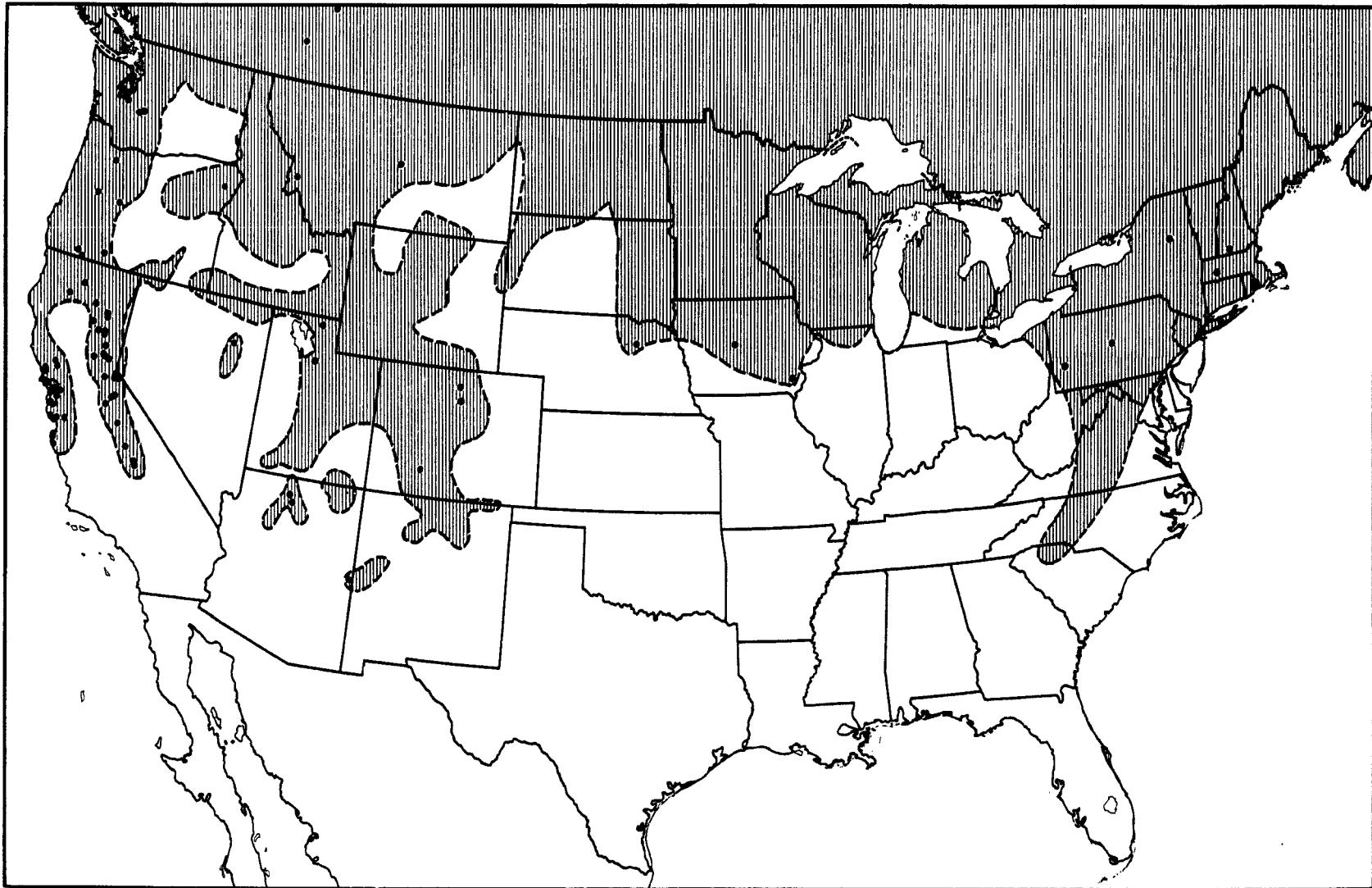
Riverside Co.: Ribbonwood, ♀, V-20-39 (E. S. Ross, U.C.D.); 3 mi. E. Keen Camp, ♀, VIII-27-52 (H. Graham, C.I.S.); Keen Camp, 8 mi. W., ♀, V-17-39 (E. G. Linsley, C.I.S.); Piñon Flat, ♀, VI-18-41 (E. C. Van Dyke, C.A.S.); Whitewater Canyon, ♀, IX-11-35 (P. H. Timberlake, U.C.R.); Sheep Creek, ♀, VI-23-34 (C. M. Dammers, U.C.R.).

San Bernardino Co.: Banning Canyon, ♀, V-19-51 (R. C. Bechtel, U.C.D.); Mountain Home, ♀, IX-12-53 (E. I. Schlinger, U.C.D.); Mill Creek Canyon, ♀, IX-21-28 (E. P. Van Duzee, C.A.S.); Morongo Valley, ♀, IX-27-41 (P. H. Timberlake, U.C.R.); South Fork Creek, San Bernardino Mts., 6,200 ft., ♀, IX-2-46 (P. H. Timberlake, U.C.R.); Mill Creek, ♂, IX-29-37 (P. H. Timberlake, U.C.R.); ♀, V-30-39 (P. H. Timberlake, U.C.R.); Cajon Valley, ♀, V-8-34 (C. M. Dammers, U.C.R.); Forest Home, ♀, VI-2-34 (C. M. Dammers, U.C.R.).

San Diego Co.: Warner Springs, ♀, VIII-30-51 (E. I. Schlinger, U.C.D.); Jacumba, ♀, VII-17-40 (R. H. Beamer, U.K.); Mt. Laguna, ♀, VII-16-50 (D. Cox, C.I.S.).

Santa Barbara Co.: Carpenteria, ♀, 1932 (U.C.D.).

Santa Clara Co.: San Antonio Valley, ♀, VII-30-49 (J. E. Gillaspy, U.C.D.); Stevens Creek, ♀, IX-13-13 (U.C.R.).



Map 3. Distribution of *Vespula vulgaris* (Linnaeus).

Shasta Co.: Carbon, ♀, X-12-52 (J. C. Hall, U.C.D.); Cayton, ♀, VI-20-54 (J. C. Downey, U.C.D.); Burney, ♀, VI-9-41 (C.I.S.).

Siskiyou Co.: Happy Camp, ♀, VIII-30-50 (C.I.S.); Hamburg, ♀, VIII-17-50 (C.I.S.).

Solano Co.: Vacaville, ♀, VIII-26-50 (A. T. McClay, U.C.D.).

Sonoma Co.: Cloverdale, ♀, VIII-24-53 (A. D. Telford, U.C.D.); Cazadero, ♀, III-30-34 (G. E. and R. M. Bohart, U.C.D.).

Trinity Co.: Carrville, ♀, VI-9-34 (U.C.D.); Fawn Lodge, ♀, VIII-16-52, (R. C. Bechtel, U.C.D.); Trinity Center, ♀, VII-26-54 (J. A. Powell).

Yolo Co.: Davis, ♀, III-18-49 (R. C. Bechtel, U.C.D.); ♀, IX-6-52 (E. I. Schlinger, U.C.D.); Cache Creek Canyon, ♀, IV-30-54 (E. I. Schlinger, U.C.D.).

Discussion:

The yellow mesoscutal stripes are diagnostic among the western *Vespa*. The Nevada ("Nev.") and Arizona (Huachuca Mts.) localities given in the geographical range are from Bequaert (1932). Nests are subterranean. We have seen 10 males, 98 females, and 182 workers from California, collected from March to October.

Vespa (Vespa) vulgaris (Linnaeus) (Figs. 10, 12, 18)

Vespa vulgaris Linnaeus, 1758. Syst. Nat., 1:572.
Holotype ♀, Europe.

Geographical range: Holarctic; south in United States to Iowa, Illinois, California, and mountains of North Carolina, New Mexico, and Arizona (map 3). Also in New Zealand (introduced).

California records:

Alameda Co.: Berkeley, ♀, IV-20-50 (W. F. Ehrhardt, U.C.D.); ♂, IV-26-38 (G. E. and R. M. Bohart, U.C.D.); Oakland, ♀, II-24-52 (R. Schuster, C.I.S.).

Alpine Co.: Hope Valley, ♀, VII-9-48 (P. D. Hurd, Jr., C.I.S.); ♀, VIII-16-49 (P. C. Hutchinson, C.A.S.).

Contra Costa Co.: Mt. Diablo, ♂, VI-19-39 (C.I.S.); Orinda, ♀, VIII-25-53 (M. Wasbauer).

El Dorado Co.: Meyers, ♀, IX-16-52 (E. I. Schlinger, U.C.D.); Camp Sacramento, ♀, V-22-49 (W. F. Ehrhardt, U.C.D.); Echo Lake, ♀, VII-23-31, (E. O. Essig, C.I.S.); Fallen Leaf Lake, ♀, VI-19-31 (O. H. Swezey, C.A.S.); Riverton, ♀, VII-7-31 (E. C. Zimmerman, C.A.S.).

Fresno Co.: Huntington Lake, ♀, VII-25-40 (A. T. McClay, U.C.D.); Lake Sequoia, ♀, IX-4-51 (J. C. Hall, U.C.D.).

Lake Co.: Anderson Springs, ♀, VIII-14-22 (J. E. Cottle, C.A.S.).

Lassen Co.: Bridge Creek Camp, ♀, VII-12-54 (A. A. Grigarick, U.C.D.); McCoy Flat Reservoir, ♀, VII-23-54 (J. A. Powell); Lassen National Park, ♀, VI-19-40 (I. McCracken, C.A.S.).

Marin Co.: Olema, ♀, XI-1-53 (R. C. Schuster, C.I.S.); Mill Valley, ♀, V-11-49 (A. Bartel, C.I.S.); Bolinas, ♀, III-7-49 (D. Cox, C.I.S.); Mt. Tamalpais, ♀, VIII-27-16 (E. P. Van Duzee, C.A.S.); Fairfax, ♀, IX-28-54 (H. L. Mathis, U.C.D.).

Mendocino Co.: Van Damme Park, ♀, IX-13-49 (C. D. MacNeill, C.I.S.); Little River, ♀, VIII-23-50 (J. Linsley, C.I.S.).

Monterey Co.: Monterey, ♀, VIII-29-50 (R. C. Bechtel, U.C.D.); Big Sur, ♀, VII-4-37 (C. A. Hamsher, U.C.D.); Carmel, ♀, IX-6-27 (L. S. Slevin, C.A.S.).

Napa Co.: Mt. St. Helena, ♀, VI-9-18 (E. P. Van Duzee, C.A.S.).

Nevada Co.: Sagehen, nr. Hobart Mills, ♀, VIII-10-51 (E. G. Linsley, C.I.S.); ♀, VII-16-54 (R. C. Blaylock, U.C.D.); Grass Valley, ♀, V-17-30 (E. P. Van Duzee, C.A.S.); Truckee, 7 mi. S.E., ♀, VI-24-54 (R. C. Blaylock, U.C.D.).

Placer Co.: Alta, ♀, VI-25-33 (G. E. Bohart, U.C.D.).

Plumas Co.: Bucks Lake, ♀, VI-23-49 (A. S. Deal, U.C.D.); ♀, VII-14-49 (R. C. Bechtel, U.C.D.); Quincy, 4 mi. W., ♀, VI-21-49 (W. R. Schreader, U.C.D.); Onion Valley, ♀, VII-7-49 (E. I. Schlinger, U.C.D.); Meadow Valley, ♀, VI-30-24 (E. C. Van Dyke, C.A.S.).

San Francisco Co.: San Francisco, ♀, IX-3-52 (A. D. Telford, U.C.D.); Presidio, ♂, XI-22-25 (C. L. Fox, C.A.S.).

San Mateo Co.: Kings Mt., ♀, X-8-48 (P. D. Hurd, Jr., U.C.D.); Halfmoon Bay, ♀, III-28-53 (W. D. McLellan, U.C.D.); San Mateo, ♀, VI-10-11 (J. A. Kusche, C.A.S.); Redwood City, ♀, VII-14-48 (E. S. Ross, C.A.S.).

Santa Clara Co.: Stevens Creek, ♀, IX-13-13 (U.C.R.).

Santa Cruz Co.: Soquel, ♀, VI-12-52 (E. I. Schlinger, U.C.D.); Felton, ♀, VII-20-51 (D. Burdick); Mt. Herman, ♀, VII-7-22 (F. E. Blaisdell, C.A.S.).

Shasta Co.: Hat Creek, ♀, VII-9-47 (T. O. Thatcher, U.C.D.); Pot Spring, 2 mi. S.W., ♀, VII-9-47 (T. O. Thatcher, C.I.S.).

Sierra Co.: Gold Lake, ♀, VII-19-21 (C. L. Fox, C.A.S.).

Siskiyou Co.: McCloud, ♀, IX-12-51 (J. C. Hall, E. I. Schlinger, U.C.D.).

Sonoma Co.: Maacama Creek, ♀, VIII-24-53 (A. D. Telford, U.C.D.); Triniti, ♀, III-7-37 (C.I.S.);

Camp Meeker, ♀, 1931 (C.A.S.); Monte Rio, ♀, X-5-12 (U.C.R.).

Tehama Co.: Deer Creek, ♀, V-23-55 (R. M. Bohart, U.C.D.).

Trinity Co.: Lewiston, 10 mi. N., ♀, VII-28-50 (H. H. Blakemore, C.I.S.).

Tulare Co.: Mineral King, ♂, VIII-19-40 (F. T. Scott, C.I.S.); Giant Forest, ♀, VII-16-23 (C. L. Fox, C.A.S.).

Tuolumne Co.: Mill Creek Camp, ♀, VII-13-51 (R. C. Bechtel, U.C.D.); Pinecrest, ♀, VII-10-48 (P. H. Arnaud, U.C.D.); Strawberry, ♀, VI-30-51 (R. W. Morgan, C.I.S.); Tuolumne, ♀, VII-25-15 (C. L. Fox, C.A.S.).

Discussion:

This species is similar in markings to *pensylvanica*, although somewhat darker. Females and workers are best separated by the roughly triangular pronotal yellow mark in *pensylvanica* and the linear one in *vulgaris*. Available records indicate that it is primarily Sierran and coastal in California (see map 3). Nests are subterranean or rarely just above ground. We have seen 10 males, 43 females, and 150 workers from California, collected from January through November.

to the north, it is a rare, montane species in California where we have seen only 3 males and 5 females, collected from May through August. An additional record is that given by Bequaert (1932): 1 ♀, Giant Forest, Sequoia National Park (R. C. Shannon).

Vespa (Dolichovespula) arenaria (Fabricius) (Figs. 14, 21, 25)

Vespa arenaria Fabricius, 1775. Syst. Ent., p. 365.
Holotype worker, America.

Geographical range: America, north of Mexico.
California records:

Alameda Co.: Berkeley, ♀, III-30-52 (D. E. Barcus, U.C.D.); ♀, VI-12-46 (P. D. Hurd, Jr., U.C.D.); ♂, V-8-22 (U.C.D.).

Alpine Co.: Hope Valley, ♀, VI-7-52 (R. C. Bechtel, U.C.D.); Carson Pass, ♂♀, IX-6-34 (U.C.D.).

Contra Costa Co.: Danville, ♀, VII-26-52 (F. X. Williams, C.A.S.).

Del Norte Co.: Crescent City, ♀, VII-1-51 (M. F. McClay, U.C.D.).

El Dorado Co.: Snowline Camp, ♀, VI-22-51 (E. I. Schlinger, U.C.D.); Placerville, ♀, IX-28-46 (G. Vansell, U.C.D.); China Flat, ♂, VIII-2-49 (J. W. MacSwain, C.I.S.).

Fresno Co.: Lake Lone Indian, ♀, VIII-25-49 (E. I. Schlinger, U.C.D.); Heart Lake, 10,500 ft., ♂, IX-1-52 (E. I. Schlinger, U.C.D.); Rea Lake, 10,500 ft., ♀, VII-20-10 (E. C. Van Dyke, C.A.S.).

Glenn Co.: Artois, ♀, VII-11-52 (J. W. MacSwain, C.I.S.).

Humboldt Co.: Eureka, ♀♀, VI-30-52 (R. R. Snelling, U.C.D.).

Inyo Co.: Inyo Co., ♀, VII-12-34 (U.C.D.).

Lake Co.: Middletown, ♀, VII-22-34 (E. P. Van Duzee, C.A.S.).

Lassen Co.: Bridge Creek Camp, ♀, VII-9-49 (L. W. Isaak, U.C.D.); Butte Lake, ♀, IX-11-48 (C. D. MacNeill, C.I.S.); Hallelujah Junction, ♀, VII-12-54 (R. C. Blaylock, U.C.D.).

Los Angeles Co.: Crystal Lake, ♀, VI-29-50 (P. D. Hurd, Jr., C.I.S.).

Marin Co.: Point Reyes Station, ♂, VII-14-48 (W. F. Chamberlain, U.C.D.); Point Reyes, ♀, VIII-14-48 (W. F. Chamberlain, C.I.S.).

Mariposa Co.: Yosemite Valley, ♀♀, VII-16-29 (E. C. Zimmerman, C.A.S.).

Mendocino Co.: Ryan Creek, ♀, VII-17-46 (C.I.S.).

Merced Co.: Peregoy Meadows, ♀, VIII-14-47 (L. L. Jensen, C.I.S.).

Modoc Co.: Juniper Flat, ♀, VIII-1939 (J. J. du Bois); Lake City, ♀, VII-29-22 (C. L. Fox, C.A.S.).

Vespa (Dolichovespula) adulterina (Buysson) (Figs. 19, 26)

Vespa norwegica adulterina Buysson, 1905. Ann. Ent. Soc. Fr., 63:600. Cotype ♀♀, Europe; Corvallis, Oregon.

Geographical range: Holarctic; south in United States to California, Colorado, Michigan, and the mountains of North Carolina.

California records:

Shasta Co.: Big Springs, ♀, V-23-41 (J. R. Fisher, U.C.D.); Hat Lake, Lassen National Park, ♀, VI-14-41 (U.C.D.).

Sierra Co.: Gold Lake, ♀, VII-11-21 (C. L. Fox, C.A.S.).

Trinity Co.: Nash Mine, ♀, VI-13-18 (E. C. Van Dyke, C.A.S.); Big Flat, ♀, VI-21-34 (T. Aitken, U.C.D.).

Tulare Co.: Mineral King, ♂, VIII-19-40 (F. T. Scott, U.C.D.).

Discussion:

This species is an inquiline in the nest of *Vespa arenaria*. The pale markings vary from whitish to yellow, and whitish specimens have sometimes been called subspecies *arctica* Rohwer. Because of the extensive overlap in distribution of the forms with different markings, we prefer not to divide the species. Although more common

Mono Co.: June Lake, ♀, VIII-13-48 (W. E. Kelson, U.C.D.); Topaz Lake, ♂, VII-17-51 (A. T. McClay, U.C.D.); Cottonwood Creek, ♀, VII-14-53 (W. D. McLellan, U.C.D.).

Monterey Co.: Bixby Creek, ♀, VIII-10-49 (M. Wasbauer); Carmel, ♂, VII-24-33 (L. S. Slevin, C.A.S.); Paraiso Springs, ♀, VIII-30-24 (L. S. Slevin, C.A.S.).

Napa Co.: Calistoga, ♂♀, VIII-25-53 (E. I. Schlinger, U.C.D.); Napa, ♀, VIII-25-53 (E. I. Schlinger, U.C.D.).

Nevada Co.: Rucker Lake, ♀, VII-5-49 (E. I. Schlinger, U.C.D.); Webber Lake, ♂, VIII-25-46 (R. M. Bohart; U.C.D.); Sagehen, nr. Hobart Mills, ♀, VI-25-54 (J. A. Powell).

Plumas Co.: Quincy, 4 mi. W., ♀, VI-21-49 (E. I. Schlinger, U.C.D.); ♀, VII-7-49 (A. S. Deal, U.C.D.).

San Bernardino Co.: Mill Creek, 6,000 ft., ♀, V-28-50 (P. H. Timberlake, U.C.R.); Barton Flat, ♂, VIII-23-52 (P. H. Timberlake, U.C.R.); Big Bear Valley, ♂, VIII-7-33 (P. H. Timberlake, U.C.R.).

San Francisco Co.: San Francisco, ♂, IX-3-52 (A. D. Telford, U.C.D.); ♀, IV-3-54 (E. I. Schlinger, U.C.D.); ♀, V-20-14 (W. M. Gifford, U.C.R.).

San Mateo Co.: Halfmoon Bay, ♀, VII-11-50 (E. C. Carlson, U.C.D.); Woodside, ♀, V-15-47 (V. M. Stern, C.I.S.); Colma, ♂, VII-30-11 (J. A. Kusche, C.A.S.).

Santa Barbara Co.: Santa Barbara, ♀, (W. C. Gifford, C.A.S.).

Santa Clara Co.: Stanford, ♀, V-3-36 (C. A. Hamsher, C.I.S.).

Shasta Co.: Old Station, ♂♀, IX-23-51 (J. C. Hall, E. I. Schlinger, U.C.D.); Hat Creek, ♀, VI-5-41 (P. D. Hurd, Jr., U.C.D.).

Sierra Co.: Webber Lake, ♀, VII-5-51 (E. I. Schlinger, U.C.D.).

Siskiyou Co.: Sisson, ♀, VII-25-18 (E. P. Van Duzee, C.A.S.).

Solano Co.: Dixon, ♂, VII-25-23 (J. E. Cottle, C.A.S.).

Sonoma Co.: Glen Ellen, ♂♀, VI-9-51 (E. I. Schlinger, U.C.D.); Cazadero, ♀, IV-18-35 (U.C.D.).

Trinity Co.: Trinity River Camp, ♀, VI-3-51 (A. T. McClay, U.C.D.); Coffee Creek, ♀, VI-7-34 (U.C.D.).

Tulare Co.: Sequoia National Park, ♀, VI-25-41 Giant Forest, ♀, IX-5-32 (P. H. Timberlake, U.C. R.).

Tuolumne Co.: Dodge Ridge, ♀, VII-18-51 (A. T. McClay, U.C.D.).

Discussion:

We have seen this widely distributed species from thirty-six counties extending from San Bernardino County in the south to Modoc County in

the north. It is essentially an inhabitant of the mountain ranges and the coastal area as far south as Santa Barbara County. However, it is occasionally taken in the Sacramento Valley. The nests are above ground, usually attached to bushes or to low trees. We have seen 53 males, 215 females, and 108 workers collected from March to October. We consider *arenaria fernaldi* (Lewis) synonymous with *arenaria* (Fabricius).

Vespa (Dolichovespula) maculata (Linnaeus)

(Pl. 7, a, b, c; figs. 11, 15, 20)

Vespa maculata Linneaus, 1763. Centuria Ins. Rar., p. 30. Type (identity doubtful), Pennsylvania.

Geographical range: Alaska (Yukon Territory), Canada (British Columbia to Quebec), United States (map 4).

California records:

Alameda Co.: Oakland, ♀, XI-10-48 (R. H. Goodwin, C.I.S.).

Calaveras Co.: Mokelumne Hill, ♀ (F. E. Blasdell, C.A.S.).

El Dorado Co.: Pollock Pines, ♀, IV-24-38 (A. T. McClay, U.C.D.); Riverton, ♂, VIII-20-53 (A. A. Grigarick, U.C.D.); ♀, VII-7-31 (E. C. Zimmerman, C.A.S.); Placerville, ♀, VII-7-31 (E. C. Zimmerman, C.A.S.).

Fresno Co.: Sequoia Lake, ♀, XI-27-37 (C.A.S.).

Humboldt Co.: Fort Seward, ♀, VI-17-35 (H. J. Rayner, U.C.D.); Blocksburg, ♀, VI-17-35 (E. O. Essig, C.I.S.).

Lake Co.: Blue Lake, ♀, VII-30-49 (H. A. Hunt, U.C.D.); Anderson Springs, ♀, VIII-14-22 (J. E. Cottle, C.A.S.).

Madera Co.: North Fork, ♀, VI-21-33 (R. P. Allen, C.A.S.); Bass Lake, ♀, VII-10-34 (R. P. Allen, C.A.S.).

Marin Co.: Phoenix Lake, ♀, VIII-21-48 (A. Bartel, C.I.S.); Fairfax, ♀, VIII-10-40 (C.I.S.); Lagunitas, ♀, VI-9-40 (Miller, C.I.S.).

Mariposa Co.: Yosemite, ♀, V-21-31 (C.I.S.).

Mendocino Co.: Potter Valley, ♀, VII-1-51 (W. C. Bentinck, C.I.S.); Hickey Grove, ♀, VIII-25-50 (J. Linsley, C.I.S.); Alder Springs, ♀, VIII-28-50 (M. Wasbauer); Yorkville, ♀, V-1-24 (E. P. Van Duzee, C.A.S.).

Modoc Co.: Cedarville, 15 mi. E., ♀, VII-8-46 (P. D. Hurd, Jr., C.I.S.); Davis Creek, ♀, VII-13-22 (C. L. Fox, C.A.S.); Buck Creek, ♀, VII-20-22 (C. L. Fox, C.A.S.); Lake City, ♀, VII-30-22 (C. L. Fox, C.A.S.).

Napa Co.: Mt. St. Helena, ♀, IX-11-48 (J. E. Gillaspy, C.I.S.).

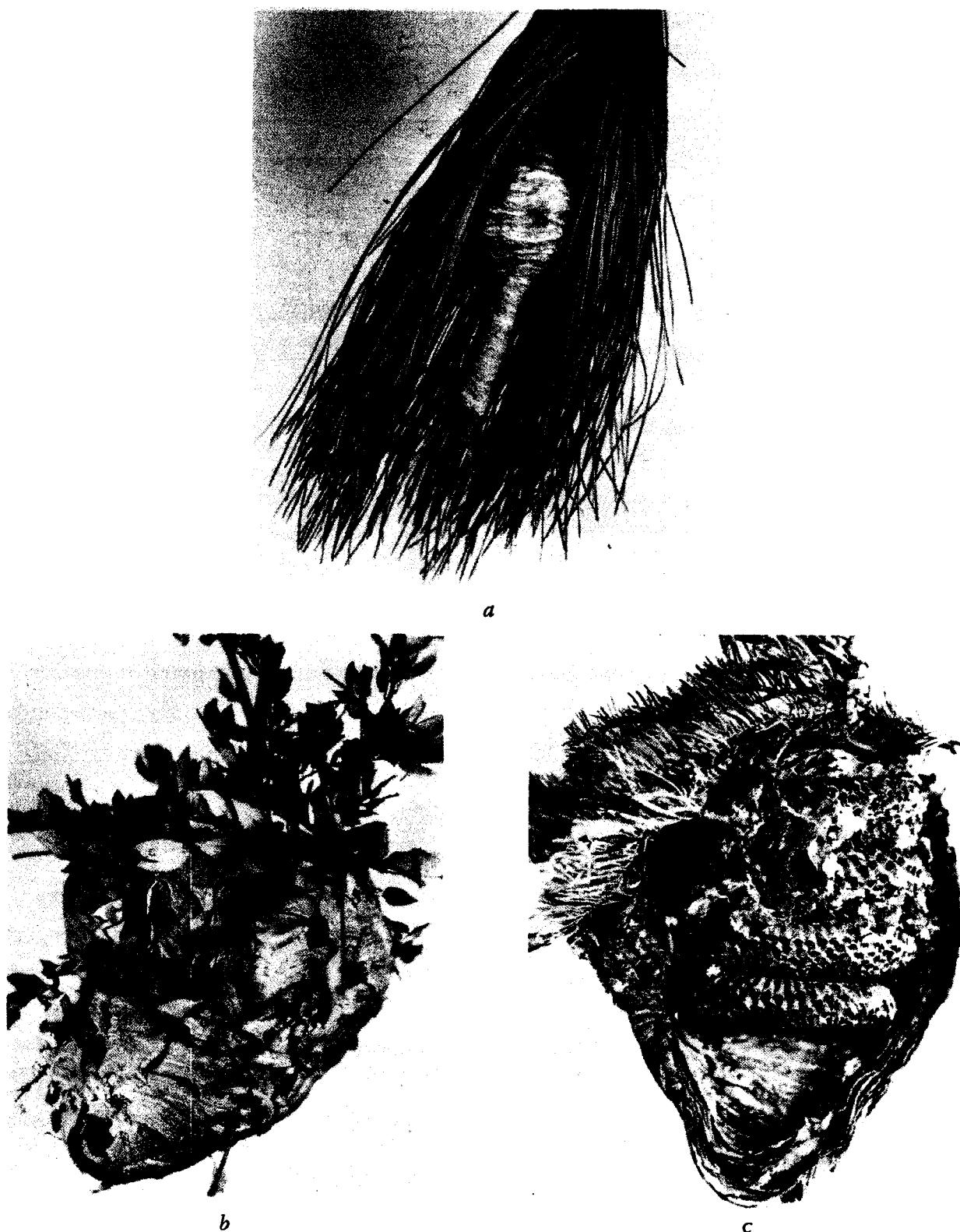
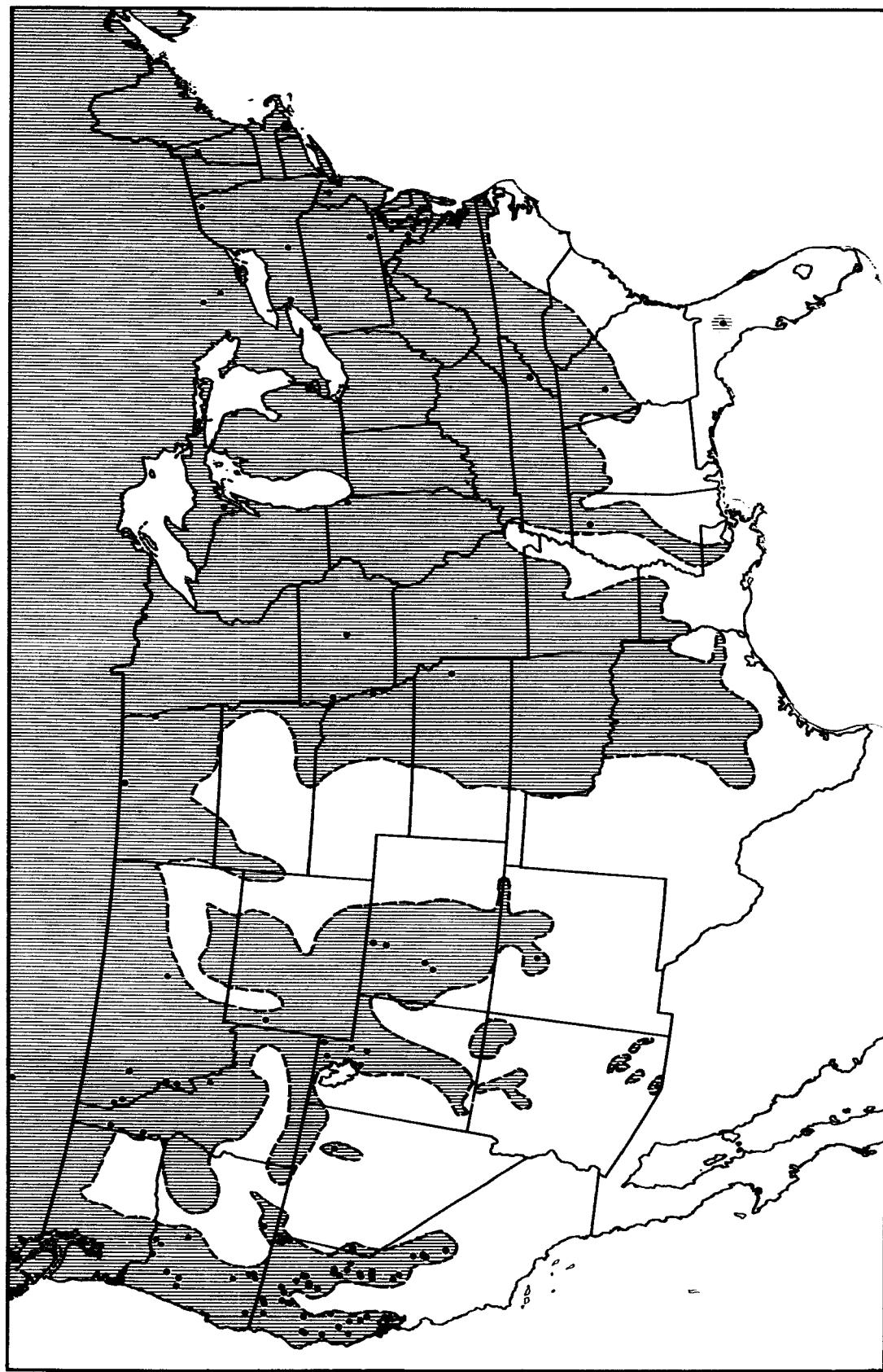


Plate 7. *a*. Queen nest of *Vespula maculata* (L.) showing tubular entrance (photograph by F. M. Summers). *b*. Mature nest of *V. maculata* with entrance below (photograph by F. M. Summers). *c*. Mature nest of *V. maculata* with outer envelope removed to show comb structure (photograph by F. M. Summers).



Map 4. Distribution of *Vespa maculata* (Linnaeus).

Placer Co.: Baxter, ♀, IX-1949 (M. Wasbauer); Gold Run, ♀ (U.C.R.).

Plumas Co.: Little Grass Valley, ♀, VII-22-51 (E. R. Jaycox, U.C.D.); Quincy, 4 mi. W., ♀ VI-21-49 (E. L. Atkinson, C.I.S.); Meadow Valley, ♀, VI-3-24 (E. C. Van Dyke, C.A.S.).

Shasta Co.: Old Station, ♀, IX-23-51 (J. C. Hall, E. I. Schlinger, U.C.D.); Shingletown, ♀, VI-16-41 (P. D. Hurd, Jr., U.C.D.); Hat Creek, ♀, VI-1-41 (E. G. Linsley, C.I.S.); Viola, ♀, V-19-41 (C.I.S.); Cayton, ♀, VII-14-18 (E. P. Van Duzee, C.A.S.).

Sierra Co.: Downieville, ♀, IX-9-51 (D. P. Lawfer, U.C.D.); Webber Lake, ♀, IX-3-39 (B. Brookman, C.I.S.); St. Charles Hill, ♀, VII-7-26 (E. H. Nast, C.A.S.).

Siskiyou Co.: Horse Creek, ♀, VII-4-50 (H. E. Cott, U.C.D.); Bartle, 5-10 mi. N.E., ♀, VI-20-54 (E. I. Schlinger, U.C.D.); Hamburg, ♀, VIII-17-50 (C.I.S.); Dunsmuir, ♀, VII-4-52 (R. P. Allen, C.I.S.); Elk Creek, ♀, IX-8-41 (E. C. Van Dyke, C.A.S.).

Tehama Co.: Paynes Creek, ♀, IX-23-51 (J. C. Hall, E. I. Schlinger, U.C.D.).

Trinity Co.: Carrville, ♀, V-30-34 (T. Aitken, U.C.D.); East Fork Trinity River, ♀, X-1-49 (C.I.S.); Trinity Center, ♀, VIII-27-36 (J. T. Howell, C.A.S.); Scott Mountain, ♀, VIII-26-36 (J. T. Howell, C.A.S.); Peanut, ♀, VIII-9-49 (P. C. Hutchinson, C.A.S.).

Tuolumne Co.: Columbia, ♀, I-14-24 (C. B. Stockel, C.A.S.).

Discussion:

This species occurs primarily in the north coast ranges and at moderate elevations in the Sierra. Nests are aerial, frequently high off the ground, and often a foot or more in diameter. We have seen 1 male, 107 females, and 64 workers from California, collected throughout the year.

Polistes apachus Saussure (Pl. 8, a, b; fig. 33)

Polistes apachus Saussure, 1857. Ann. Soc. Ent. Fr., (3)5:314. No type designated, Sonora, Mexico.

Geographical range: California, southwestern United States, and Mexico (map 5).

California records:

Fresno Co.: Firebaugh, 7 mi. S., ♂, IX-22-48 (R. F. Smith, U.C.D.); Coalinga, ♂♀, VII-18-46 (P. D. Hurd, Jr., U.C.D.); Fresno, ♂♀, VII-19-45 (P. Simmons, U.C.D.); Mendota, ♂, VIII-11-47 (V. M. Stern, C.I.S.); Oxalis, ♀, VIII-23-47 (V. M. Stern, C.I.S.); Chowchilla, ♂, IX-2-47 (R. Coleman, C.I.S.).

Glenn Co.: Artois, ♂, VII-15-52 (E. G. Linsley, R. F. Smith, C.I.S.).

Inyo Co.: Furnace Creek, ♀, IV-1-51 (P. D. Hurd, Jr., C.I.S.).

Kern Co.: Shafter, ♂♀, VIII-19-53 (J. E. Eckert, U.C.D.); Bakersfield, ♀, VII-21-51 (L. W. Isaak, U.C.D.); ♂, VI-1938 (C.I.S.); Maricopa, ♀, VI-30-52 (G. E. Bohart, Utah State Agr. Coll.).

Los Angeles Co.: Glendale, ♀, VI-18-43 (E. I. Schlinger, U.C.D.).

Merced Co.: Dos Palos, 5 mi. S., ♂, VII-18-46 (R. F. Smith, U.C.D.); ♀, VII-17-47 (V. M. Stern, C.I.S.).

Riverside Co.: Banning, ♂, VII-2-52 (S. Miyagawa, U.C.D.); Whitewater, ♂, VII-9-50 (J. W. MacSwain, U.C.D.); Riverside, ♀, X-13-36 (I. McCracken, C.A.S.); ♂, IX-27-28 (P. H. Timbelake, U.C.R.).

San Bernardino Co.: Mill Creek Canyon, ♀, IX-21-23 (E. P. Van Duzee, U.C.D.); Needles, ♀, XII-17-21 (J. A. Kusche, U.C.D.); Rialto, ♀, IV-17-38 (P. D. Hurd, Jr., C.I.S.); Redlands, ♀, II-14-24 (F. R. Cole, U.C.R.); ♀, IX-15-22 (U.C.R.).

San Diego Co.: Encinitas, ♀, VIII-1942 (E. I. Schlinger, U.C.D.).

Stanislaus Co.: Hughson, ♂, X-1947 (U.C.D.); Ceres, ♀, VIII-21-53 (W. W. Middlekauff, C.I.S.); Turlock, ♀, VI-25-51 (R. Snelling, U.C.D.).

Tulare Co.: Visalia, ♀, VIII-23-50 (R. C. Bechtel, U.C.D.); ♂, X-16-54 (A. E. and R. E. Dorow, U.C.D.).

Yolo Co.: Davis, ♀, IX-26-54 (R. S. Bethel, U.C.D.).

Discussion:

It appears likely that *apachus* was introduced into California from Texas about 1920 and that it has been gradually extending its range in the state since that time. To support this theory chronologically the first county records in the specimens we have were: San Bernardino in 1921 and 1923, followed by Riverside in 1928, Kern in 1938, San Diego in 1942, Los Angeles in 1943, Fresno in 1944, Merced in 1946, Stanislaus in 1947, Tulare in 1950, Inyo in 1951, Glenn in 1952, and Yolo in 1954. The limits of its range in southern Colorado and in Kansas indicate that it may have gone about as far north in California as it can go. This is the largest and most brightly colored *Polistes* in the state. Because of the tendency of the wasps to locate their nests in fig trees, olive trees, and grape vines, and their pugnacity when disturbed, they are sometimes classed as agricultural pests (Simmons *et al.*, 1948). In its presumed area of origin it is primarily associated with mesquite and grassland rather than with wooded areas. Nests are large, circular, and

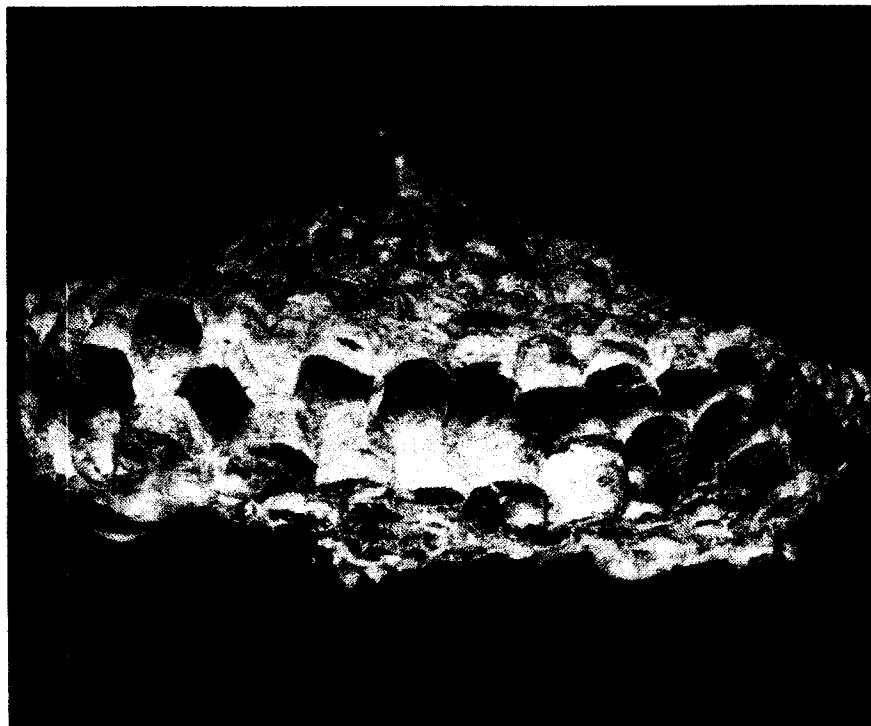
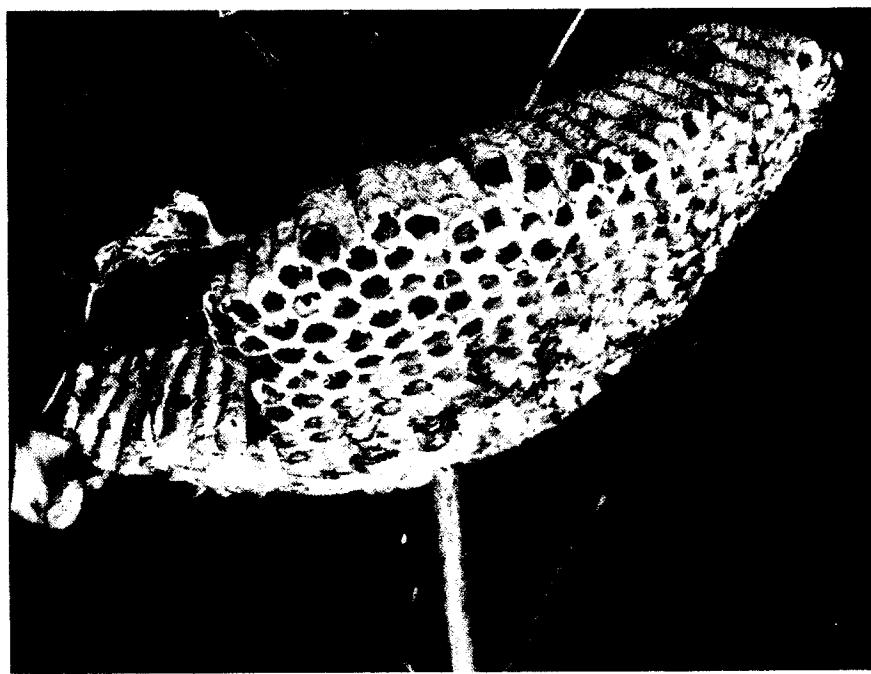
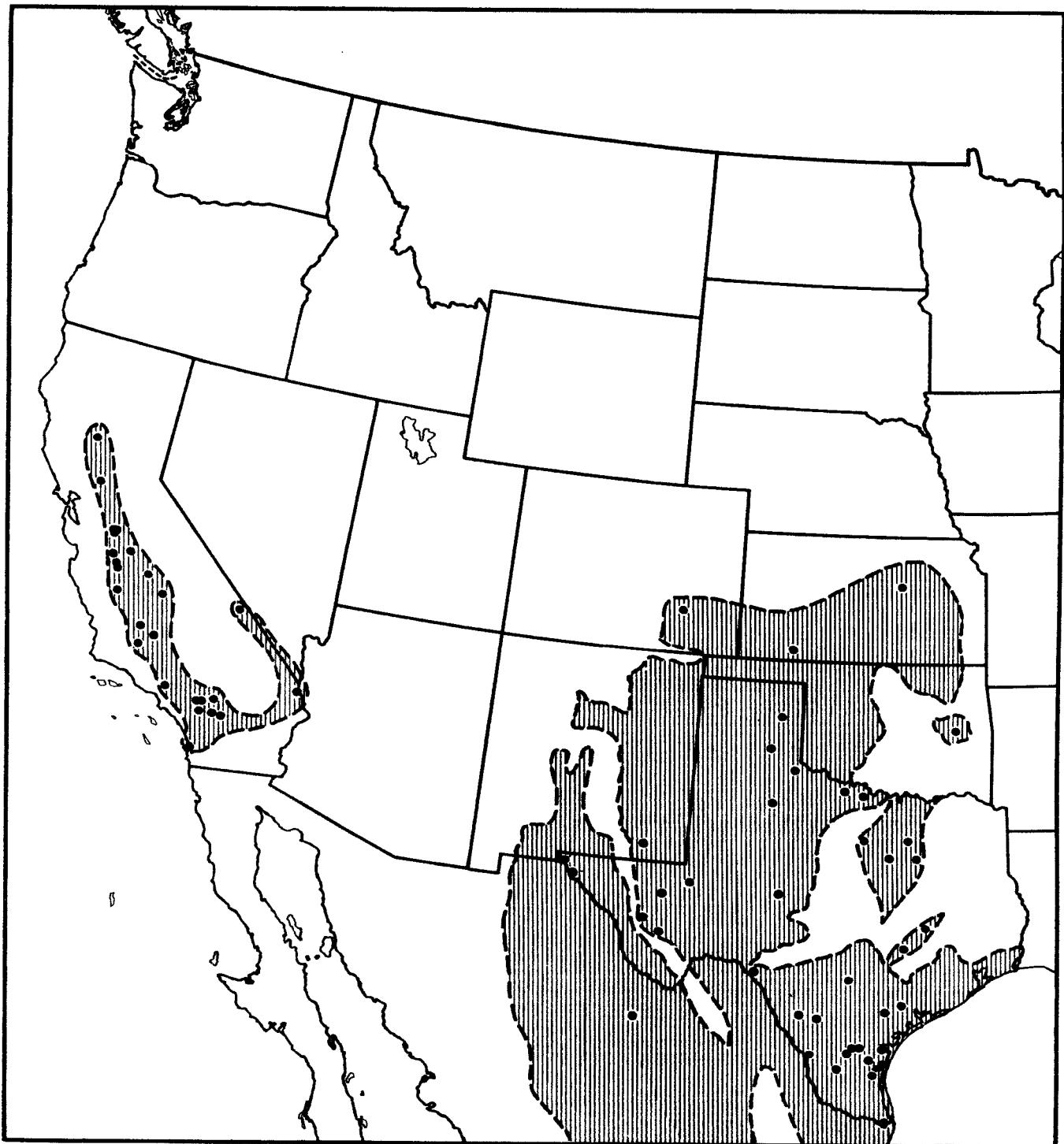
*a**b*

Plate 8. *a*. Small nest of *Polistes apachus* Saussure suspended from the eaves of a dwelling (photograph by H. Kido). *b*. Large nest of *P. apachus* attached at its side to a bush about 5 feet from the ground (photograph by H. Kido).



Map 5. Distribution of *Polistes apachus* Saussure.

contain about 150 cells. We have seen 24 males and 107 females from California, collected from February through December.

Polistes canadensis navajo Cresson

Polistes navajo Cresson, 1868. Trans. Amer. Ent. Soc., 1:383. Lectotype ♀, New Mexico.

Geographical range: Arizona, New Mexico, and mountainous areas of Sonora, Chihuahua, Durango, Sinaloa, and Zacatecas in Mexico; California in the extreme southeast.

Discussion:

We have seen no recent specimens of this large wasp from California. However, the U. S. National Museum has a specimen from Needles, San Bernardino County. Also, it has been reported from Riverside County and across the border from Imperial County near Yuma, Arizona (Snelling, 1954). So far, there is no evidence that it has colonized in California, but in the future it may do so in the southern part of the state where it might occur in wooded canyons at low elevations.

Polistes exclamans arizonensis Snelling

Polistes exclamans arizonensis Snelling, 1954. Jour. Kansas Ent. Soc., 27:152. Holotype ♀ Baboquivari Mts., Arizona.

Geographical range: Sonora, Mexico; Arizona north to Phoenix, California in extreme southeast.

Discussion:

This subspecies is common in southern Arizona where it is sometimes a nuisance in citrus groves (Hopkins, 1955). We have seen no specimens from California, but Snelling (1954) has recorded it just across the state boundary at Winterhaven and Rancho Santa Fe in Imperial County. It can be recognized by its brownish red color, moderate size, and spotted antennae in the female.

Polistes fuscatus aurifer Saussure
(Figs. 29, 34)

Polistes aurifer Saussure, 1853. Études Fam. Vespidae, 2:78. ♀, California.

Geographical range: Pacific Coast states, Arizona, Nevada, Idaho, Alberta, British Columbia (map 6), and Hawaii (introduced).

California records:

Alameda Co.: Livermore, ♀, V-12-40 (M. Cazier, U.C.D.); Tesla, ♂, IX-25-48 (P. D. Hurd, Jr., C.I.S.).

Alpine Co.: Carson Pass, 8,600 ft., ♂, IX-3-33 (U.C.D.); Woodfords, 3 mi. N.E., ♂♀, VIII-21-49 (C. D. MacNeill, C.I.S.).

Butte Co.: Jarboe Pass, ♀, V-12-49 (W. W. Middlekauff, C.I.S.).

Calaveras Co.: Mokelumne Hill, ♂, (F. E. Blaisdell, C.A.S.).

Colusa Co.: Wilbur Hot Springs, ♀, V-21-50 (L. W. Quate, C.I.S.).

Contra Costa Co.: Antioch, ♀, VII-15-53 (W. H. Lange, U.C.D.); ♂, VII-8-47 (P. D. Hurd, Jr., C.I.S.).

Del Norte Co.: Smith River Valley, ♀, VII-17-34 (E. P. Van Duzee, C.A.S.).

El Dorado Co.: Camino, 3 mi. S., ♀, VI-26-48 (C. Chan, U.C.D.).

Fresno Co.: Coalinga, ♂♀, VII-18-46 (P. D. Hurd, Jr., U.C.D.).

Glenn Co.: Artois, ♂♀, VII-20-52 (J. W. MacSwain, C.I.S.).

Humboldt Co.: Fort Seward, ♀, VI-3-35 (H. J. Rayner, U.C.D.).

Inyo Co.: Bishop, ♀, VII-11-53 (W. D. McLellan, U.C.D.); Fumace Creek, Death Valley, ♀, IV-1-51 (E. G. Linsley, C.I.S.); Glacier Lodge, ♀, VII-30-53 (J. G. Rozen, C.I.S.).

Kern Co.: Walker Pass, ♀, VI-26-49 (H. E. Cott, U.C.D.); Shafter, ♂, X-16-35 (G. L. Smith, C.I.S.).

Lake Co.: Lower Lake, ♀, X-8-51 (J. I. Madigan, U.C.D.).

Lassen Co.: Hallelujah Junction, ♀, VII-4-49 (W. F. Ehrhardt, U.C.D.); ♂, VII-13-49 (P. D. Hurd, Jr., C.I.S.).

Los Angeles Co.: Glendale, ♀, VI-8-52 (E. I. Schlinger, U.C.D.); Big Dalton Dam, ♂, VI-25-50 (H. N. Yokoyama, U.C.D.); Santa Catalina Island, Avalon, ♀, VI-13-17 (J. I. Carlson, C.A.S.).

Madera Co.: Coarsegold, ♀, V-26-42 (U.C.D.).

Marin Co.: Kentfield, ♀, IV-7-39 (R. F. Smith, C.I.S.).

Mariposa Co.: Yosemite, ♂, VI-12-31 (U.C.D.); Fish Camp, ♀, VI-10-42 (E. G. Linsley, C.I.S.).

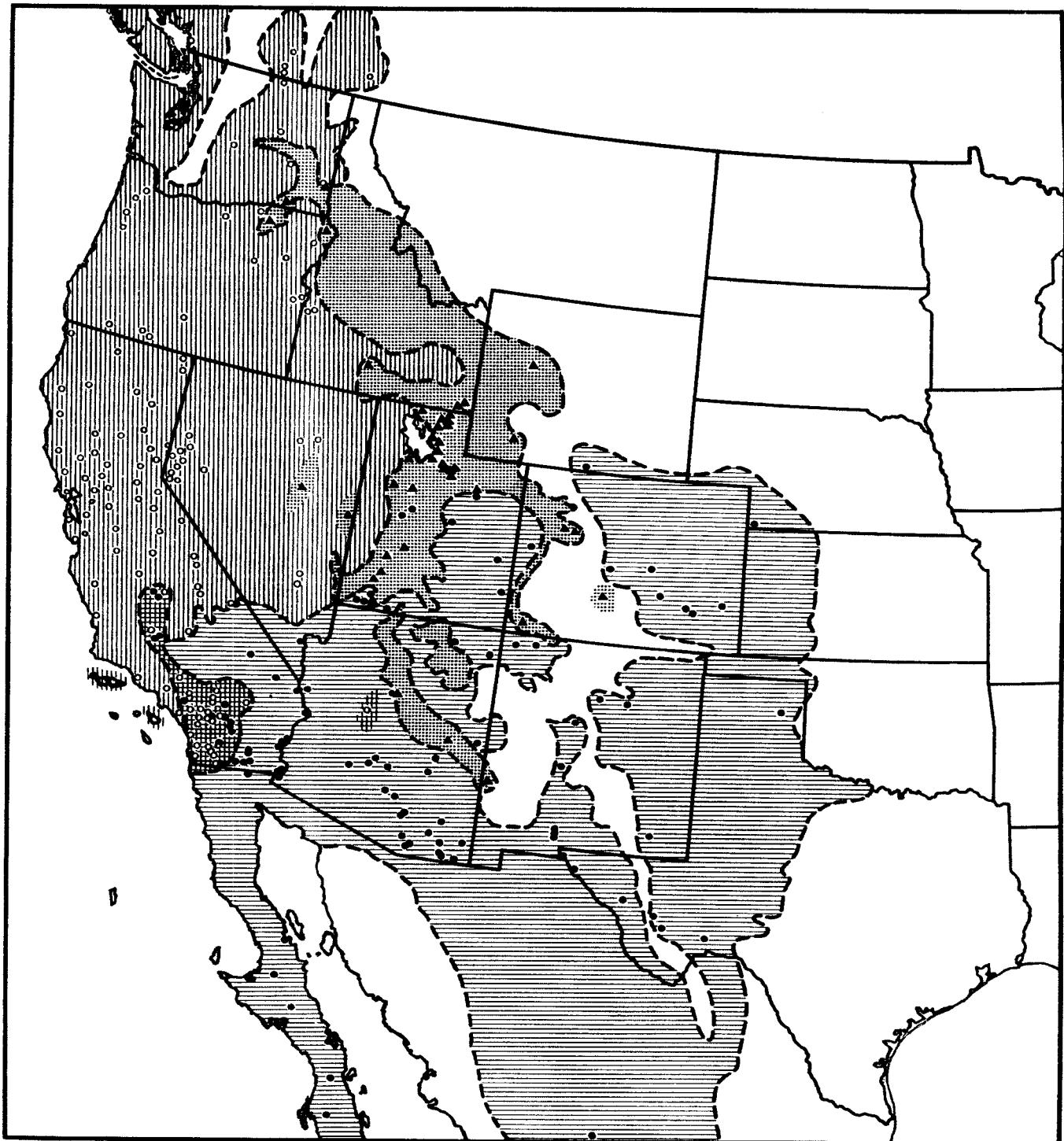
Mendocino Co.: Cummings, ♀, VIII-17-52 (R. C. Bechtel, U.C.D.); Hopland, ♂, IX-1-53 (E. I. Schlinger, U.C.D.).

Merced Co.: Dos Palos, 5 mi. S., ♂♀, VII-18-46 (R. F. Smith, U.C.D.).

Modoc Co.: Mason Creek Ranger Station, ♂, X-12-52 (E. I. Schlinger, U.C.D.); Fandango Pass, ♀, VII-10-46 (P. D. Hurd, C.I.S.).

Mono Co.: Bridgeport, ♀, VIII-13-52 (G. C. Bechtel, U.C.D.); Topaz Lake, ♂, VII-17-51 (A. T. McClay, U.C.D.).

Monterey Co.: Bixby Creek, ♀, VIII-1-49 (M. Wasbauer); Paraiso Springs, ♂, IX-25-19 (L. S. Slevin, C.A.S.).



Map 6. Distribution of three subspecies of *Polistes fuscatus* (Fabricius); subspecies *aurifer* indicated by open circles, subspecies *centralis* by solid circles, and subspecies *utahensis* by solid triangles.

- Napa Co.: Samuel Springs, ♀, VI-7-53 (R. C. Bechtel, U.C.D.); St. Helena, ♂, IX-11-48 (P. D. Hurd, Jr., C.I.S.).
- Nevada Co.: Truckee, ♀, VII-21-50 (R. C. Bechtel, W. J. Wall, U.C.D.).
- Orange Co.: Santa Ana, ♀, VI-17-26 (C.I.S.); Laguna Beach, ♂, VII-25-26 (T. Craig, C.A.S.).
- Placer Co.: Colfax, ♀, V-20-52 (E. I. Schlinger, U.C.D.); Emigrant Gap, ♂, VI-13-39 (M. Cazier, U.C.D.).
- Plumas Co.: Quincy, ♀, VII-5-52 (E. I. Schlinger, U.C.D.); Blairsden, ♂, VIII-23-52 (R. C. Bechtel, U.C.D.).
- Riverside Co.: Idyllwild, ♂, VII-6-50 (J. C. Hall, U.C.D.); The Gavilan, ♀, V-17-51 (R. C. Bechtel, U.C.D.); Riverside, 4 mi. S., ♀, III-29-52 (E. I. Schlinger, U.C.D.); Hemet, 10 mi. S.W., ♂♀, VII-19-46 (P. D. Hurd, Jr., R. F. Smith, U.C.D.); Banning, ♀, VII-16-50 (R. Schuster, C.I.S.); 3 mi. E. Keen Camp, ♀, VIII-27-52 (H. Graham, C.I.S.); ♂, V-30-39 (E. G. Linsley, C.I.S.); Corona, ♀, VIII-1910 (C.I.S.); Whitewater, ♀, IV-2-48 (J. W. MacSwain, C.I.S.); Temecula, ♂, VII-4-50 (J. W. MacSwain, C.I.S.).
- Sacramento Co.: Sacramento, ♀, VIII-26-26 (F. H. Wymore, U.C.D.); ♂, VII-11-22 (C. E. Von Geldern, C.A.S.).
- San Bernardino Co.: Banning Canyon, ♀, V-19-51 (E. I. Schlinger, U.C.D.); Glen Ranch, ♀, VII-6-52 (S. Miyagawa, U.C.D.); Snow Crest Camp, ♀, VII-12-52 (D. E. Barcus, U.C.D.); Camp Baldy, ♂, VII-7-52 (D. E. Barcus, U.C.D.); Ontario, ♀, VII-1-50 (J. E. Paschke, C.I.S.); Colton, ♀, IV-26-17 (E. P. Van Duzee, C.A.S.); Mill Creek Canyon, ♀, IX-13-23 (E. P. Van Duzee, C.A.S.); Oak Glen Lodge, 5,000 ft., ♂, (F. Daggett, C.A.S.); San Bernardino, ♀, V-12-36 (C. M. Dammers, U.C.R.); Twentynine Palms, ♂, VIII-3-33 (P. H. Timberlake, U.C.R.).
- San Diego Co.: Carlsbad, ♀, VII-22-51 (I. R. Haig, U.C.D.); Borego, ♀, IV-11-52 (J. W. MacSwain, C.I.S.); Pine Valley, ♂, IX-7-48 (G. A. Marsh, C.I.S.); Padre Dam, ♂, IX-6-48 (G. A. Marsh, C.I.S.); Lake Hodges, ♂, VII-20-40 (C.I.S.); Mt. Laguna, ♀, VII-16-50 (D. C. Cox, C.I.S.); San Diego, ♀, X-24-46 (W. W. Jones, C.I.S.); Coronado, ♀, VII-3-90 (F. E. Blaisdell, C.A.S.); Poway, ♂, VIII-6-86 (F. E. Blaisdell, C.A.S.); Descanso, ♀, VIII-14-14 (W. S. Wright, C.A.S.); Warner Springs, ♂, VI-5-36 (C. M. Dammers, U.C.R.).
- San Joaquin Co.: Stockton, ♀, V-38-23 (F. H. Wymore, U.C.D.).
- San Luis Obispo Co.: Caliente Mt., 2 mi. S.E., ♂, X-18-52 (K. W. Tucker, U.C.D.); Morro Bay, ♀, IX-13-28 (L. S. Slevin, C.A.S.).
- San Mateo Co.: La Honda, ♀, V-26-22 (D. Burk, C.I.S.).
- Santa Barbara Co.: Santa Cruz Island, ♀, VIII-20-? (T. D. A. Cockerell, U.C.R.).
- Santa Clara Co.: Los Gatos, ♀, VII-1-33 (C. A. Hamsher, U.C.D.).
- Santa Cruz Co.: Soquel, ♀, VII-1933 (C. A. Hamsher, C.I.S.).
- Shasta Co.: Hat Creek Ranger Station, ♀, VI-29-47 (D. H. Bixby, C.I.S.).
- Sierra Co.: Sierraville, ♀, VIII-26-48 (J. W. MacSwain, C.I.S.); Gold Lake, ♂, VIII-5-21 (C. L. Fox, C.A.S.).
- Siskiyou Co.: Happy Camp, ♀, VIII-20-50 (C.I.S.).
- Solano Co.: Vacaville, ♂, VI-26-50 (A. T. McClay, U.C.D.); Mix Canyon, ♀, VIII-3-50 (R. C. Bechtel, U.C.D.).
- Sonoma Co.: Maacama Creek, ♀, VIII-3-53 (E. I. Schlinger, U.C.D.); Sobre Vista, ♂, IX-20-10 (J. A. Kusche, C.A.S.).
- Stanislaus Co.: Turlock, ♀, VI-28-51 (R. Snelling, U.C.D.); Westley, ♂, VI-30-49 (T. F. Leigh, U.C.D.).
- Sutter Co.: Verona, ♀, VII-30-26 (F. H. Wymore, U.C.D.).
- Trinity Co.: Trinity Center, ♀, VII-18-53 (M. F. McClay, U.C.D.).
- Tulare Co.: Woodlake, ♀, III-22-47 (N. W. Frazier, C.I.S.).
- Tuolumne Co.: Tuolumne City, ♀, VI-5-53 (J. G. Rozen, C.I.S.); Strawberry, ♂, VII-29-54 (J. C. Downey, U.C.D.).
- Ventura Co.: Santa Paula, ♀, VII-1923 (D. Burk, C.I.S.).
- Yolo Co.: Davis, ♀, V-25-52 (E. M. Evans, U.C.D.); Woodland, ♂, VIII-30-53 (A. T. McClay, U.C.D.).

Discussion:

This is certainly the most abundant and widespread *Polistes* in the state. Available records include fifty-one California counties and elevations from sea level to more than 8,000 feet in the Sierra. In the southeastern part of the state it intergrades with subspecies *centralis* Hayward, on its eastern boundary in the foothills of the Rocky Mountains with subspecies *utahensis* Hayward, and in northern Washington and Idaho with subspecies *variatus* Cresson. We have seen 282 males and 972 females taken in every month in the year. Winter records are of females, mostly collected in hibernation. Only token county records are given above except in areas of overlapping distribution with *centralis*.

Polistes fuscatus centralis Hayward
(Fig. 27)

Polistes fuscatus centralis Hayward, 1933. Proc. Utah Acad. Sci., 10:143. Holotype ♀, Moab, Utah.

Geographical range: Southwestern United States from western Texas through New Mexico, Colorado, Nebraska, Wyoming, Arizona, and Utah to southern California, and south into Baja California and northern Mexico proper (map 6).

California records:

Imperial Co.: Palo Verde, 3 mi. S., ♀, IV-8-49 (F. D. Hurd, Jr., U.C.D.); Niland, ♀, X-24-51 (P. D. Hurd, Jr., C.I.S.); ♂, X-24-51 (P. H. Timberlake, U.C.R.); El Centro, ♀, I-26-10 (G. R. Pilate, C.A.S.); Potholes, ♀, IV-19-23 (E. P. Van Duzee, C.A.S.).

Inyo Co.: Furnace Creek, Death Valley, ♀, III-31-53 (J. W. MacSwain, C.I.S.).

Kern Co.: Kern Park, ♀, VII-28-46 (U.C.D.).

Riverside Co.: Blythe, ♂♀, VIII-4-46 (F. D. Hurd, Jr., U.C.D.); Ripley ♀, VIII-19-46 (P. D. Hurd, Jr., U.C.D.); ♂, VII-5-51 (R. F. Smith, J. W. MacSwain, C.I.S.); Indio, ♀, IV-26-49 (R. E. Ryckman, C.I.S.); ♂, VI-27-36 (E. S. Ross, C.A.S.); Coachella, ♀, X-6-35 (E. G. Linsley, C.I.S.); ♂, V-17-28 (E. C. Van Dyke, C.A.S.); Salton Sea, ♂, V-25-40 (C.I.S.); Magnesia Canyon, ♂, VIII-20-52 (E. M. Evans, U.C.D.); ♀, VI-28-52 (A. T. McClay, U.C.D.).

San Bernardino Co.: Needles, ♂, XI-27-21 (J. A. Kusche, U.C.D.); ♀, XII-4-41 (J. A. Kusche, C.A.S.); Parker Dam, ♀, IV-26-49 (C. D. MacNeill, C.I.S.); Renoville, ♀, IV-2-51 (P. D. Hurd, C.I.S.); Ontario, ♀, VII-1-50 (J. A. Paschke, C.I.S.); Morongo Valley, ♀, VII-27-41 (P. H. Timberlake, U.C.R.).

San Diego Co.: Borego, ♀, V-2-52 (P. D. Hurd, Jr., C.I.S.); Mt. Laguna, ♂, VIII-1-50 (D. Cox, C.I.S.); San Diego, ♀, VI-29-40 (C.I.S.); Coronado, ♀, VIII-3-90 (C.A.S.).

Tulare Co.: Visalia, ♀, VII-19-52 (R. C. Bechtel, U.C.D.); Lindsay, ♂, VII-17-09 (W. A. Davidson, U.C.D.).

Discussion:

The color variation ranges from the more typical red and yellow to nearly all yellow. Females average a little larger than those of *P. b. californicus* but are sometimes difficult to separate from them. This species is not uncommon in the desert areas of the southeastern counties, but records from other parts of the state are exceptional. As indicated on map 6 it is primarily an

inhabitant of the creosote bush and prairie, plains, and desert grassland areas. Its distribution overlaps that of subspecies *aurifer* in southern California. Also, it intergrades with subspecies *utahensis* (dotted areas of map 6) and subspecies *variatus* (unmarked areas of map 6 in Texas, New Mexico, Colorado, Wyoming, Nebraska, Kansas, and Oklahoma). We have seen 40 males and 160 females, collected all through the year.

Polistes hunteri californicus R. Bohart
(Figs. 28, 32)

Polistes hunteri californicus R. Bohart, 1949. Pan-Pac. Ent., 25:101. Holotype ♂, Antioch, Contra Costa Co., California.

Geographical range: California, Baja California, and Arizona (map 7).

California records:

Alameda Co.: Tesla, ♂♀, IX-25-48 (P. D. Hurd, Jr., U.C.D.).

Butte Co.: Richardson Springs, ♀, V-19-44 (E. C. Van Dyke, C.A.S.).

Calaveras Co.: Mokelumne Hill, ♀ (F. E. Blasdell, C.A.S.).

Contra Costa Co.: Antioch, ♂♀, VII-16-53 (R. C. Bechtel, U.C.D.).

El Dorado Co.: Chile Bar, ♂♀, VII-5-48 (C. Chan, U.C.D.).

Fresno Co.: Raisin City, ♂♀, X-15-51 (P. D. Hurd, Jr., C.I.S.).

Humboldt Co.: Blocksburg, ♂♀, V-29-35 (C.I.S.).

Imperial Co.: San Felipe Creek, ♂♀, IX-2-35 (F. T. Thorne, U.C.R.).

Inyo Co.: Big Pine, ♂♀, VI-17-51 (G. C. Bechtel, U.C.D.).

Kern Co.: Walker Pass, ♀, VI-26-49 (H. E. Cott, U.C.D.).

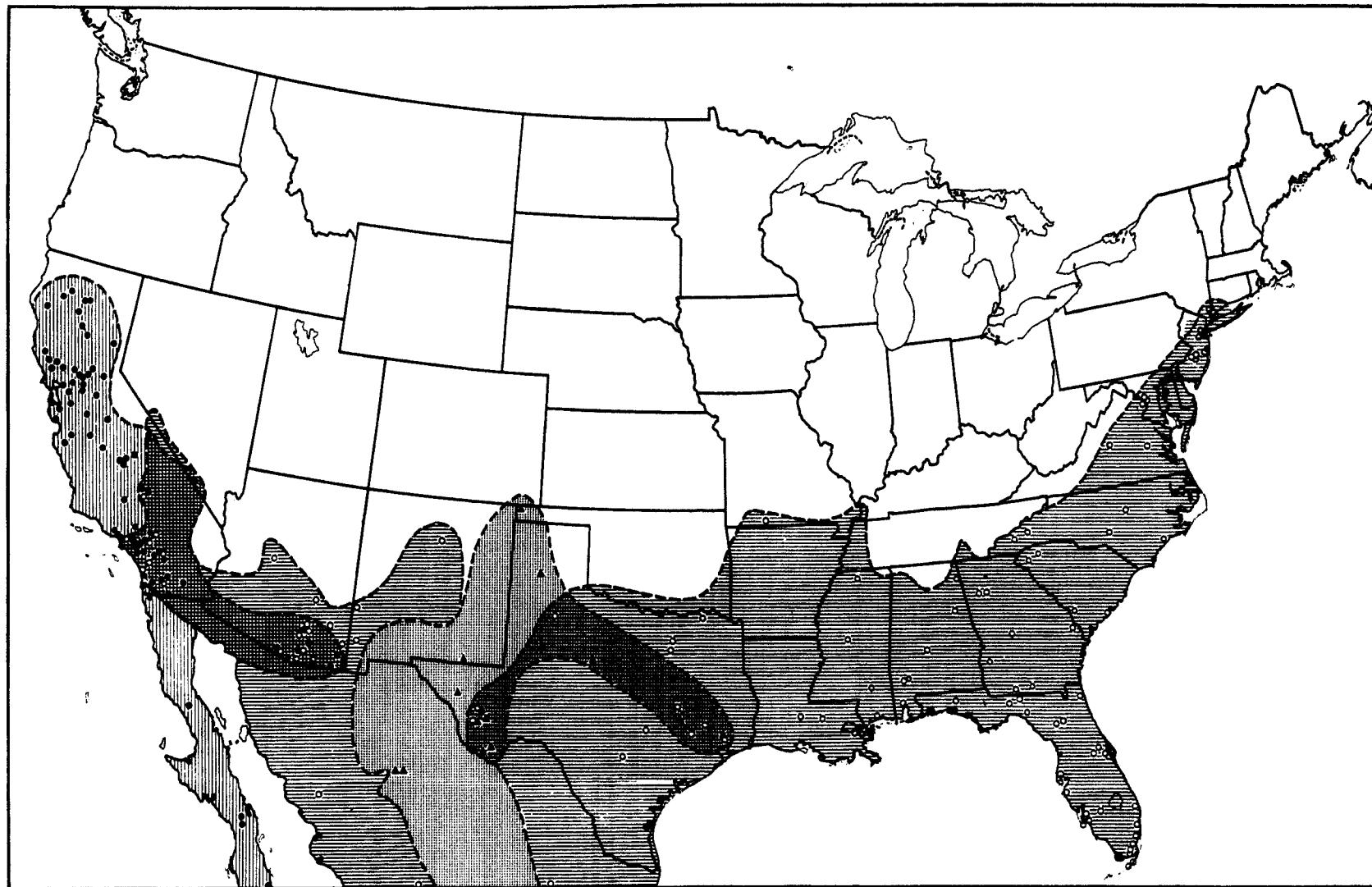
Lake Co.: Middletown, ♀, IX-11-48 (P. D. Hurd, Jr., U.C.D.); ♂, VII-22-34 (E. P. Van Duzee, C.A.S.).

Los Angeles Co.: Westwood Hills, ♂, VIII-11-35 (E. G. Linsley, U.C.D.); West Hollywood Hills, ♀, VIII-14-49 (R. G. Howell, C.I.S.); Voltaire, ♀, IX-5-23 (J. D. Gunder, C.A.S.); Laurel Canyon, ♀, VIII-2-17 (E. C. Van Dyke, C.A.S.).

Mariposa Co.: Mariposa, ♀, VI-13-38 (N. F. Hardman, C.I.S.).

Mendocino Co.: Hopland, ♀, IX-1-53 (E. I. Schlinger, U.C.D.).

Monterey Co.: Paraiso Springs, ♂, IX-23-19 (L. S. Slevin, U.C.D.); ♀, VIII-26-24 (L. S. Slevin, C.A.S.).



Map 7. Distribution of *Polistes hunteri* Bequaert; subspecies *californicus* indicated by solid circles, subspecies *hunteri* by open circles, and subspecies *neotropicus* Bequaert by solid triangles.

Napa Co.: Samuel Springs, ♀, V-30-53 (E. I. Schlinger, U.C.D.).

Orange Co.: Silverado Canyon, ♀, III-15-36 (U.C.D.); Yorba Linda, ♂, VIII-14-20 (P. H. Timberlake, U.C.R.).

Placer Co.: Loomis, ♀, VII-24-51 (E. I. Schlinger, U.C.D.).

Plumas Co.: Portola, ♀, IX-28-13 (U.C.R.).

Riverside Co.: Banning, ♀, VII-9-50 (M. J. Stebbins, U.C.D.); Hemet, 10 mi. W., ♂, VIII-14-46 (J. W. MacSwain, C.I.S.); Andreas Canyon, ♀, IV-13-27 (T. Craig, C.A.S.); Palm Springs, ♀, III-22-16 (C. L. Fox, C.A.S.).

Sacramento Co.: Sacramento, ♂, VII-28-26 (F. H. Wymore, U.C.D.); ♀, VII-27-52 (S. Miyagawa, U.C.D.).

San Benito Co.: Pinnacles National Monument, ♀, V-3-46 (P. D. Hurd, Jr., C.I.S.).

San Bernardino Co.: Victorville, ♀, VII-8-50 (H. F. Robinson, U.C.D.); East Highlands, ♂, IX-22-53 (E. I. Schlinger, U.C.D.).

San Diego Co.: San Diego, ♂, X-24-46 (W. W. Jones, C.I.S.).

San Joaquin Co.: Lodi, ♀, VIII-20-52 (E. I. Schlinger, U.C.D.); Tracy, ♂, VIII-1-49 (P. D. Hurd, Jr., C.I.S.).

Santa Clara Co.: Stanford, ♀, V-3-36 (C. A. Hamsher, U.C.D.).

Santa Cruz Co.: Mt. Herman, ♀, III-13-43 (K. Frick, C.I.S.).

Shasta Co.: Round Mountain, ♀, V-23-49 (R. M. Bohart, U.C.D.); Redding, ♂, VII-7-18 (E. P. Van Duzee, C.A.S.).

Solano Co.: Vacaville, ♀, IX-23-50 (A. T. McClay, U.C.D.); Green Valley, ♂, IX-13-48 (R. M. Bohart, U.C.D.).

Sonoma Co.: Cloverdale, ♂, VIII-24-53 (A. D. Telford, U.C.D.); Maacama Creek, ♀, VIII-3-53 (E. I. Schlinger, U.C.D.).

Stanislaus Co.: Turlock, ♂, IX-18-51 (R. Snelling, U.C.D.); ♀, IX-3-51 (R. Snelling, U.C.D.).

Tehama Co.: Vina, ♂♀, IX-22-51 (J. C. Hall, E. I. Schlinger, U.C.D.).

Trinity Co.: Carrville, ♀, VI-17-13 (E. C. Van Dyke, C.A.S.).

Tulare Co.: Visalia, ♀, IV-23-49 (R. C. Bechtel, U.C.D.); Exeter, ♂, IX-5-49 (R. L. Langston, C.I.S.).

Ventura Co.: Santa Susana, ♂, VIII-13-37 (C.I.S.).

Yolo Co.: Davis, ♂♀, VII-27-53 (A. T. McClay, U.C.D.).

Discussion:

The dominant California subspecies has light red and yellow markings in the female with practically no black. Various degrees of intermediates between *californicus* and typical *hunteri* occur in

parts of southern California, Arizona, and northern Mexico. Because of the more stable markings in the female, the localities marked on the map are based on this sex only. It can be seen that the zone of overlap is primarily southern California and Arizona. However, typical *hunteri* is uncommon in the former area and *californicus* is uncommon in the latter. The nests are usually small but we have seen one elliptical nest with about 150 cells. Total specimens examined have been 145 males and 583 females collected every month in the year. The winter records are of females only, mostly taken in hibernation under bark. Only token county records are given above except in areas of overlapping distribution with typical *hunteri*.

Polistes hunteri hunteri Bequaert

Polistes fuscatus hunteri Bequaert, 1940. Jour. N.Y. Ent. Soc., 48:23 Holotype ♂, Paradise Key, Dade Co., Florida.

Geographical range: Eastern and southern United States, Mississippi Valley, Texas, New Mexico, Arizona, and southeastern California (map 7).

California records:

Inyo Co.: Big Pine Creek, 7,500 ft., ♀, VI-12-42 (R. M. Bohart, U.C.D.).

Kern Co.: Kenville, ♀, XII-26-38 (E. C. Van Dyke, C.A.S.).

Los Angeles Co.: Big Dalton Dam, ♂♀, VI-1950 (F. X. Williams, C.A.S.). Fish Canyon, ♀, IV-28-49 (E. I. Schlinger, U.C.D.).

Riverside Co.: San Jacinto, ♀, V-31-41 (E. C. Van Dyke, C.A.S.); Riverside, ♀, III-18-55 (J. C. Hall, U.C.D.).

San Bernardino Co.: San Bernardino, ♀, I-12-10 (G. R. Pilate, C.A.S.); Victorville, ♀, VII-1-50 (H. F. Robinson, U.C.D.).

San Diego Co.: San Diego, ♀, XI-1-10 (F. E. Blaisdell, C.A.S.); Descanso, ♀, VIII-14-14 (W. S. Wright, C.A.S.); Leucadia, ♀, VIII-31-51 (E. I. Schlinger, U.C.D.).

Discussion:

P. hunteri is variable in coloration, and color forms agreeing with more than one subspecies may be reared from a single nest from intermediate geographical areas. Likewise, exceptionally marked specimens may be taken from the middle of a subspecies distribution. On the whole, however, the distribution is as outlined in map 7, and it is useful to have names to apply to the three differently colored, geographical entities in the United States. The typical subspecies enters California only on the south and east

where it intergrades with subspecies *californicus*. We have seen approximately 40 females and a number of associated males from California which appear to be referable to this subspecies.

Polistes major palmarum Bequaert
(Figs. 30, 31)

Polistes major palmarum Bequaert, 1936. Ent. News, 47:11. Holotype ♀, Palm Springs, California.

Geographical range: Southern California in naturally occurring palm grove areas.

California records:

Riverside Co.: Palm Canyon, ♀, IV-15-38 (R. M. and G. E. Bohart, U.C.D.); Magnesia Canyon, ♂♀, VII-2-52 (A. A. Grigarick, U.C.D.); Palm Springs, ♀, V-2-53 (R. M. Bohart, U.C.D.); Andreas Canyon, ♀, IV-7-40 (R. M. Bohart, U.C.D.); Pines to Palms Highway, 1,000 ft., ♀, V-24-40 (R. Husbands, C.I.S.).

San Diego Co.: Borego, ♀, IV-8-39 (R. M. Bohart, U.C.D.); South Indian Canyon, ♀, VII-15-48 (G. A. Marsh, C.I.S.).

Discussion:

The light red and yellow markings of this subspecies are similar to those of *P. b. californicus* which can be distinguished superficially from the former by the less regular yellow band on the second tergite. The other subspecies of *P. major* Beauvois all have darker markings and are found to the south in Baja California and Mexico proper, and to the east in Arizona, New Mexico, Texas, Florida, and the West Indies. The nests are usually attached to native palms. One such nest we have seen has a total of 140 cells. We have seen 10 males and 154 females, collected from February through July.

Mischocyttarus flavitarsis (Saussure)

Polybia flavitarsis Saussure, 1854. Études Fam. Vespidae, 2:199. Holotype ♀, California.

Geographical range: California, Oregon, Utah, Colorado, Nebraska, and Arizona.

California records:

Alameda Co.: Oakland, ♀, IV-11-50 (W. C. Bentinck, C.I.S.); ♂, I-29-49 (M. Wasbauer).

Alpine Co.: Ebbetts Pass, ♀, IX-11-38 (M. Cazier, U.C.D.).

Butte Co.: Richardson Springs, ♀, V-19-44 (E. C. Van Dyke, C.A.S.).

Calaveras Co.: Mokelumne Hill, ♀, V-20-31 (R. L. Usinger, C.I.S.).

Contra Costa Co.: Antioch, ♀, VIII-9-49 (P. D. Hurd, Jr., C.I.S.); ♂, X-14-54 (A. M. Barnes, C.I.S.).

El Dorado Co.: China Flat, ♀, VI-28-48 (S. A. Sher, C.I.S.).

Glenn Co.: Stony Gorge Reservoir, ♀, VII-15-50 (M. Wasbauer).

Humboldt Co.: Fort Seward, ♀, V-20-35 (H. J. Rayner, U.C.D.).

Lake Co.: Little Borax Lake, ♀, V-9-53 (W. H. Lange, U.C.D.).

Lassen Co.: Blue Lake, ♀, VII-20-47 (D. W. Adams, C.I.S.).

Los Angeles Co.: Tanbark Flat, ♂♀, VI-20-50 (H. F. Robinson, U.C.D.).

Marin Co.: Fairfax, ♂, X-15-11 (E. C. Van Dyke, U.C.D.); Stinson Beach, ♀, IX-16-49 (D. Cox, C.I.S.).

Mariposa Co.: Yosemite, 4,000 ft., ♀, V-21-31 (C.I.S.).

Mendocino Co.: Ryan Creek, ♀, IV-17-38 (N. F. Hardman, C.I.S.).

Monterey Co.: Bixby Creek, ♂, VIII-7-49 (M. Wasbauer); Paraiso Springs, ♀, IX-25-19 (L. S. Slevin, C.A.S.).

Napa Co.: Napa, ♀, VII-25-51 (D. P. Lawfer, U.C.D.).

Nevada Co.: Dutch Flat, ♀, VIII-25-48 (R. F. Smith, C.I.S.).

Placer Co.: Penryn, ♀, IX-14-54 (R. S. Bethel, U.C.D.); ♂, X-23-54 (R. S. Bethel, U.C.D.).

Plumas Co.: Quincy, 4 mi. W., ♀, VII-3-49 (L. W. Isaak, U.C.D.).

Riverside Co.: Banning, ♀, VII-2-52 (H. L. Mathis, C.I.S.).

Sacramento Co.: Sacramento, ♀, V-26-51 (H. F. Robinson, U.C.D.).

San Bernardino Co.: Camp Baldy, ♀, VII-7-52 (R. L. Anderson, U.C.D.); Mountain Home, ♂, IX-2-53 (E. I. Schlinger, U.C.D.).

San Luis Obispo Co.: Cambria, ♂, XI-16-37 (O. Bryant, C.A.S.).

San Mateo Co.: Menlo Park, ♀, VII-7-37 (C.A.S.); San Mateo, ♂, X-3-20 (E. P. Van Duzee, C.A.S.).

Santa Clara Co.: Los Gatos, ♀, III-28-36 (C. A. Hamsher, U.C.D.); Stanford University, ♂, X-2-09 (U.C.R.).

Santa Cruz Co.: Felton, ♂, VIII-6-47 (R. S. Beal, C.I.S.).

Shasta Co.: Old Station, ♀, VIII-16-52 (R. C. Bechtel, U.C.D.).

Sierra Co.: Calpine, ♀, VIII-27-48 (R. F. Smith, C.I.S.); Goodyear Creek, ♂, VII-10-21 (E. Nast, C.A.S.).

- Siskiyou Co.: Shasta Springs, ♀, VI-19-20 (C. L. Fox, C.A.S.).
 Solano Co.: Vacaville, ♂, XI-20-49 (A. T. McClay, U.C.D.); Mix Canyon, ♀, VIII-3-50 (R. C. Bechtel, U.C.D.).
 Sonoma Co.: Sobre Vista, ♀, IX-29-10 (J. A. Kusche, C.A.S.).
 Stanislaus Co.: Turlock, ♂, VIII-17-51 (R. Snelling, U.C.D.); ♀, V-10-51 (R. Snelling, C.A.S.).
 Tehama Co.: Vina, ♀, V-30-20 (C. T. Dodds, C.I.S.).
 Trinity Co.: Coffee Creek, ♀, V-17-34 (G. E. Bohart, U.C.D.).
 Tulare Co.: Visalia, ♀, IV-23-49 (R. C. Bechtel, U.C.D.).
 Tuolumne Co.: Sonora, ♂, VII-11-51 (R. C. Bechtel, E. I. Schlinger, U.C.D.); Long Barn, ♀, IV-20-34 (E. P. Van Duzee, C.A.S.).
 Ventura Co.: Santa Paula, ♀, IV-14-27 (C.I.S.).
 Yolo Co.: Davis, ♂♀ VII-13-26 (F. H. Wymore, U.C.D.).
 Yuba Co.: Yuba Co., ♀, (U.C.R.).

Discussion:

M. flavitarsis is the more westerly of the two species of the genus in the United States. It occurs in four subspecies, but only the typical one is represented in California. It is common, widespread, and found at various elevations from sea level to 9,000 feet. The nest is similar to that of *Polistes* but with fewer cells. Females hibernate under bark together with *P. f. aurifer* and *P. b. californicus*. Smith (1944) has reported them in large numbers in an abandoned nest of *Vespula arenaria*. We have seen 55 males and 444 females from California, collected every month in the year. Only token county records are given above.

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