

BULLETIN OF THE CALIFORNIA INSECT SURVEY

VOLUME 4, NO. 1

THE FLIEGVILLES OF CALIFORNIA

(Diptera: Calliphoridae)

BY

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# THE BLOWFLIES OF CALIFORNIA

(Diptera: Calliphoridae)

by

Maurice T. James

Identification of the blowflies of North America has been made much easier and more secure in recent years by the publication of the monograph of that family by Hall (1948). However, there exists no regional treatment that covers any definite part of the United States. Hall's monograph gives only general information about the geographical distribution of most of the species. These considerations, together with the fact that Hall had obviously examined an insufficient amount of material from the western states, makes a review of the California species particularly desirable.

The family Calliphoridae is for the most part easy to recognize. As in the other Calyptratae, the squamae are well developed, the transverse mesonotal suture is complete, the postalar callus is distinct, and the second antennal segment has a longitudinal suture extending along its upper outer edge. The arista is plumose (rarely pubescent), the hairs being usually long; there is no postscutellum in any of the Nearctic species; hypopleural and pteropleural bristles are present; there are two or three sternopleurals, one or two in front and one behind; vein  $m_{1+2}$  bends strongly forward, greatly narrowing but usually not closing the apical cell; and the first abdominal sternum overlaps the lateral margins of the tergites. Except for the Polleniinae, the Nearctic Calliphoridae are chiefly a metallic blue, green, or coppery. The metallic muscids, particularly *Cryptolucilia caesarion* (Meigen), may be confused with them, but the Muscidae lack hypopleural bristles; less commonly, metallic Larvaevoridae (= Tachinidae), which may be distinguished by the bare arista and the well-developed postscutellum, or some Otitidae (*Chrysomyza*), which may be recognized by the lack of the suture on the second antennal segment, may cause some confusion. The presence of only two notopleurals and two sternopleurals and the lack of tessellation on the abdomen will distinguish the nonmetallic forms (the Polleniinae) from the Sarcophagidae, and the lack of a postscutellum will distinguish them from the Larvaevoridae.

Blowflies are important from a medical and veterinary standpoint. Some are obligatory or facultative parasites on man or on domestic or other useful animals. In our area, the primary screwworm, *Callitroga hominivorax* (Coquerel), is the only obligatory parasite that invades living tissue, although larvae of *Protocalliphora*, represented in the California fauna by seven known species, feed on the blood of nesting birds, often with fatal results. Of the facultative parasites, *Callitroga macellaria* (Fabricius), *Phaenicia sericata* (Meigen), and *Phormia regina* (Meigen) are important as sheep maggots in the State. These three species, as well as *Paralucilia wheeleri* (Hough), *Protophormia terraenovae* (Robineau-Desvoidy), *Lucilia illustris* (Meigen), *Cynomyopsis cadaverina* (Robineau-Desvoidy), *Calliphora vicina* Robineau-Desvoidy, and *Calliphora vomitoria* (Linnaeus) have been recorded in wound myiasis either in California or in other parts of the world, and the two species of *Calliphora* have been reported as also causing gastrointestinal myiasis.

The species of *Buolucilia* have been considered as parasites of frogs and toads. However, Dodge (1952) has shown that *B. silvarum* (Meigen) may also be a saprophage. The immature stages and biology of *B. thaluna* (Shannon) are unknown.

Some calliphorids, such as *Phaenicia sericata* (Meigen) and *Eucalliphora lilaea* (Walker), freely enter houses. Since the breeding places of these flies are in such unsanitary media as carrion and garbage, and since the adults visit such places as well as the food in our shops and on our tables for feeding and oviposition, mechanical transmission of pathogenic organisms becomes a distinct sanitary consideration. The nuisance value of these flies is likewise worthy of notice; annoyance from flies buzzing and zooming through our homes may be very disturbing. The cluster fly, *Pollenia rudis* (Fabricius), is commonly found indoors, but does not share the disagreeable habits of other house-entering members of this family. It is usually found on windows or out-of-the-way places; it is not

noisy; and its breeding habits, as parasites of earthworms, removes it from the category of flies dangerous to health. It has been recorded in gastrointestinal myiasis of man, but the record is highly doubtful and can not be accepted until verified records of such occurrence are forthcoming.

Some calliphorids are useful scavengers; in fact, this would be true of all but the obligatory parasites if it were not for their myiasis-producing propensities and mechanical disease transmission. The breeding habits of *Melanodexia* and, virtually, of *Acronesia*, are unknown.

Many Calliphoridae are more or less associated with man or his domestic animals. For the most part, such "domestic" species are widely distributed, with such Holarctic elements as *Phaenicia sericata*, *Calliphora vomitoria*, *C. vicina*, and *Phormia regina*. *Pollenia rudis*, by virtue of its "cluster-fly" habits, has undoubtedly been spread widely by human influences. The endemic California fauna, on the other hand, consists of an important group of species which, though some are widespread, are chiefly silvan or mountain species. Only two of the silvan species, *Buolucilia silvarum*, and *Lucilia illustris*, are found in the Old World.

Aside from Hall's monograph, the most useful original literature for use in the study of the western species are the works of Shannon (1926) and James (1948, 1953). It was originally planned to include the larvae in this report, but since little can be added to the treatments of Hall (1948) and James (1948), and since illustrations which have been already published are so essential to correct identification, it was considered best to omit the immature forms.

Only distributional records obtained from the determination of specimens have been used in this study, and with few exceptions all identifi-

cations have been made by me. The material has come from the following sources: the California Insect Survey, University of California, Berkeley (C.I.S.); the University of California, Davis (U.C.D.); the University of California, Los Angeles (U.C.L.A.); the California Academy of Sciences (C.A.S.); the private collection of Paul H. Arnaud, Jr. (P.A.); the State College of Washington (W.S.C.); the University of Idaho (U.I.); the Utah State Agricultural College (U.S.A.C.); the University of Kansas (K.U.); the University of Nebraska (N.U.); and the private collection of H. J. Reinhard (H.J.R.). I wish to express my great appreciation to all who have so generously collaborated in this work, and especially to Dr. Paul D. Hurd, Jr., and Paul A. Arnaud, Jr. who copied data for me which I did not record at the time I made identifications of material in their collections; to Dr. Deane P. Furman, for records of *Callitroga hominivorax*; and to Dr. James A. Douglas, for information concerning the importance of sheep strike in California and the significance of species of flies involved therein.

The terminology is essentially that used by Hall. I have followed that author in numbering the abdominal segments, the apparent first (morphologically the combined first and second) segment being called the first. Also, Hall's nomenclature is followed for the most part, except that *Apaolina* and *Melanodexiopsis* are not accepted as valid genera, the species of *Melanodexia* are revised, and certain changes proposed by James (1953) are incorporated in this study. The concept of genera proposed by Townsend and followed by Hall is, in the opinion of many dipterists, too radical; it is accepted here, pending a thorough study of generic relationships of the world fauna in this family.

### Key to the Subfamilies of California Calliphoridae

1. Stem vein (base of radius before humeral cross vein) ciliate posteriorly on upper surface of wing . . . . . Chrysomyinae (p. 4)  
Stem vein bare posteriorly on upper surface of wing . . . . . 2
2. Prosternum and propleuron setulose or pilose; in the California species, at least the abdomen metallic blue, green, or bronze, the sheen sometimes dulled by pollen . . Calliphorinae (p. 3)  
Prosternum and propleuron bare; ground color dull black or at most subshining, never metallic blue, green, or bronze . . . . . Polleniinae (p. 5)

## Key to the Genera of California Calliphorinae

- |    |   |                             |
|----|---|-----------------------------|
| 1. | Lower squamal lobe bare above (Luciliini) . . . . .   | 2                           |
|    | Lower squamal lobe pilose above (Calliphorini) . . . . .  | 4                           |
| 2. | Subcostal sclerite with stiff, black setulae; ocellar triangle large, reaching about halfway to the lunule in the female; normally two postsutural acrosticals in the Nearctic species . . . . .  | <i>Lucilia</i> (p. 6)       |
|    | Subcostal sclerite bare; ocellar triangle not reaching halfway to the lunule in the female; two or three postsutural acrosticals . . . . .  | 3                           |
| 3. | Length of head at antenna and at vibrissa more than half head height; second abdominal segment <sup>1</sup> with erect median marginal bristles which are usually well developed . . . . .  | <i>Bufolucilia</i> (p. 3)   |
|    | Length of head at antenna and at vibrissa less than half head height; second abdominal segment with at most poorly developed median marginal bristles. . . . .  | <i>Phaenicia</i> (p. 3)     |
| 4. | Hindmost presutural intra-alar absent <sup>2</sup> . . . . .  | 5                           |
|    | Hindmost presutural intra-alar present . . . . .  | 6                           |
| 5. | Abdomen distinctly pollinose, the pollen forming a distinctly tessellated pattern; male hypopygium massive, in usual position bent under the abdomen; outer forceps strongly curved, with a horn-like prominence at the base of each . . . . .            | <i>Aldrichina</i> (p. 10)   |
|    | Abdomen wholly shining; male hypopygium of moderate size, the outer forceps but slightly curved and without hornlike processes basally . . . . .  | <i>Cynomyopsis</i> (p. 11)  |
| 6. | Faciale with a row of stout but short bristles ascending from the vibrissa to a point almost halfway to the antennal base; a second pair of strong ocellars behind the paired ocelli . . . . .  | <i>Eucalliphora</i> (p. 15) |
|    | Faciale with at most a few stout bristles above the vibrissa; second pair of ocellars weak or absent . . . . .  | 7                           |
| 7. | Abdomen elongated, longer than the mesonotum, and polished, with but little pollen; squamae whitish; second abdominal segment with only weak marginal bristles which are but little longer than the setulae; three lateral scutellars . . . . .           | <i>Cyanus</i> (p. 18)       |
|    | Abdomen no longer than the mesonotum and pollinose; squamae, in the known California species, brownish to blackish; second abdominal segment with distinct marginal bristles . . . . .  | 8                           |
| 8. | Usually three strong lateral scutellars and two preintra-alars; bend of vein $M_{1+2}$ more distant from the wing margin than length of $M_{1+2}$ from cross vein $m$ to the bend; processes of fifth sternite of male prominent . . . . .                | <i>Acronesia</i> (p. 18)    |
|    | Usually four or five strong lateral scutellars and three preintra-alars; bend of vein $M_{1+2}$ closer to wing margin than length of $M_{1+2}$ from cross vein $m$ to the bend; fifth sternal processes of fifth sternite of male not prominent . . . . . | <i>Calliphora</i> (p. 4)    |

## Key to the California Species of *Phaenicia* and *Busolucilia*



<sup>1</sup>That is, the apparent second abdominal segment; it is actually the third.

<sup>2</sup>Absent also in some species of *Acronesia* which as yet are not recorded from California; these have a distinctly pollinose, though not distinctly tessellated abdomen, and the genitalia are quite different from those of either *Aldrichina* or *Cynomyopsis*.

2. Front broad, at narrowest 0.14 head width in male, 0.35 in female; normally two postsutural acrosticals; fifth sternite of male prominent, as long as fifth tergite; body form distinctly elongated . . . . . *Bufolucilia elongata* (p. 6)  
 Front narrower, at narrowest 0.08 head width in male, 0.31 in female; normally three postsutural acrosticals; fifth sternite of male considerably shorter than fifth tergite; body not conspicuously elongated . . . . . *Bufolucilia silvarum* (p. 6)
3. Normally two postsutural acrosticals; basicostal scale blackened or dark brown; front at narrowest 0.05 head width in male, 0.30 in female . . . . . *Phaenicia mexicana* (p. 8)  
 Normally three postsutural acrosticals; basicostal scale yellow to yellowish white. . . . . 4
4. Third antennal segment broadly yellowish inwardly, in the female inflated and distinctly broader than the parafacial; parafrontals of male at their narrowest approach almost contiguous . . . . . *Bufolucilia thatuna* (p. 7)  
 Third antennal segment of ordinary size, practically wholly black, in the female distinctly narrower than the parafacial; parafrontals of male widely separated. . . . . 5
5. Central occipital area (cerebrale) with a single seta on each side, just behind the inner vertical bristle; abdomen usually strongly coppery; male commonly with two pairs of ocellar bristles, with front at narrowest 0.18 head width, and with arms of fifth sternite as long as fourth tergite . . . . . *Phaenicia cuprina* (p. 8)  
 Central occipital area usually with a group of about five setae (sometimes reduced to two or even one) on each side, just behind the inner vertical bristle; abdomen varying from bright green to coppery; male commonly with one pair of ocellar bristles, with front at narrowest 0.11 head width, and with arms of fifth sternite much shorter than fourth tergite . . . . .  
 . . . . . *Phaenicia sericata* (p. 8)

#### Key to the California Species of *Calliphora*

1. Three postsutural intra-alars . . . . . 2  
 Two postsutural intra-alars . . . . . 3
2. Bucca reddish; front of male 0.13 head width, about as wide as parafacial at its narrowest . . . . . *coloradensis* (p. 12)  
 Bucca, when fully colored, black; front of male 0.05 head width, much narrower than parafacial at its narrowest . . . . . *livida* (p. 12)
3. Basicosta usually yellow to orange yellow; bucca reddish on anterior half or more; front of male at its narrowest 0.09 to 0.10 head width . . . . . *vicina* (p. 14)  
 Basicosta black; bucca, when fully colored, black; front of male, at its narrowest, 0.04 to 0.06 head width . . . . . 4
4. Bucca with hair mostly or wholly black . . . . . *terrae-novae* (p. 13)  
 Bucca with hair mostly reddish-orange or reddish-yellow posteriorly . . . . . *vomitoria* (p. 14)

#### Key to the Genera of California Chrysomyinae

1. Hind coxa pilose posteriorly; mesonotum blue or green, with distinct longitudinal black vittae which are clearly visible, regardless of the light incidence; lower part of head yellow (Chrysomyini) . . . . . 2  
 Hind coxa bare posteriorly; mesonotum dull, dark blue or black, with at most, vittae which are dependent for visibility on the proper light incidence; head predominantly dark in color (Phormiini) . . . . . 3

## Key to the California Species of *Callitroga*

1. Parafrontal with black hair anteriorly outside the row of frontal bristles; basicosta of male normally black; female usually without proclinate fronto-orbitals. . . . *hominivorax* (p. 18)  
 Parafrontal with pale hair anteriorly outside the row of frontal bristles; basicosta of male usually yellow, to brown; female with one or two proclinate fronto-orbitals . . . . *macellaria* (p. 19)

## Key to the Genera of Polleniinae

1. Mesonotum behind suture and scutellum flattened on the disc; scutellum widened; body with fine, crinkly, yellowish to whitish hairs (tribe Polleniini) . . . . . *Pollenia* (p. 25)  
 Mesonotum and scutellum convex on disc; scutellum not conspicuously widened; body without crinkly hair (tribe Melanodexiini). . . . . *Melanodexia* (p. 5)

### Key to the California Species of *Melanodexia*

- Facial carina elevated between the bases of the antennae into a keel which extends, at a level higher than the ventral margin of the second antennal segment (in its normal position), either as a keel or a broadly rounded prominence, to about the middle of the third; abdomen of female subshining or thinly pollinose, the last tergite sometimes strongly glossy . . . . . 2  
Facial carina obscure, evident only between the antennal bases and, if extending ventrad, not raised above the level of the ventral margin of the second segment; abdomen in both sexes distinctly pollinose; complex of male inner and outer forceps, from posterior view, about half as broad as long; the outer forceps, from side view, tapering to a sharp or narrowly rounded apex . . . . . 5
  - Facial carina very narrow between the antennal bases, which are separated from each other by less than the maximal diameter of the arista; squamae uniformly dark brown, as dark as the base of the wing; male forceps complex, from posterior view, about half as broad as long; the outer forceps, from side view, tapering to a narrowly rounded apex . . . . . *tristis* (p. 27)  
Facial carina between antennal bases broader than the maximal diameter of the arista; squamae usually yellow, with or without a brown border, sometimes infuscated or discolored, especially in greased specimens; male forceps complex, from posterior view, more than half as broad as long; the outer forceps, from side view, parallel-sided on apical half to third and broadly rounded at the apex . . . . . 3

<sup>3</sup>No key is presented to separate the species of this genus because of its present unsatisfactory condition. The genus is now being revised by Curtis W. Sabrosky.

3. Second antennal segment much broader than the third, especially in the male, almost always reddish yellow; the facial carina also broad, usually largely reddish yellow; mesonotum of male moderately hairy; rarely more than two postacrosticals present; male forceps complex, from posterior view, almost as broad as long; fifth tergite of female strongly shining, distinctly more so than the subshining fourth . . . . . *satanica* (p. 27)  
 Second antennal segment (except sometimes in *californica*) at most slightly broader than the third, usually more or less darkened; the facial carina relatively narrow, with consequently a stronger keel, usually largely or wholly black; mesonotum of male with longer and denser hair than in *satanica* . . . . . 4
4. Male forceps complex, from posterior view, almost as broad as long, essentially as in *satanica*; fifth tergite of female strongly shining and contrasting somewhat with the fourth, as in *satanica*; two or three postacrosticals . . . . . *californica* (p. 28)  
 Male forceps complex, from posterior view, distinctly longer than broad; fourth and fifth tergites of female, like the preceding ones, thinly pollinose or subshining, and not at all contrasting; one or two postacrosticals . . . . . *glabricula* (p. 28)
5. Frontals in two strong rows; front of female very wide, its width at upper level of lunule about 0.57 width of head; male outer forceps tapering to a sharp point, gradually rounded posteriorly on the apical two-fifths and curving forward evenly . . . . . *grandis* (p. 29)  
 Frontals usually in a single though sometimes irregular row; front of female of moderate width, its width at the upper level of the lunule about 0.50 width of head; male outer forceps tapering to a blunt point, bent forward abruptly near the apex . . . . . *tristina* (p. 29)

## DISCUSSION OF SPECIES

### Genus *Lucilia* Robineau-Desvoidy

#### *Lucilia illustris* (Meigen)

*Musca illustris* Meigen, 1826, Syst. Beschr. Bekann. Eur. Zweifl. Insekt., 5:54. Type, Germany.

#### Geographical distribution:

Widespread: Europe; Asia, from Manchuria and Japan to India and Burma; Australia; New Zealand; North America from Alaska to northern Mexico. Temperate and high mountain regions.

#### California records:

Humboldt Co.: Eureka, 6 ♂, VII-30-52, (L. A. Ruud, C.I.S.).

Mendocino Co.: Albion, 2 ♂, VII-7-54 (M. T. James, W.S.C.).

Trinity Co.: Trinity River Camp, 1 ♀, VI-1-51 (A. T. McClay, U.C.D.).

#### Discussion:

Though of rare occurrence in California and apparently confined to the northern part of the state, this holarctic species is common in the Pacific Northwest. It seems to be essentially a silvan species which breeds normally in carrion but which may produce subdermal myiasis in mammals, including man.

### Genus *Bufolucilia* Townsend

#### *Bufolucilia elongata* (Shannon)

*Lucilia elongata* Shannon, 1924, Insec. Insc. Mens., 12:76. Type ♀, Orcas Island, Washington.

#### Geographical distribution:

Rare: Washington, Oregon, California, ?Colorado.

#### California records:

San Mateo Co.: La Honda Road, nr. Skyline Blvd., 3 ♂, V-1949 (P. H. Arnaud, P.A.).

#### *Bufolucilia silvarum* (Meigen)

*Musca silvarum* Meigen, 1826, Syst. Beschr. Bekann. Eur. Zweifl. Insekt., 5:53. Type ♀, Germany.

#### Geographical distribution:

Europe, Asia, North Africa, Canada southward to the District of Columbia and California.

#### California records:

Alameda Co.: Berkeley, V-14-33 (R. M. and G. E. Bohart, C.A.S.). Pleasonton, X-21-32 (A. E. Michelbacher, C.I.S.). Albany, IV-29-21 (C.I.S.).

Contra Costa Co.: Antioch, IV-1937 and V-15-36 (E. S. Ross, C.A.S.); V-26-33 (E. O. Essig, C.I.S.).

Fresno Co.: Firebaugh, 7 mi. S., IX-22-48 (R. F. Smith, C.I.S.).

Glenn Co.: Artois, VII-11-52 (J. W. MacSwain, C.I.S.); VII-16-52, VII-11-52 (H. L. Hansen, C.I.S.).

Humboldt Co.: Orick (U.S.A.C.).

Lake Co.: Lower Lake, Clear Lake, V-11-26 (E. P. Van Duzee, C.A.S.).

Los Angeles Co.: Big Dalton Dam, VII-13-50 (T. R. Haig, U.C.D.). Glendale, IV-24-49 (E. I. Schlinger, U.C.D.). Los Angeles River, Long Beach, VI-26-54 (M. T. James, W.S.C.). Pasadena, V-31-95 (W.S.C.).

Merced Co.: Dos Palos, 5 mi. S., VII-2-49, VII-5-49, VII-19-49 (A. D. Telford, C.I.S.); VII-18-46 (R. F. Smith, C.I.S.).

Monterey Co.: Carmel, X-18-40 (L. S. Slevin, C.A.S.).

Placer Co.: Loomis, IV-10-51 (J. C. Hall, U.C.D.).

Riverside Co.: Riverside, XI-7-33, XI-10-33, to fish bait (A. J. Basinger, C.A.S.).

Sacramento Co.: Elk Grove, IX-24-49 (H. A. Hunt, U.C.D.). Sacramento, V-5-49 (W. F. Ehrhardt, U.C.D.); XI-8-51 (J. C. Hall, U.C.D.); IV-19-49 (E. L. Atkinson, C.I.S.); VII-1-52 (P. H. Arnaud, P.A.). Isleton, X-1-47 (R. Coleman, C.I.S.).

San Bernardino Co.: Victorville, V-2-53 (G. A. Marsh, R. O. Schuster, C.I.S.).

San Joaquin Co.: Tracy, VI-7-49 (R. F. Smith, C.I.S.).

San Luis Obispo Co.: Paso Robles, IX-10-24 (L. S. Slevin, C.A.S.).

San Mateo Co.: Memorial Park, VII-15-51 (P. H. Arnaud, P.A.).

Santa Clara Co.: Los Altos, V-19-22 (E. O. Essig, C.I.S.). Stanford University, V-27-53 (P. H. Arnaud, P.A.). Alviso, VI-5-22 (C.I.S.).

Santa Cruz Co.: Santa Cruz, IV-31-53 (A. E. Gray, C.I.S.).

Stanislaus Co.: Westley, IV-27-48 (R. F. Smith, C.I.S.). Patterson, XI-5-46 (R. F. Smith, C.I.S.).

Sutter Co.: Live Oak, VII-11-46 (P. D. Hurd, Jr., C.I.S.).

Tulare Co.: Woodlake, III-22-47 (N. W. Frazier, C.I.S.).

Yolo Co.: Yolo Causeway, IV-29-49 (W. F. Ehrhardt, U.C.D.). Elkhorn Ferry, V-12-52, V-20-51 (A. T. McClay, U.C.D.); V-17-51 (R. M. Bohart, U.C.D.); V-20-51 (M. F. McClay, U.C.D.). Davis, V-9-51, V-12-49, V-13-52, V-16-51, V-17-52, V-19-52, V-25-52, IV-12-51, IV-17-52 (A. T. McClay, U.C.D.); V-4-50 (H. F. Robinson, U.C.D.); IV-10-51 (E. I. Schlinger, R. C. Bechtel, U.C.D.); IV-15-52 (J. K. Hester, U.C.D.); V-26-

36, X-4-36 (M. A. Embury, C.I.S.); V-23-36 (A. R. Mead, C.I.S.); V-5-52 (A. A. Grigarick, U.C.D.); XI-22-50, V-1950 (J. C. Hall, U.C.D.); XI-26-35, X-22-50 (U.C.D.); V-17-49 (H. A. Hunt, U.C.D.); X-1946 (A. L. Booth, U.C.D.); IV-30-48 (E. I. Schlinger, U.C.D.); V-17-51 (M. F. McClay, U.C.D.); V-20-53 (W. D. McLellan, U.C.D.); III-19-48 (C. D. MacNeill, C.I.S.). Woodland, VI-10-53 (E. I. Schlinger, U.C.D.).

#### Discussion:

This species is known to be a parasite of toads and frogs, and the invasion of the muscle tissues may terminate fatally for the amphibian host. Dodge (1952), however, records it as commonly coming to meat-bait traps, and as being reared from the carcass of a rat which had egg masses matted in its fur at the time it was shot. These facts, together with the moderate abundance of the species, indicate that it is a facultative, rather than an obligatory, parasite.

#### *Bufolucilia thatuna* (Shannon)

*Lucilia thatuna* Shannon, 1926, Proc. Ent. Soc., Wash. 28:132. Type ♂, Moscow Mountain, Idaho.

#### Geographical distribution:

Washington, Oregon, Idaho, Montana, California, Colorado.

#### California records:

Alameda Co.: Berkeley, III-28-20, IV-12-20, V-11-20 (A. J. Basinger, C.I.S.); IX-19-37 (K. Snyder, C.I.S.).

Butte Co.: Oroville, VI-2-50 (C. A. Downing, C.I.S.). Pulga, V-14-21 (C.I.S.).

Contra Costa Co.: Moraga, IV-1937 (E. S. Ross, C.A.S.). Lafayette, V-11-52 (R. A. Stirton, C.I.S.).

Eldorado Co.: Camino, 3 mi. S., VI-23-48 (K. W. Tucker, C.I.S.).

Los Angeles Co.: Tanbark Flat, IX-2-50 (E. B. Goodwin, U.C.D.); VI-23-50 (P. D. Hurd, Jr., C.I.S.); VI-24-50 (J. C. Hall, U.C.D.); VII-3-50 (U.C.L.A.); VII-7-50 (H. N. Yokoyama, U.C.D.). Beverly Glen, VII-28-52, VII-30-52 (U.C.L.A.). Big Dalton Dam, VII-12-50 (T. R. Haig, C.I.S.).

Marietta Co.: Yosemite, 3,880'-4,000', V-20-31 (C.I.S.).

Marin Co.: Mill Valley, III-28-26 (M. C. Van Duzee, C.A.S.). Novato, IX-16-51 (E. L. Kessel, C.A.S.).

Monterey Co.: Paradise Canyon, nr. Prunedale, IX-21-50 (P. H. Arnaud, P.A.). Pfeiffer Big Sur State Park, VI-16-49, VI-19-49 (P. H. Arnaud, P.A.).

Placer Co.: Dutch Flat, V-20-52 (E. I. Schlinger, U.C.D.).

San Bernardino Co.: Forest Home, V-18-34, to fish bait (A. J. Basinger, C.A.S.). Rim World Road, 6,000', IX-14-34, to fish bait (A. J. Basinger, C.A.S.).

Santa Clara Co.: Stanford University, V-21-53, X-9-52 (P. H. Arnaud, P.A.).

Santa Cruz Co.: Santa Cruz Mts., VIII-13-38 (L. W. Hepner, K.U.). Soquel, VI-22-24-1950 (M. T. James, W.S.C.).

Sierra Co.: Sierraville, VIII-26-48 (J. W. MacSwain, C.I.S.).

Sonoma Co.: Cazadero, III-30-34 (G. E. and R. M. Bohart, C.A.S.). Guerneville, IV-3-37 (G. E. and R. W. Bohart, C.A.S.).

Tehama Co.: Vina, VI-11-20 (C.I.S.).

Tuolumne Co.: Strawberry, VI-15-53 (J. G. Rozen, C.I.S.). Bumble Bee, VII-8-51 (T. R. Haig, U.C.D.). Pinecrest, VII-15-47 (P. H. Arnaud, P.A.). Dardanelles, VI-26-51 (U.C.L.A.).

Yolo Co.: Cache Creek Canyon, IV-30-54 (E. I. Schlinger, U.C.D.).

## Genus *Phaenicia* Robineau-Desvoidy

### *Phaenicia cuprina* (Wiedemann)

*Musca cuprina* Wiedemann, 1830, Aussereurop. Zweifl. Insekten, 2:654. Type ♀, China.

#### Geographical distribution:

China and Japan to India; East Indies; Fiji; Hawaii; Southern United States, Florida to Washington, D.C., and westward to California; South America.

#### California records:

Los Angeles Co.: Burbank, IX-25-50 (E. H. Kardos, U.S.A.C.). Los Angeles, VI-2-49 (N.U.).

San Mateo Co.: Redwood City, V-16-48, X-25-53 (P. H. Arnaud, P.A.).

Santa Clara Co.: San Jose, VI-30-49 (L. W. Quate, N.U.); VII-17-49, VIII-9-49, bait trap (L. W. Quate, N.U.).

Solano Co.: Vacaville, V-14-50, VIII-25-50, VIII-26-50, IX-30-50, X-1-50 (A. T. McClay, U.C.D.).

Yolo Co.: Davis, X-3-50 (A. T. McClay, U.C.D.); X-3-50, frequenting alfalfa (H. F. Robinson, U.C.D.).

### *Phaenicia mexicana* (Macquart)

*Lucilia mexicana* Macquart, 1843, Dipt. Exot., 2(3):143. Type ♂, Mexico.

#### Geographical distribution:

Mexico, Texas, Arizona, New Mexico, Utah, California.

#### California records:

Los Angeles Co.: Tanbark Flat, VI-21-50 (H. L. Hansen, C.I.S.). Camp Baldy, VII-11-50 (H. L. Hansen, C.I.S.). Downey, V-1-34, to fresh dead gopher (A. J. Basinger, C.A.S.).

Orange Co.: No locality (K.U.).

Riverside Co.: San Jacinto Mts., VII-1-52 (H. L. Mathis, U.C.D.). Riverside, VII-27-49, bait trap (L. W. Quate, N.U.); XI-7-33, XI-10-33, XII-9-33, XI-12-34, to fish bait (A. J. Basinger, C.A.S.); III-8-34, to human excrement (A. J. Basinger, C.A.S.); IV-24-34, V-13-34 (A. J. Basinger, C.A.S.). Glen Ivy, IX-20-35, on fresh chicken guts (A. J. Basinger, C.A.S.). Corona, Temescal Wash, IX-20-35, on fresh chicken guts (A. J. Basinger, C.A.S.). San Jacinto, V-18-33 (A. J. Basinger, C.A.S.). San Andreas Canyon, X-28-34 (A. J. Basinger, C.A.S.).

Sacramento Co.: "Sacramento County," IV-1949 (E. L. Atkinson, C.I.S.).

San Diego Co.: La Jolla, VIII-2-34 (A. J. Basinger, C.A.S.); X-28-34, fresh fish (A. J. Basinger, C.A.S.). Carlsbad, VI-1-54 (J. G. Hall, U.C.D.).

Yolo Co.: Davis, V-12-49 (R. C. Bechtel, U.C.D.).

#### Discussion:

This species is very close to the eastern *P. caeruleiviridis* (Macquart). If the two are synonymous, as seems quite probable, the name *mexicana* holds priority.

This is apparently to a large extent a silvan species, though it may be a contaminating species in cities. It is attracted to excrement including human, to garbage, and to freshly killed carcasses of animals. The contamination of drying fruits in the Sacramento Valley attributed by Donohoe (1937) to *Lucilia caeruleiviridis* was probably due to this species.

### *Phaenicia sericata* (Meigen)

*Musca sericata* Meigen, 1826, Syst. Beschr. Bekann. Eur. Zweifl. Ins., 5:53. Type ?, Germany.

#### Geographical Distribution:

Practically cosmopolitan; recorded abundantly from all continents.

#### California records:

Alameda Co.: Bay Farm Island, VII-30-39 (R. G. Dahl, P.A.). Berkeley, V-20-33, VI-19-33, and VI-20-33 (R. and G. Bohart, C.A.S.); V-24-49

(N.U.); I-30-50 (A. A. Hubert, K.U.); VI-24-49, VII-7-49, VII-27-49, VIII-17-49, bait trap (L. W. Quate, N.U.); V-17-49, VII-7-49, bait trap (L. W. Quate, U.C.L.A.); X-5-50 (W. A. McDonald, U.C.L.A.); III-24-46 (U.C.D.); VI-11-40, VI-19-40, V-24-40 (Miller, C.I.S.); XI-1925 (C.I.S.); V-15-48, VI-29-46, IV-19-41, X-15-40, X-26-40 (P. D. Hurd, Jr., C.I.S.); III-21-27, III-21-37 (N. W. Frazier, C.I.S.); XI-11-40 (D. J. Laski, C.I.S.); IX-18-39 (C. Lewis, C.I.S.); IV-3-49 (W. W. Middlekauff, C.I.S.); X-20-15 (E. P. Van Duzee, C.I.S.); XI-11-23, VIII-30-30 (C.I.S.). Melrose, IV-2-27 (E. P. Van Duzee, C.A.S.); VI-9-15 (C.I.S.). Oakland, VI-20-49, VI-21-49 (L. W. Quate, N.U.); VII-12-49, VIII-9-49, bait trap (L. W. Quate, C.I.S.); VII-7-49, VIII-4-49, VIII-15-49, IX-23-49, X-21-49, bait trap (L. W. Quate, N.U.); VI-14-50, VIII-19-50 (A. A. Hubert, K.U.). Strawberry Canyon, IX-27-47 (T. F. Leigh, C.I.S.). San Lorenzo, III-24-39 (K. D. Snyder, C.I.S.).

Amador Co.: Ione, V-17-37 (N. W. Frazier, C.I.S.).

Butte Co.: Oroville, V-5-21 (C.I.S.).

Contra Costa Co.: Point Richmond, III-30-47, V-18-47 (C. A. Hanson, C.I.S.). Richmond, VIII-18-49, bait trap (U.C.L.A.); VIII-10-49, bait trap (L. W. Quate, N.U.). Martinez, (U.C.D.). Antioch, X-15-38 (J. W. MacSwain, C.I.S.).

Eldorado Co.: Camino, 3 mi. S., VI-26-48 (D. Carter, C.I.S.).

Fresno Co.: Lake Sequoia, IX-4-51 (U.C.D.). Firebaugh, VIII-4-49 (A. D. Telford, C.I.S.). Oxalis, IX-10-47 (V. M. Stern, C.I.S.).

Glenn Co.: Artois, VII-11-52 (J. W. MacSwain, C.I.S.); VII-11-52, VII-16-52 (H. L. Hansen, C.I.S.).

Imperial Co.: Hot Mineral, IV-30-52 (U.C.L.A.). Palm Canyon, Borrego Valley, IV-26-53 (A. Fukushima, U.C.L.A.). Imperial Dam, IV-27-53 (A. Fukushima, U.C.L.A.).

Inyo Co.: Westgard Pass Plateau, V-22-37 (L. R. Gillogly, C.I.S.). Lone Pine, V-16-37 (L. R. Gillogly, C.I.S.). Furnace Creek, Death Valley, IV-1-51 (J. W. MacSwain, C.I.S.).

Lake Co.: Lakeport, V-18-32 (U.C.D.). Clear Lake, VI-10-36 (A. R. Mead, C.I.S.).

Los Angeles Co. Glendale, XI-25-50 (E. I. Schlinger, U.C.D.). Camp Baldy, VII-11-50 (H. F. Robinson, U.C.D.); VI-26-50 (J. C. Hall, U.C.D.); VI-26-50 (A. T. McClay, U.C.D.). Los Angeles, (U.C.L.A.); VI-2-49 (L. W. Quate, N.U.). Campus, U.C.L.A., V-17-33 (U.C.L.A.). Pomona, VII-20-31, X-9-31 (C.I.S.). Hermosa Beach, X-30-40, V-1938 (K. D. Snyder, C.I.S.). Los Angeles River, Long Beach, VI-26-54 (M. T. James,

W.S.C.). Westwood Hills, I-1952, IV-14-52, VI-20-39, and other dates (U.C.L.A.). Santa Monica, IV-13-50 (W. A. McDonald, U.C.L.A.); IV-26-50 (T. P. Kinsel, U.C.L.A.). Castaic, V-6-50 (W. A. McDonald, U.C.L.A.). Sawtelle, IV-22-50 (U.C.L.A.). Burbank, IX-25-50 (E. H. Kardos, U.S.A.C.). Van Nuys, V-12-36 (K. W. Opitz, U.C.L.A.). Beverly Glen, V-25-49 (G. Heid, U.C.L.A.). Palms, VI-8-38 (D. L. Dow, U.C.D.). Soledad Canyon, IV-23-50 (W. A. McDonald, U.C.L.A.). Big Tujunga Canyon, IV-11-53 (U.C.L.A.). San Fernando, IV-13-53 (R. H. Orson, U.C.L.A.). Carmelina, V-16-52 (H. Washburn, U.C.L.A.). Venice, V-23-53 (G. Yamamoto, U.C.L.A.). Compton, VI-20-52 (M. T. James, W.S.C.).

Madera Co.: Coarsegold, V-12-42 (A. J. Walz, C.I.S.).

Marin Co.: Novato, IX-16-51 (E. P. Kessel, C.A.S.). Mill Valley, VI-2-49 (E. S. Ross, C.A.S.). San Quentin Point, III-31-49 (P. D. Hurd, Jr., C.I.S.). Muir Beach, V-30-46 (E. P. Kessel, C.A.S.); VI-2-49 (E. S. Ross, C.A.S.). Stinson Beach, II-12-50 (A. A. Hubert, K.U.).

Mariposa Co.: El Portal, V-23-38 (N. A. Olson, C.I.S.).

Mendocino Co.: Albion, VII-7-54 (M. T. James, W.S.C.).

Merced Co.: Dos Palos, VII-14-51 (J. C. Hall, U.C.D.).

Monterey Co.: Carmel, VIII-7-32 (L. S. Slevin, C.A.S.); V-17-34 (L. S. Slevin, C.A.S.). Paradise Canyon, nr. Prunedale, IX-21-50 (P. H. Arnaud, P.A.).

Orange Co.: Brea, VIII-26-23 (A. J. Basinger, C.A.S.).

Riverside Co.: Palm Springs, I-19-53, XII-29-52 (P. H. Arnaud, P.A.); IV-11-50 (L. W. Quate, C.I.S.). Temecula, IV-8-50 (P. D. Hurd, Jr., C.I.S.). Cottonwood Springs, IV-26-49 (L. W. Quate, C.I.S.); IV-12-50 (W. F. Barr, U.I.). Riverside, VII-2-49, bait trap (L. W. Quate, N.U.). Palm Desert, IV-11-50 (L. W. Quate, C.I.S.).

Sacramento Co.: Sacramento, II-26-50 (H. F. Robinson, U.C.D.); XI-8-51 (J. C. Hall, U.C.D.); VII-10-52, VIII-12-52 (P. H. Arnaud, P.A.). Elk Grove, IX-24-49 (H. A. Hunt, U.C.D.).

San Benito Co.: Panoche Creek, IV-30-22 (A. J. Basinger, C.A.S.).

San Bernardino Co.: San Bernardino, V-24-36 (M. Hebert, U.C.L.A.). Yucaipa, VI-28-52 (R. H. and L. D. Beamer, LaBerge, Liang, Weiner, K.U.).

San Diego Co.: San Diego, IV-20-21-1913 (W. S. Wright, C.A.S.); XII-26-49 (A. Mayrhofer, N.U.); VI-4-51 (J. B. Plant, U.S.A.C.); VII-12-44 (Harry A. Hill, K.U.). San Vincente Lake, VII-9-52 (R. X. Schick, U.C.L.A.).

San Francisco Co.: San Francisco, VIII-15-39 (R. G. Dahl, P.A.); sand dunes, X-8-49 (P. H. Arnaud, P.A.); IV-9 to VI-11-52 (C. E. Kaufeldt, C.A.S.). Baker's Beach, VIII-29-53 (P. H. Arnaud, P.A.). Farallon Islands, X-23-51 (W. C. Bentinck, C.I.S.).

San Joaquin Co.: Tracy, VI-13-49 (J. W. Mac Swain, C.I.S.).

San Luis Obispo Co.: Pismo Beach, VII-2-54 (M. T. James, W.S.C.).

San Mateo Co.: Redwood City, anise flowers, XI-11-43 (P. H. Arnaud, P.A.); flowers *Baccharis pilularis*, XI-22-51 (P. H. Arnaud, P.A.); flowers forget-me-not, V-2-48 (P. H. Arnaud, P.A.); XII-20-53, X-25-53, XI-11-43, VII-4-46, X-6-41, III-27-48, VI-21-52, XI-7-48, VI-4-46, VIII-28-41, VIII-25-41 (P. H. Arnaud, P.A.).

Santa Barbara Co.: Carpinteria, VII-1-54 (M. T. and H. B. James, W.S.C.).

Santa Clara Co.: San Jose, VII-10-49, VIII-9-49, bait trap (L. W. Quate, U.C.L.A.); VI-29-49, VI-30-49 (L. W. Quate, N.U.); VII-17-49, VIII-9-49, bait trap (L. W. Quate, N.U.); V-27-42 (C. Reed, P.A.); V-27-42, IX-18-40, VIII-3-40 (Harold Madsen, P.A.); X-6-47 (P. H. Arnaud, P.A.). Palo Alto, IV-28-06 (J. M. Aldrich, U.I.); IX-6-94 (K.U.). Los Gatos, VI-1932 (C. A. Hamsher, U.C.D.). Mountain View, V-20-40, VI-11-41 (K. Frick, C.I.S.). Milpitas, V-12-41 (K. Frick, C.I.S.).

Santa Cruz Co.: Soquel, VI-22-24-1950 (M. T. James, W.S.C.).

Siskiyou Co.: Gazelle, IX-22-51 (J. C. Hall, E. I. Schlinger, U.C.D.).

Solano Co.: Vacaville, X-1-50, IX-30-50, IX-23-50, VIII-26-50 (A. T. McClay, U.C.D.); VI-1-32 (A. S. Harris, C.I.S.).

Stanislaus Co.: Patterson, VI-24-49 (T. F. Leigh, C.I.S.).

Sutter Co.: Live Oak, VII-11-46 (P. D. Hurd, Jr., C.I.S.).

Tulare Co.: Woodlake, III-22-47, IV-23-47 (N. W. Frazier, C.I.S.).

Yolo Co.: Davis, V-7-51, V-19-51, V-16-51, V-12-49, IV-29-51, V-10-51, V-13-51, V-21-51, V-15-51, IV-12-51 (A. T. McClay, U.C.D.); V-1950, XI-22-50, III-1950 (J. C. Hall, U.C.D.); VI-9-51 (H. F. Robinson, U.C.D.); VI-16-32 (F. H. Wymore, U.C.D.); V-31-36, V-27-36 (A. R. Mead, C.I.S.). Elkhorn Ferry, IV-20-50 (A. T. McClay, M. F. McClay). Putah Canyon, IV-4-51, IV-1950 (J. C. Hall, U.C.D.). West Sacramento, VII-10-52, VIII-18-52, flowers *Foeniculum vulgare* (P. H. Arnaud, P.A.).

#### Discussion:

This is the common green-bottle or English sheep fly. Though primarily a carrion feeder, the larvae are commonly involved in wound myiasis and are important in certain parts of the world, including California, as producers of sheep strike. Some strains seem much more inclined to a parasitic existence than others; in fact, it was chiefly nonvirulent strains of this fly which were used in maggot therapy. Adults freely enter houses and other buildings, where they may contaminate food; they may be instrumental in the contamination of drying fruits.

### Genus *Aldrichina* Townsend

#### *Aldrichina grabami* (Aldrich)

*Calliphora grabami* Aldrich, 1930, Proc. U.S. Nat. Mus. 78(1):1. Type ♂, China.

#### Geographical distribution:

Siberia, China, Washington, Oregon, California, Arizona, New Mexico, Colorado.

#### California records:

Alameda Co.: B.S.A. Camp, Oakland, VII-1928 (D. Ormsbee, U.C.D.). Oakland, X-21-49, X-28-49 (L. W. Quate, N.U.); VII-7-49 (L. W. Quate, U.C.L.A.); VIII-15-49 (L. W. Quate, U.C.L.A.); VI-14-50 (A. A. Hubert, K.U.). Berkeley, V-24-49 (U.C.L.A.); II-28-37, on meat (N. W. Frazier, C.I.S.); III-11-52 (J. W. Hinerman, C.I.S.). San Lorenzo, III-24-49 (K. D. Snyder, C.I.S.). Arroyo Mocho, 5 mi. S. Livermore, III-19-51 (P. D. Hurd, Jr., C.I.S.).

Contra Costa Co.: Mt. Diablo, V-29-51 (W. J. Wall, U.C.D.). Richmond, VIII-18-49 (L. W. Quate, N.U.).

Eldorado Co.: Pyramid Ranger Station, VII-12-48 (P. D. Hurd, Jr., C.I.S.). Strawberry, VII-28-50, VII-4-53 (M. E. Gardner, U.C.D.). Meyers, IV-23-50 (E. I. Schlinger, U.C.D.). Wright's Lake, VII-2-48 (R. A. Smith, C.I.S.); VII-2-48 (P. D. Hurd, Jr., C.I.S.). Echo Lake, VIII-10-52 (S. B. Freeborn, U.C.D.). China Flat, VI-28-48 (D. Carter, C.I.S.); VI-28-48 (L. W. Quate, N.U.).

Inyo Co.: Darwin, V-22-37 (C. A. Hamsher, U.C.D.).

Kern Co.: Bakersfield (C.A.S.); Bakersfield, III-26-47 (P. H. Arnaud, P.A.).

Lassen Co.: King's Creek Meadows, VII-22-50 (L. W. Quate, C.I.S.).

Los Angeles Co.: Crystal Lake, VI-29-50 (J. C. Hall, U.C.D.); VII-9-52 (J. K. Hester, U.C.D.). Crystal Lake Road, 4,700', VII-9-52 (W. V. Garner, C.I.S.). Westwood Hills, IV-2-39 (U.C.L.A.). Van Nuys, V-14-36 (K. W. Opitz, U.C.L.A.). Mt. Wilson, Opids Camp, V-14-37 (J. Wilcox, P.A.). Sierra Madre, V-17-41 (J. Wilcox, P.A.). Pomona, (C.I.S.). Camp Baldy, VI-26-50 (J. D. Paschke, C.I.S.).

Madera Co.: Bass Lake, V-30-42 (E. G. Linsley, C.I.S.). Coarsegold, V-26-42 (E. G. Linsley, C.I.S.).

Mariposa Co.: Yosemite National Park, VIII-1-40 (D. E. Hardy, K.U.). Yosemite, 3,880'-4,000', V-22-31, V-19-31 (C.I.S.); V-25-38 (K. D. Snyder, C.I.S.); V-22-38 (N. A. Olson, C.I.S.). Miami Ranger Station, V-18-42 (C.I.S.).

Mendocino Co.: Albion, VII-7-54 (M. T. James, W.S.C.).

Mono Co.: Benton, VII-10-50 (H. A. Hunt, U.C.D.). "Fernbr.", VIII-18-48 (W. E. Kelson, C.I.S.).

Nevada Co.: Sagehen, 5½ mi. NW. Hobart Mills, VI-20-54 (Helen James, W.S.C.).

Plumas Co.: Quincy, 4 mi. W., VI-26-49 (R. C. Bechtel, U.C.D.); VI-20-49 (J. W. MacSwain, C.I.S.). Keddie, VI-25-41 (C.I.S.). Onion Valley, VII-7-49 (F. Morishita, C.I.S.).

Riverside Co.: San Jacinto Mt. Tr., VII-1-52 (H. L. Mathis, U.C.D.). Idylwild, VII-10-52 (R. X. Schick, U.C.L.A.); VI-2-39 (A. M. Dunlop, C.I.S.).

Sacramento Co.: Sacramento, II-6-52, II-2-50, XI-8-51 (J. C. Hall, H. F. Robinson, H. A. Hunt, U.C.D.). Walnut Gap, IV-4-47 (C. A. Hanson, C.I.S.).

San Bernardino Co.: Goldstone Lake, V-25-53 (R. O. Schuster, C.I.S.).

San Diego Co.: La Jolla, VII-6-35, to fresh fish (A. J. Basinger, C.A.S.).

San Joaquin Co.: Manteca, IV-29-52 (J. K. Hester, U.C.D.). Lodi, IV-27-50, XI-26-50, (S. Kappos, U.C.D.).

San Mateo Co.: Redwood City, III-14-48 (P. H. Arnaud, P.A.).

Santa Clara Co.: San Jose, II-18-42 (Harold Madsen, P.A.). Mountain View, II-27-41 (K. Frick, C.I.S.).

Shasta Co.: Old Station, IX-23-51 (J. Hall, E. I. Schlinger, U.C.D.). Viola, VI-21-41 (C. W. Anderson, C.I.S.).

Solano Co.: Vacaville, V-30-49 (A. T. McClay, U.C.D.).

Tulare Co.: Wood Lake, IV-12-47 (C.I.S.); III-22-47, rotary trap (Norman W. Frazier, C.I.S.).

Sequoia National Park, VIII-6-40 (E. E. Kenaga, K.U.). Visalia, IV-23-49 (R. C. Bechtel, U.C.D.).

Tuolumne Co.: Bumble Bee, VI-23-51 (T. R. Haig, U.C.D.). Pinecrest, VII-24-47, VII-1948, VII-2-48 (P. H. Arnaud, P.A.).

Trinity Co.: Big Bar, VIII-2-30, in cabin (Irene Wilson, U.C.L.A.).

Yolo Co.: Woodland, IV-30-51 (E. I. Schlinger, U.C.D.); V-23-49 (Jack Fowler, U.C.D.). Elkhorn Ferry, V-20-51 (A. T. McClay, U.C.D.). Broderick, V-25-51 (J. C. Hall, U.C.D.). Putah Canyon, IV-25-48, XI-10-52 (E. I. Schlinger, U.C.D.). Davis, IV-2-51, IV-5-52, IV-13-51 (E. I. Schlinger, U.C.D.); IV-2-51, IV-8-51, V-6-51, V-10-51, V-23-47, X-19-51 (A. T. McClay, U.C.D.); III-1950, (J. C. Hall, U.C.D.); III-4-53, fish-meal bait (E. C. Carlson, U.C.D.); III-5-53, fermented-syrup bait (E. C. Carlson, U.C.D.).

#### Discussion:

Little is known of the biology of this species. It was introduced into the United States from China, and appears to be spreading in this country. According to Hall, Linquist collected it almost throughout the year in a meat-baited trap at Nice, California. I have taken it on garbage containing razor-clam cleanings at Ocean Park, Washington, and Basinger found it attracted to fresh fish at La Jolla, California.

## Genus *Cynomyopsis* Townsend

### *Cynomyopsis cadaverina* (Robineau-Desvoidy)

*Cynomya cadaverina* Robineau-Desvoidy, 1830, *Essai sur les Myodaires*, p. 365. Type ♀, Carolina.

#### Geographical distribution:

Greenland, Baffin Island, Yukon Territory, and Alaska, southward to Georgia, Texas, and California; common in the northern half of the United States.

#### California records:

Alameda Co.: Berkeley, XI-1925 (C.I.S.). Oakland, X-28-49, bait trap (L. W. Quate, N.U.).

Modoc Co.: Davis Creek, X-12-53 (J. C. Hall, U.C.D.).

Yolo Co.: Davis, X-1946 (A. L. Booth, U.C.D.).

#### Discussion:

This common northern species seems to be rare in California, where the adults may be found only during the cooler and more moist times of the year. It is attracted to excrement and putrid carrion, and may frequently enter houses in the

spring and late fall. Wound myiasis may occur in mammals, including man, the larvae occurring first in pustular wounds and later invading healthy tissue. Adults may blow cured meats in shops and homes.

### Genus *Calliphora* Robineau-Desvoidy

#### Discussion:

The five species of *Calliphora* that are known to occur in California seem to be closely similar to one another in their bionomics. They breed in carrion, usually after it has started to decompose, although the adults will blow fresh meat. I have observed *Calliphora* sp. ovipositing on freshly opened canned pears. Hall (1948) records *C. vicina* adults feeding on wind-fallen apples in November. Garbage is a general attractant. Cases of wound and cavity myiasis involving *C. vicina* and *C. vomitoria* are on record, but the evidence is that the larvae have first entered pustular sores and diseased body openings and have invaded healthy tissue later. These same two species also have been accused of producing gastrointestinal myiasis, probably from eggs ingested with blown meat or other foods. *C. vicina* and *C. vomitoria* have been suspected of paedogenetic reproduction, but there is no evidence other than circumstantial to support such a supposition.

#### *Calliphora coloradensis* Hough

*Calliphora coloradensis* Hough, 1899, Zool. Bull. 2:286. Type ♂, Colorado.

#### Geographical distribution:

Mexico to Alaska, eastward to Indiana and Ontario.

#### California records:

Alameda Co.: Berkeley, XII-25-20, XI-1925 (C.I.S.). Livermore, VII-7-37 (C.I.S.). Oakland, VII-7-49, bait trap (L. W. Quate, U.C.L.A.); X-7-49, bait trap (L. W. Quate, N.U.).

Contra Costa Co.: Antioch, V-22-48 (F. Ehrenford, C.I.S.).

Lassen Co.: Hallelujah, VI-27-49 (W. F. Ehrhardt, U.C.D.).

Los Angeles Co.: Crystal Lake, VII-9-52 (J. K. Hester, U.C.D.).

Mono Co.: Mono Lake, VII-27-47 (A. C. Michener, K.U.). Blanco's Corral, White Mts., 10,000', VII-5-53 (W. D. McLellan, U.C.D.); VII-7-53 (J. W. MacSwain, C.I.S.).

Orange Co.: Brea, VIII-25-23, VIII-26-23 (A. J. Basinger, C.A.S.).

Riverside Co.: The Gavilan, V-18-51 (E. I. Schlinger, U.C.D.). Riverside, VII-27-49, bait trap (L. W. Quate, U.C.L.A.). Palm Springs, Chino Canyon, XII-24-50 (P. H. Arnaud, P.A.). Palm Springs, XII-6-52, I-5-53, I-14-53 (P. H. Arnaud, P.A.).

San Benito Co.: Panoche Creek, IV-8-22 (C.A.S.).

San Bernardino Co.: Forest Home, V-18-34, to fish bait (A. J. Basinger, C.A.S.); XI-10-34, to fresh chicken guts (A. J. Basinger, C.A.S.). Chino, IV-25-34, to human excrement (A. J. Basinger, C.A.S.). Quail Springs, X-5-35 (A. J. Basinger, C.A.S.).

San Diego Co.: Jacumba, 13 mi. W., IV-14-34, to fish bait (A. J. Basinger, C.A.S.).

Santa Clara Co.: San Jose, VIII-9-49, bait trap (L. W. Quate, U.C.L.A.); VIII-9-49, bait trap (L. W. Quate, N.U.).

Santa Cruz Co.: Santa Cruz Mts., VIII-13-38 (R. I. Sailer, K.U.).

Solano Co.: Vacaville, VIII-17-47 (A. T. McClay, U.C.D.).

Tuolumne Co.: Tuolumne Meadows, VII-16-49 (L. L. Jensen, C.I.S.).

Yolo Co.: Davis, V-7-51 (A. T. McClay, U.C.D.); IV-2-51 (E. J. Taylor, U.C.D.); XI-26-35 (U.C.D.). Woodland, VIII-16-53 (A. T. McClay, U.C.D.).

#### *Calliphora livida* Hall

*Calliphora livida* Hall, 1948, The Blowflies of North America, p. 296. Type ♂, Georgia.

#### Geographical distribution:

California to Alaska, eastward to Georgia and Ontario.

#### California records:

Amador Co.: Silver Lake, IX-26-53 (K. W. Tucker, U.C.D.).

Eldorado Co.: Echo Lake, VIII-10-50 (S. B. Freeborn, C.I.S.). Fallen Leaf Lake, VIII-31 (O. B. Swezey, C.A.S.). Strawberry, IX-1-52 (M. E. Gardner, U.C.D.); VII-3-51, VII-7-51 (S. M. Kappos, U.C.D.). Echo Portals, 7,300', VII-16-46 (P. H. Arnaud, P.A.).

Inyo Co.: White Mountain, VII-24-36 (E. C. Hendee, C.I.S.). Lone Pine, VII-28-40 (R. H. Beamer, K.U.).

Los Angeles Co.: Camp Baldy, VII-11-50 (D. C. Blodget, U.C.L.A.).

Madera Co.: Thousand Island Lake, VII-5-52 (W. McDonald, U.C.L.A.).

Mariposa Co.: Yosemite National Park, VIII-1-40 (E. E. Kenaga, K.U.).

Mono Co.: Blanco's Corral, White Mts., V-11-53 (N. Malley, U.C.D.); VII-7-53 (W. D. McLaren, U.C.D.); VI-30-53 (J. W. MacSwain, C.I.S.). Piute Mountain, 1 mi. N., VII-9-53 (E. G. Linsley, R. F. Smith, C.I.S.).

Monterey Co.: Big Sur, IX-6-49 (U.C.L.A.).

Nevada Co.: Sagehen, nr. Hobart Mills, VIII-10-51 (E. G. Linsley, C.I.S.).

Plumas Co.: Keddie, VI-28-41 (F. H. Rindge, C.I.S.).

Riverside Co.: San Jacinto Mts., VII-21-29 (P. W. Oman, K.U.).

San Bernardino Co.: Forest Home, XI-10-34, to fresh chicken guts (A. J. Basinger, C.A.S.).

Santa Clara Co.: Alum Rock Park, IV-23-48 (P. H. Arnaud, P.A.).

Shasta Co.: Mammoth, VII-7-38 (R. M. and G. E. Bohart, C.A.S.). Manzanita Lake, Lassen National Park, V-21-41 (P. D. Hurd, Jr., C.I.S.). Lassen Peak Trail, Lassen National Park, VII-14-47 (T. F. Leigh, C.I.S.).

Tuolumne Co.: Bumble Bee, VI-24-51 (A. T. McClay, U.C.D.); VII-8-51 (T. R. Haig, U.C.D.). South Base Mt. Dana, VII-17-49 (L. L. Jensen, C.I.S.). Sonora Pass, VI-21-51, VII-11-51 (D. P. Lawfer, U.C.D.).

### *Calliphora terra-novae* Macquart

*Calliphora terra-novae* Macquart, 1851, Dipt. Exot., 4(2):217. Type ♀, "Terre Neuve."

#### Geographical distribution:

Alaska and Newfoundland, south to New York, New Mexico, and California.

#### California records:

Alameda Co.: Russell City, VII-8-49, bait trap (L. W. Quate, U.C.L.A.). Berkeley, V-15-48 (P. D. Hurd, Jr., C.I.S.); IV-2-54, *Brassica* (P. D. Hurd, Jr., C.I.S.); III-5-52 (D. E. Barons, U.C.D.). Oakland, VIII-19-50 (A. A. Hubert, K.U.).

Alpine Co.: Hope Valley, VII-9-48 (L. W. Quate, N.U.).

Contra Costa Co.: Richmond, VII-8-49, bait trap (L. W. Quate, U.C.L.A.).

Eldorado Co.: Strawberry, VI-28-50 (S. B. Freeborn, U.C.D.); VII-4-53 (M. E. Gardner, U.C.D.). Echo Lake, VII-10-52 (S. B. Freeborn, U.C.D.).

Fresno Co.: Heart Lake, 10,500', IX-1-52 (E. I. Schlinger, U.C.D.). Lone Indian Lake, VIII-20-49 (E. I. Schlinger, U.C.D.).

Lassen Co.: Summit Camp, VI-28-49 (E. L. Atkinson, C.I.S.).

Los Angeles Co.: Lancaster, V-13-53 (U.C.L.A.). Crystal Lake, VI-29-50 (W. A. McDonald, U.C.L.A.); VII-9-52 (D. E. Barons, U.C.D.).

Mariposa Co.: Yosemite, 3,880'-4,000', V-19-31, V-21-31 (C.I.S.). Miami Ranger Station, V-22-42 (A. J. Walz, C.I.S.).

Mono Co.: Sardine Creek, 8,500', VI-28-51, VII-11-51 (R. W. Morgan, U.C.D.); VII-18-51 (A. T. McClay, U.C.D.). Blanco's Corral, White Mts., 10,000', VII-30-53 (J. W. MacSwain, C.I.S.).

Monterey Co.: Carmel, V-5-42, VII-23-30, VI-19-39 (C.A.S.); III-8-36, VIII-6-30, VIII-6-33 (L. S. Slevin, C.A.S.).

Nevada Co.: Sagehen, nr. Hobart Mills, VIII-10-51 (E. G. Linsley, C.I.S.).

Riverside Co.: Idylwild, VII-10-52 (R. X. Schick, U.C.L.A.). San Jacinto Mt. Tr., VII-1-52 (D. E. Barons, U.C.D.); VII-1-52 (A. A. Grigarick, U.C.D.); VII-1-52 (A. T. McClay, U.C.D.). VIII-1-52 (J. K. Hester, U.C.D.); VIII-1-52 (D. E. Barons, U.C.D.).

San Bernardino Co.: Forest Home, V-18-34, to fish bait (A. J. Basinger, C.A.S.); XI-10-34, to fresh chicken guts (A. J. Basinger, C.A.S.).

San Francisco Co.: San Francisco, VI-1940 (E. S. Ross, C.A.S.); IV-5 to VII-2-52 (C. E. Kaufeldt, C.A.S.); XI-1925 (C.I.S.). San Francisco Beach, V-16-51 (E. I. Schlinger, R. C. Bechtel, U.C.D.).

San Joaquin Co.: Tracy, VI-21-49 (R. F. Smith, C.I.S.).

San Mateo Co.: Redwood City, V-28-46 (P. H. Arnaud, P.A.).

Santa Barbara Co.: St. Inez River, XII-1938 (B. E. White, C.A.S.).

Santa Clara Co.: Stevens Creek, IV-21-50 (D. J. Gould, N.U.). Univ. Calif. Ranch, San Jose, IV-11-43 (P. H. Arnaud, P.A.).

Shasta Co.: Manzanita Lake, Lassen National Park, V-21-41 (R. F. Smith, C.I.S.); V-21-41 (C. D. Michener, C.I.S.). Viola, 2 mi. W., V-27-41 (P. D. Hurd, Jr., C.I.S.). Kings Creek Meadow, VII-22-50 (L. W. Quate, C.I.S.).

Sierra Co.: Gold Lake, VII-10-34 (L. S. Rose, C.A.S.).

Sonoma Co.: Glen Ellen, VI-9-51 (E. I. Schlinger, U.C.D.).

Tuolumne Co.: Strawberry, V-18-53 (J. G. Rozen, C.I.S.). Bumble Bee, VII-8-51 (T. R. Haig, U.C.D.). Dardanelles, V-26-51 (E. L. Silver, U.C.L.A.). Sonora Pass, VI-27-51 (E. L. Silver, U.C.L.A.); VI-27-51, VII-11-51 (A. T. McClay, U.C.D.); VI-27-51 (D. P. Lawfer, U.C.D.).

Belle Meadows, VIII-18-48 (P. H. Arnaud, P.A.).  
Yolo Co.: Davis, III-27-53 (W. D. McLellan, U.C.D.).

*Calliphora vicina* Robineau-Desvoidy

*Calliphora vicina* Robineau-Desvoidy, 1830, *Essai sur les Myodaires*, p. 435. Type ♀, Pennsylvania.

Geographical distribution:

Holarctic; southern South America, South Africa, and southern Australia; in North America, from Mexico City, throughout the United States and Canada, to Alaska and Greenland.

California records:

Alameda Co.: Berkeley, III-18-32 (R. P. Allen, C.A.S.); III-21-22 ("T.I.S.", U.C.D.); IV-20-49 (C.I.S.); X-5-50 (W. A. McDonald, U.C.L.A.); III-5-52 (D. E. Barcus, U.C.D.); V-24-49 (N.U.); V-24-49, VI-10-30 (U.C.L.A.); VI-3-48, V-22-40, V-30-40 (J. Fraser, C.I.S.); VI-16-48, I-18-48, X-31-41, VI-7-48 (P. D. Hurd, Jr., C.I.S.); X-12-40, XI-1925, VI-1925 (C.I.S.); VI-6-46 (L. L. Jensen, C.I.S.); I-31-37 (N. W. Frazier, C.I.S.); IX-1937 (K. D. Snyder, C.I.S.). Melrose, VI-8-15, VI-9-15 (C.I.S.). Alameda, IV-16-27 (E. P. Van Duzee, C.A.S.). Oakland hills, V-1938 (P.A.). Oakland, VII-7-49, VII-14-49, bait trap (L. W. Quate, U.C.L.A.); III-22-18 (C.I.S.). B.S.A. Camp, Oakland, VII-1929 (D. Ormsbee, U.C.D.).

Contra Costa Co.: Richmond, VIII-18-49, bait trap (L. W. Quate, U.C.L.A.). Antioch, IV-9-49 (L. W. Quate, C.I.S.).

Humboldt Co.: Eureka, IV-26-52 (L. A. Ruud, C.I.S.).

Los Angeles Co.: Glendale, VII-18-48 (E. I. Schlinger, U.C.D.). Hermosa Beach, V-1938 (K. D. Snyder, C.I.S.). Tanbark Flat, VI-21-50 (H. M. Graham, C.I.S.).

Riverside Co.: Riverside, V-12-34, XII-9-33, to fish bait (A. J. Basinger, C.A.S.); IV-9-33 (A. J. Basinger, C.A.S.).

Sacramento Co.: Sacramento, III-23-52, II-6-52 (H. F. Robinson, U.C.D.).

San Francisco Co.: San Francisco, VIII-11-48 (S. A. Sher, C.I.S.); III-22-12, III-25-12, III-15-10, VI-17-19, VII-10-08 (F. E. Blaisdell, C.A.S.); III-21-26 (C. L. Fox, C.A.S.); VII-26-49 (H. B. Leech, C.A.S.). Baker's Beach, VIII-29-53 (P. H. Arnaud, P.A.).

San Mateo Co.: Redwood City, II-16-47, VI-13-46 (P. H. Arnaud, P.A.).

Yolo Co.: Davis, II-27-49, on alfalfa (U.C.L.A.).

*Calliphora vomitoria* (Linnaeus)

*Musca vomitoria* Linnaeus, 1758, *Systema Naturae*, 10th ed., p. 595. Type, Sweden.

Geographical distribution:

Holarctic; South Africa; Hawaii. In North America, from Greenland and Alaska south to Mexico.

California records:

Alameda Co.: Strawberry Canyon, III-12-50 (L. W. Quate, N.U.). Hayward, V-21-30 (F. E. Blaisdell, C.A.S.). Oakland, X-7-49, X-28-49, bait trap (L. W. Quate, N.U.); V-14-37, III-1936 (E. S. Ross, C.A.S.); IX-1935 (C.A.S.). Berkeley, XI-1925, VI-1925, X-17-30, XI-1-30, IV-1-21 (C.I.S.); II-2-50 (E. G. Linsley, C.I.S.); IV-5-52 (J. W. Hinerman, C.I.S.); V-1-52 (R. O. Schuster, C.I.S.); III-10-51 (M. J. Stebbins, C.I.S.); XII-5-37 (A. E. Meier, C.I.S.); VIII-17-49 (U.C.L.A.); VIII-31-49, bait trap (L. W. Quate, N.U.).

Alpine Co.: Hope Valley, VII-18-48 (R. A. Smith, C.I.S.).

Calaveras Co.: Big Trees, VII-15-50 (L. W. Quate, C.I.S.).

Contra Costa Co.: Albany, IV-29-21 (C.I.S.). Antioch, III-16-51 (R. C. Bechtel, U.C.D.). Orinda, VI-VIII, 1950 (E. W. Clark, U.C.L.A.). Point Richmond, III-30-47, V-18-47 (C. A. Hanson, C.I.S.). Richmond, VII-8-49, Bait trap (U.C.L.A.). Mt. Diablo, V-27-31 (C.A.S.).

Eldorado Co.: Snowline Camp, VI-30-48 (C. Chan, U.C.D.). Strawberry, VIII-12-50, VII-4-53 (M. E. Gardner, U.C.D.). Pacific, VIII-9-40 (E. E. Kenaga, K.U.). Fallen Leaf Lake, VI-10-30 (C.I.S.).

Humboldt Co.: Trinidad, VI-6-25 (C.A.S.).

Inyo Co.: Whitney Portal, VII-3-53 (W. D. McLellan, U.C.D.).

Lake Co.: Clear Lake Oaks, IV-19-54 (U.C.D.).

Los Angeles Co.: Camp Baldy, VI-26-50 (K. G. Whitesell, U.C.D.). Crystal Lake, VI-29-50 (J. D. Paschke, C.I.S.).

Marin Co.: Mill Valley, III-21-26 (M. C. Van Duzee, C.A.S.). Inverness, VIII-27-16 (L. Bruner, N.U.). Stinson Beach, V-6-51 (E. I. Schlinger, U.C.D.); II-12-50 (A. A. Hubert, K.U.). Cypress Ridge, IV-6-21 (C.I.S.).

Mariposa Co.: Yosemite Valley, VII-10-21, VI-25-22 (E. C. Van Dyke, C.A.S.). Yosemite, 3,880', V-16-31, V-17-28 (E. O. Essig, C.I.S.); V-19-31, V-15-31, V-22-31, V-17-31 (C.I.S.). Miami Ranger Station, V-20-42 (A. J. Walz, C.I.S.).

Mendocino Co.: Eel River, VI-19-48 (R. M. Bohart, U.C.D.). Yorkville, IV-24-28 (C.A.S.).

Ryan Creek, III-7-54 (P. D. Hurd, Jr., C.I.S.).

Monterey Co.: Carmel, IV-30-31, X-21-37, IX-26-40 (L. S. Slevin, C.A.S.).

Napa Co.: Napa, XII-20-53 (D. P. Lawfer, U.C.D.).

Plumas Co.: Onion Valley, VII-7-49 (E. I. Schlinger, U.C.D.).

Riverside Co.: San Jacinto Mt. Tr., VII-1-52 (H. L. Mathis, U.C.D.).

San Benito Co.: Pinnacles National Monument, IV-24-48 (P. D. Hurd, Jr., C.I.S.).

San Bernardino Co.: Forest Home, V-18-34, to fish bait (A. J. Basinger, C.A.S.).

San Joaquin Co.: Corral Hollow, X-21-46 (R. F. Smith, C.I.S.).

San Mateo Co.: San Bruno, III-26-51 (E. I. Schlinger, U.C.D.). Portola State Park, V-7-50 (P. H. Arnaud, P.A.). Skyline Blvd., La Honda Road, X-22-52 (P. H. Arnaud, P.A.). Redwood City, II-7-54 (P. H. Arnaud, P.A.). Half Moon Bay, 4 mi. E., X-21-49 (R. L. Langston, C.I.S.). Kings Mountain, X-8-48 (P. D. Hurd, Jr., C.I.S.).

Santa Barbara Co.: Santa Inez River, XII-1938 (B. E. White, C.A.S.).

Santa Clara Co.: Headwaters Stevens Creek, 2,500 ft., X-19-46 (P. H. Arnaud, P.A.). Univ. Calif. Ranch, San Jose, IV-11-43 (P. H. Arnaud, P.A.). Stanford University, I-30-51 (P. H. Arnaud, P.A.).

Santa Cruz Co.: Soquel, VI-22-24-1952 (M. T. James, W.S.C.).

Shasta Co.: Viola, 2 mi. W., V-27-41 (P. D. Hurd, Jr., C.I.S.). Viola, 4 mi. W., V-20-41 (C. W. Anderson, C.I.S.).

Sierra Co.: Gold Lake, VII-13-34 (L. S. Rose, C.A.S.).

Solano Co.: Vacaville, XI-20-49 (A. T. McClay, U.C.D.). Pleasant Valley, III-11-51 (J. C. Hall, U.C.D.).

Sonoma Co.: Triniti, XII-20-37, III-26-37 (N. W. Frazier, C.I.S.).

Trinity Co.: No locality, V-26-34 (G. E. Bohart, C.A.S.). Zenia, VI-20-31 (E. W. Baker, C.I.S.).

Tulare Co.: Sequoia National Park, Ash Mt. River, IV-26-51 (E. J. Taylor, U.C.D.).

Tuolumne Co.: Bumble Bee, VIII-8-51 (T. R. Haig, U.C.D.). Sonora Pass, 9,624', VI-27-51 (A. T. McClay, U.C.D.). Pinecrest, VII-18-47 (P. H. Arnaud, P.A.).

Yolo Co.: Putah Canyon, V-2-48 (E. I. Schlinger, U.C.D.). Davis, III-12-51, III-18-51, IV-29-51, V-23-47 (A. T. McClay, U.C.D.). X-12-50 (M. A. Stewart, U.C.D.); V-5-51 (R. C. Bechtel, U.C.D.); XI-26-35, X-8-36 (U.C.D.); VII-18-36 (S. C. Dorman, C.I.S.).

## Genus *Eucalliphora* Townsend

### *Eucalliphora lilaea* (Walker)

*Musca lilaea* Walker, 1849, List, IV, 894. Type ♀, St. Martin's Falls, Albany River, Hudson's Bay.

**Geographical distribution:**  
Highlands of northern Mexico northward to Alaska, eastward to Ontario.

#### California records:

Alameda Co.: Alameda, IV-19-36 (C. A. Hamsher, U.C.D.); XI-23-30 (G. Heid, C.A.S.); IV-11-39 (C.I.S.). Strawberry Canyon, XII-9-48 (W. W. Middlekauff, J. W. MacSwain, C.I.S.). Berkeley, II-19-50 (E. I. Schlinger, U.C.D.); X-1925 (U.C.D.); XII-4-34, V-16-33, V-20-33 (R. M. and G. E. Bohart, C.A.S.); XI-22-32 (G. E. Bohart, C.A.S.); V-24-49, V-29-49, VII-7-49, VIII-17-49, bait trap (L. W. Quate, U.C.L.A.); VIII-31-49, bait trap (L. W. Quate, N.U.); V-24-49 (N.U.); II-19-53 (A. E. Gray, C.I.S.); III-17-51 (M. Sakamoto, C.I.S.); III-29-48, V-1-49, III-14-51, V-16-48, III-13-49, II-25-51 (P. D. Hurd, Jr., C.I.S.); X-14-47, IX-1937, II-5-38, XII-15-37 (K. D. Snyder, C.I.S.); IV-2-34 (B. Brookman, C.I.S.); XII-2-25 (W. W. Jones, C.I.S.); III-29-48 (U. N. Lanham, C.I.S.); III-14-47 (N. W. Frazier, C.I.S.); V-1-31, X-1925, IV-1-21, IV-8-21, XI-1925, V-1931, III-30-21, X-18-30, XII-6-30, III-17-23, XI-2-39, XI-28-30 (C.I.S.). Russell City, VII-8-49 (L. W. Quate, U.C.L.A.). Oakland, VII-7-49, bait trap (L. W. Quate, U.C.L.A.); IX-14-49, IX-15-49, IX-23-49, X-7-49, X-21-49, X-28-49, bait trap (L. W. Quate, N.U.); VIII-4-49, bait trap (L. W. Quate, U.C.L.A.); VIII-19-50, VI-14-50 (A. A. Hubert, K.U.). Hills back of Oakland, IX-23-50 (W. C. Bentinck, C.I.S.); X-1-48 (S. A. Sher, C.I.S.).

Alpine Co.: Hope Valley, VII-18-48 (D. Carter, C.I.S.).

Butte Co.: Oroville, III-5-28 (Keiffer, C.A.S.).

Colusa Co.: Wilbur Hot Springs, 10 mi. S., V-27-50 (L. W. Quate, C.I.S.). Maxwell, III-22-53, III-23-53 (J. C. Hall, U.C.D.).

Contra Costa Co.: Richmond, XI-7-48 (S. A. Sher, C.I.S.); VIII-18-49, bait trap (L. W. Quate, U.C.L.A.); VIII-18-49 (L. W. Quate, N.U.). Point Richmond, III-30-47 (C. A. Hanson, C.I.S.). Redwood Park, IV-6-49 (K. W. Tucker, U.C.D.). Albany, III-23-21 (C.I.S.). Mt. Diablo, V-30-51 (E. I. Schlinger, U.C.D.); III-10-35 (F. R. Platt, C.I.S.); II-7-47 (U. N. Lanham, C.I.S.); IV-26-42 (P.A.). Lafayette, I-11-50, I-16-50 (A. A. Hubert,

K.U.). Orinda, IV-24-49 (D. J. Gould, C.I.S.). Antioch, VI-2-36 (C.I.S.).

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

Eldorado Co.: Echo Portals, VII-11-46 (P. H. Arnaud, P.A.). Echo Lake, VIII-10-52 (S. B. Freeborn, U.C.D.); IX-28-52 (P. H. Arnaud, P.A.); VIII-10-50 (S. B. Freeborn, C.I.S.). Meyers, IV-23-50 (E. I. Schlinger, U.C.D.). Strawberry, VII-4-53, VIII-5-50 (M. E. Gardner, U.C.D.). China Flat, VI-28-48 (L. W. Quate, N.U.); VI-28-48 (D. Carter, C.I.S.).

Humboldt Co.: Eureka, VII-15-35 (R. H. Beamer, K.U.).

Inyo Co.: Lone Pine, VII-28-40 (R. H. Beamer, K.U.). Bishop, VII-28-40 (R. H. Beamer, K.U.). Furnace Creek, Death Valley, IV-1-51 (P. D. Hurd, Jr., C.I.S.).

Kern Co.: Frazier Park, V-2-52 (R. M. Bohart, U.C.D.). Oildale, III-15-53 (T. E. Haig, U.C.D.).

Kings Co.: McClure Valley, III-6-53 (J. C. Hall, U.C.D.). Avenal, III-6-53 (J. C. Hall, U.C.D.); IV-4-48 (J. W. MacSwain, C.I.S.).

Lake Co.: Middletown, V-11-40 (K. Frick, C.I.S.). Clear Lake, V-24-41 (K. Frick, C.I.S.).

Lassen Co.: Hallelujah Jct., VI-27-49 (C. I. Smith, C.I.S.). Viewland, 4 mi. N., VI-20-54 (M. T. James, W.S.C.).

Los Angeles Co.: Westwood Hills, I-1952, IV-1939, II-10-53 (U.C.L.A.). Los Angeles, IV-19-36 (E. Dykes, U.C.L.A.). Beverly Glen, Santa Monica Mts., V-21-52, VI-5-52 (U.C.L.A.); II-22-52 (W. A. McDonald, U.C.L.A.). Santa Monica Mts., III-14-53, V-2-52 (U.C.L.A.). Castaic, V-6-50 (W. A. McDonald, U.C.L.A.). San Fernando, IV-5-53 (R. H. Orson, U.C.L.A.). Palmdale, III-15-41 (J. Wilcox, P.A.). Lancaster, 5 mi. N., III-24-47 (P. H. Arnaud, P.A.). Hermosa Beach, V-1938, XII-22-37 (K. D. Snyder, C.I.S.). Venice, V-23-53 (G. Yamamoto, U.C.L.A.). Pacific Palisades, XII-12-51, XII-17-51 (W. A. McDonald, U.C.L.A.). Glendale, VI-6-52, XI-25-50 (E. I. Schlinger, U.C.D.). Big Dalton Dam, VII-19-52 (S. Miyagawa, A. T. McClay, U.C.D.); VII-13-52 (T. R. Haig, U.C.D.); VII-12-50 (T. R. Haig, C.I.S.). Tanbark Flat, VII-4-50 (H. N. Yokoyama, U.C.D.); VII-8-52 (J. H. Nakata, U.C.D.); VII-11-52 (R. M. Bohart, U.C.D.). Crystal Lake, VI-29-50 (P. D. Hurd, Jr., C.I.S.); VII-2-52 (W. V. Garner, C.I.S.); VII-9-52 (H. L. Mathis, U.C.D.); VII-9-52 (A. T. McClay, U.C.D.); VII-9-52 (J. K. Hester, U.C.D.). Long Beach, Los Angeles River, VI-19-52 (M. T. and H. B. James, W.S.C.); VI-26-54 (M. T. James, W.S.C.).

Madera Co.: Agnew Meadow, VIII-8-52 (U.C.L.A.). San Joaquin Expt. Sta., nr. O'Neals,

II-23-53, II-22-53, flowers *Arctostaphylos mariposa* (P. D. Hurd, Jr., C.I.S.).

Marin Co.: Mill Valley, II-20-51, X-10-49 (H. B. Leech, C.A.S.); Stinson Beach, II-12-50 (A. A. Hubert, K.U.). Tocaloma, III-31-49 (P. D. Hurd, Jr., C.I.S.). San Quentin Point, III-31-49 (P. D. Hurd, Jr., C.I.S.).

Mariposa Co.: Yosemite National Park, VIII-1-40 (L. J. Lipovsky, K.U.). Yosemite, 3,880'-4,000', V-17-28 (E. O. Essig, C.I.S.); V-14-38 (N. A. Olson, C.I.S.); V-16-31, VI-12-31, V-30-31 (C.I.S.).

Mendocino Co.: Ryan Creek, III-26-49 (P. D. Hurd, Jr., C.I.S.).

Modoc Co.: Canby, 2 mi. E., VII-12-47 (T. F. Leigh, C.I.S.). Goose Lake, V-24-49 (R. M. Bohart, U.C.D.). Cedarville, VII-9-46 (P. D. Hurd, Jr., R. F. Smith, C.I.S.). Cedarville, 10 mi. S., VII-9-46 (P. D. Hurd, Jr., R. F. Smith, C.I.S.).

Mono Co.: Cottonwood Cr., VII-14-53 (W. D. McLellan, U.C.D.). Sardine Creek, 8,500', VII-11-51 (A. T. McClay, U.C.D.). Blanco's Corral, White Mt., 10,000', VI-24-53 (H. Washburn, U.C.L.A.); VII-53 (N. Malley, U.C.D.); VI-24-53, VI-30-53, VII-7-53, VII-20-53 (J. W. MacSwain, C.I.S.); VI-28-53 (W. D. McLellan, U.C.D.). Mono Lake, VII-27-47 (A. C. Michener, K.U.). Leavitt Meadows, VI-26-37 (C.I.S.).

Monterey Co.: Carmel, VIII-23-36, VI-21-42, XII-4-38, IX-7-30 (L. S. Slevin, C.A.S.). Paradise Canyon, nr. Prunedale, IX-22-50 (P. H. Arnaud, P.A.). Pfeiffer Big Sur State Park, VI-17-49, VI-18-49, VI-19-49 (P. H. Arnaud, P.A.). Pt. Pinos, Pacific Grove, V-24-52 (P. H. Arnaud, P.A.). Lockwood, VII-21-35 (Jack Beamer, K.U.).

Napa Co.: Walter Spring, V-26-51 (E. I. Schlinger, U.C.D.). Pope Valley, 8 mi. N., V-15-51 (E. I. Schlinger, U.C.D.). Napa, XII-20-51 (D. P. Lawfer, U.C.D.); IV-11-37 (N. W. Frazier, C.I.S.).

Nevada Co.: Truckee, VII-5-53 (R. M. Bohart, U.C.D.). Hobart Mills, VIII-26-48 (R. F. Smith, C.I.S.).

Placer Co.: Cisco, VI-15-51 (E. I. Schlinger, U.C.D.). Dutch Flat, V-20-50 (E. I. Schlinger, U.C.D.).

Plumas Co.: Bucks Lake, VII-1-49 (W. H. Wade, C.I.S.). Portola, XI-27-53 (P. H. Arnaud, P.A.). Quincy, 4 mi. W., VII-3-49 (F. Morishita, C.I.S.); VII-18-49 (E. L. Atkinson, C.I.S.).

Riverside Co.: Palm Springs, Chino Canyon, XII-27-50 (P. H. Arnaud, P.A.). Palm Springs, I-1-53, I-4-53, I-5-53, I-16-53, I-19-53, I-29-53, X-28-52, X-29-52, X-31-52 (P. H. Arnaud, P.A.). Riverside, VI-26-49 (L. W. Quate, U.C.L.A.).

Dos Palmas, XI-25-51 (W. A. McDonald, U.C.L.A.). San Jacinto Mts., VII-21-29 (L. D. Anderson, K.U.). San Jacinto Mt. Tr., VII-1-52 (A. T. McCay, U.C.D.). Santa Rosa Pass, IV-24-51 (E. I. Schlinger, U.C.D.). Temecula, IV-24-51 (E. J. Taylor, U.C.D.); IV-8-50 (P. D. Hurd, Jr., C.I.S.). Indio, VII-24-29 (L. D. Anderson, K.U.). White-water Fish Hatchery, II-1-54 (P. H. Arnaud, P.A.). Marvin Mountain Camp, San Jacinto Mts., VII-1-52 (W. V. Garner, C.I.S.).

Sacramento Co.: Elk Grove, IV-18-52 (E. I. Schlinger, U.C.D.). Sacramento, V-9-52 (S. Miyagawa, U.C.D.); III-23-52, II-6-52 (H. F. Robinson, U.C.D.); XI-8-51 (J. C. Hall, U.C.D.); X-23-21 (A. J. Basinger, C.A.S.); X-10-20 (E. P. Van Duzee, C.A.S.).

San Bernardino Co.: Lake Arrowhead, VII-8-51 (U.C.L.A.). Bluff Lake, IX-29-51 (U.C.L.A.). Mojave Desert, IV-10-30 (U.C.L.A.). Morongo Valley, III-28-52 (E. I. Schlinger, U.C.D.). Needles, XI-27-31, XII-18-23 (J. A. Kusche, C.A.S.).

San Diego Co.: San Diego, III-18-13 (E. P. Van Duzee, C.A.S.); III-1-35 (C.A.S.). Oceanside, V-14-53 (B. Markley, U.C.L.A.).

San Francisco Co.: San Francisco, III-22-12 and IX (F. E. Blaisdell, C.A.S.); IV-21-42 (K. Frick, C.I.S.); XI-1925 (C.I.S.).

San Joaquin Co.: Lodi, IV-2-50, XI-26-50 (S. Kappos, U.C.D.). Tracy, 6 mi. W., III-4-48 (P. D. Hurd, Jr., C.I.S.).

San Mateo Co.: Portola Road, XI-28-52 (P. H. Arnaud, P.A.). La Honda, IX-12-48, VIII-22-53 (P. H. Arnaud, P.A.). Redwood City, I-18-46, I-16-48, I-1947, II-16-47, XI-2-41, II-22-47, III-17-48, III-19-49, III-20-43, III-20-49, III-21-48, III-27-47, VI-27-46, VI-28-46, V-11-47, IX-21-41, XI-15-42, XI-25-43, XII-5-43, XII-8-43, V-30-53, XI-15-53, XII-13-53, II-7-54 (P. H. Arnaud, P.A.). San Gregorio, VIII-22-53 (P. H. Arnaud, P.A.). Searsville Lake, V-5-53 (P. H. Arnaud, P.A.). Memorial Park, VII-12-53 (P. H. Arnaud, P.A.). Jasper Ridge, XI-23-53 (P. H. Arnaud, P.A.). Sandhills Road, II-3-54 (P. H. Arnaud, P.A.).

Santa Barbara Co.: Santa Barbara, V-6-51 (M. J. Stebbins, C.I.S.).

Santa Clara Co.: Los Gatos, V-1933 (C. A. Hamsher, U.C.D.). Stanford University, I-30-51, II-25-52, II-27-52, II-4-52, II-28-52, III-20-52, V-8-52, V-20-49, X-12-51, XI-7-51, XI-12-51, V-21-53, V-27-53, V-29-53, XI-17-53, XII-19-53, I-25-54, II-2-54, II-4-54 (P. H. Arnaud, P.A.). Santa Clara, III-24-52 (P. H. Arnaud, P.A.). San Jose, IV-12-48 (P. H. Arnaud, P.A.); II-18-

42 (Harold Madsen, P.A.); III-14-42, IV-10-42, VI-16-42, IV-16-42 (C. Reed, P.A.). Univ. Calif. Ranch, San Jose, IV-11-43 (P. H. Arnaud, P.A.). Palo Alto, X-27-94 (K.U.). Alum Rock Park, II-23-50 (L. W. Quate, N.U.); II-17-52 (P. H. Arnaud, P.A.). Mountain View, VII-12-40, XI-6-41, XII-18-41 (K. Frick, C.I.S.).

Santa Cruz Co.: Soquel, VI-18-20-1950 (M. T. James, W.S.C.).

Shasta Co.: Mammoth, VII-7-33 (R. M. and G. E. Bohart, C.A.S.). Viola, V-19-41 (P. D. Hurd, Jr., C.I.S.). Viola, 2 mi. W., V-27-41 (P. D. Hurd, Jr., C.I.S.). Viola, 4 mi. W., V-20-41 (C. W. Anderson, C.I.S.). Shingletown, VI-2-41 (C. D. Michener, C.I.S.). Hat Lake, Lassen National Park, VII-3-41 (C. D. Michener, C.I.S.). Lassen Peak, 7,500', VII-18-49 (E. L. Atkinson, C.I.S.).

Siskiyou Co.: Bray, VI-30-35 (R. H. Beamer, K.U.).

Solano Co.: Vacaville, IX-23-50 (A. T. McClay, U.C.D.).

Sonoma Co.: Glen Ellen, VI-9-51 (E. I. Schlinger, U.C.D.). Mark West Springs, IV-23-35 (E. P. Van Duzee, C.A.S.). Eldridge, IX-2-49 (L. W. Quate, U.C.L.A.). Boyes Hot Springs, III-25-37 (N. W. Frazier, C.I.S.). Triniti, III-26-37 (N. W. Frazier, C.I.S.). Petaluma, IX-1942 (K. Frick, C.I.S.).

Stanislaus Co.: Westley, IV-1-48 (P. D. Hurd, Jr., C.I.S.); IV-27-48 (R. F. Smith, C.I.S.).

Sutter Co.: Sutter Buttes, III-2-53 (D. E. Barcus, U.C.D.).

Tulare Co.: Wood Lake, III-22-47, rotary trap, III-17-47, IV-5-47 (Norman W. Frazier, C.I.S.). Giant Forest, VII-28-29 (R. H. Beamer, K.U.).

Tuolumne Co.: Strawberry, VI-19-51, VI-21-51, VI-23-51 (A. T. McClay, U.C.D.); VI-25-51, VII-12-51 (S. M. Kappos, U.C.D.). Dardanelles, VI-26-51 (S. M. Kappos, U.C.D.). Sonora Pass, 9,624', VI-27-51 (A. T. McClay, U.C.D.); VI-27-51 (J. W. MacSwain, C.I.S.). Bumble Bee, VII-8-51 (T. R. Haig, U.C.D.). Pinecrest, VII-29-47, VII-29-48, VII-13-48, VIII-13-47, VIII-30-47 (P. H. Arnaud, P.A.). Belle Meadow, VIII-18-48 (P. H. Arnaud, P.A.).

Yolo Co.: Woodland, IV-30-51 (E. I. Schlinger, U.C.D.). Elkhorn Ferry, V-10-51 (E. I. Schlinger, U.C.D.). Putah Canyon, III-12-51, XI-10-52 (E. I. Schlinger, U.C.D.); XI-10-52 (W. H. Lange, U.C.D.); III-15-53 (D. E. Barcus, U.C.D.). Davis, IV-18-50, IV-1-51, IV-8-51, IV-5-51, IV-27-51, V-4-52, V-6-51, V-8-51, V-13-51, V-19-51, VII-27-51, IV-23-53, VI-25-53 (A. T. McClay, U.C.D.); IV-15-52 (J. K. Hester, U.C.D.); II-19-51, IV-30-

51, XII-8-50, X-14-49, VI-27-52, V-27-53 (E. I. Schlinger, U.C.D.); I-18-53, at light (E. I. Schlinger, U.C.D.); IV-13-51 (R. C. Bechtel, U.C.D.); III-1950, IV-27-51, XI-22-50, II-1950 (J. C. Hall, U.C.D.); III-8-51, IV-12-51 (W. J. Wall, U.C.D.); III-26-47 (Bartholomeu, U.C.D.); V-7-49 (H. Hunt, U.C.D.); X-11-50, VI-1933, IX-1936, XI-26-35, X-8-36, IX-12-27 (U.C.D.); III-1-53, III-2-53, III-3-53, III-4-53, III-5-53, III-6-53, II-28-53, fermented-syrup bait (E. C. Carlson, U.C.D.); III-1-53, III-3-53, III-4-53, III-5-53, III-6-53, fish-meal bait (E. C. Carlson, U.C.D.); III-24-53 (D. E. Barcus, U.C.D.); III-27-53 (W. D. McLellan, U.C.D.). Clarksburg, VI-7-33 (M. A. Cazier, C.I.S.).

#### Discussion:

This is the most abundant and widespread member of the Calliphorini in the western United States. It breeds in the freshly killed carcasses of small animals such as the smaller rodents and birds. The adults readily enter houses and may occur there in large numbers as a result of emergence from the bodies of poisoned or trap-killed mice. The variation in size is striking, a result, undoubtedly, of undersized individuals being produced by larval overcrowding and consequent shortage of food. This species has never been recorded in human or large-animal myiasis, and, because of its breeding habits, probably never will be. It may, however, readily contaminate food by mechanical transmission of pathogens.

### Genus *Acronesia* Hall

#### *Acronesia aldrichia* (Shannon)

*Sterigomyia aldrichia* Shannon, 1923, Insec. Insc. Mens. 11:112. Type ♂, Colorado.

##### Geographical distribution:

Alaska to Washington and Colorado.

##### California records:

None. Included in the hypothetical list of California species.

### Genus *Cyanus* Hall

#### *Cyanus elongatus* (Hough)

*Cynomyia elongata* Hough, 1898, Ent. News, 9: 106. Type ♂, Wyoming.

##### Geographical distribution:

Washington, Alberta, and North Dakota to Colorado and California.

##### California records:

Alpine Co.: Hope Valley, VII-9-48 (C. Chan, U.C.D.); VII-18-48 (P. D. Hurd, Jr., C.I.S.). Carson Pass, IX-2-33 (G. E. Bohart, C.A.S.).

Fresno Co.: Marie Lake, 10,500', VIII-30-52 (E. I. Schlinger, U.C.D.).

Mono Co.: Sien, 9,300', VII-16-34 (G. E. and R. M. Bohart, C.A.S.). Convict Lake, VI-24-37 (A. E. Meier, C.I.S.).

Tuolumne Co.: Sonora Pass, 9,000'-10,000', VII-16-51 (C. A. Downing, U.C.D.). Sonora Pass, VIII-30-54 (A. A. Grigarick, U.C.D.).

##### Discussion:

According to Hall (1948), this species is a swift flier, flying not in circles, as do species of *Calliphora* or *Cynomyopsis*, but rather in straight courses, like the Sarcophagidae and Oestridae. It is rarely taken in traps. Adults oviposit on decaying meat. There are no records of involvement in human or animal myiasis.

### Genus *Callitroga* Brauer

#### *Callitroga hominivorax* (Coquerel)

*Lucilia hominivorax* Coquerel, 1858, Ann. Soc. Ent. France (3)6:173. Type ?, Guiana, from a case of human myiasis.

##### Geographical distribution:

North Carolina to Indiana, Minnesota, Montana, and California, southward to Chile and Argentina.

##### California records:

Inyo Co.: Lone Pine, July 25, 1952; in a case of human nasal myiasis.

Solano Co.: Dixon (G. M. Spurlock, C.I.S.), larvae taken from sheep.

Yolo Co.: Davis, VI-7-36, reared (S. C. Dorman, U.C.L.A.); VII-7-40 (D. P. Furman, C.I.S.), larvae taken from sheep; IX-29-40 (G. M. Spurlock, C.I.S.), larvae from udder of milk cow.

##### Discussion:

This species has been in the literature under the name of *Cochliomyia americana* Cushing and Patton, 1930, or *Callitroga americana* (Cushing and Patton), following Hall (1948). However, as Sabrosky (1953) has shown, *Lucilia hominivorax* Coquerel, 1858, is the oldest available name that applies unquestionably to this species.

This is the screwworm, or primary screwworm, an obligate parasite, in the larval form, of mammals, including man. It is commonly involved in wound myiasis in animals, a lesion as small as a tick bite sometimes being sufficient to admit entry to the larvae. Wild animals, such as deer, may be attacked as readily as domestic cattle, sheep, and goats. In California, it may be involved in sheep strike, though in this respect is not as important as the three facultative parasites mentioned on page [1b]. A number of cases of human myiasis due to this species are on record, fifty-five having been reported in Texas alone during one severe year, 1935 (Dove, 1937). The Lone Pine specimens (larvae) were obtained from a case of human nasal myiasis by Dr. Dean P. Furman and submitted to me for confirmation of the identification.

Specimens in collections come mostly from reared material; the flies are rarely collected in nature.

#### *Callitroga macellaria* (Fabricius)

*Musca macellaria* Fabricius, 1775, Systema Ent., p. 776. Type ♀, West Indies.

##### Geographical distribution:

Maine, Quebec, Minnesota, and Oregon, southward to Patagonia.

##### California records:

Alameda Co.: Berkeley, XI-1925 (C.I.S.). Oakland, IX-27-49, X-14-49, X-28-49, bait trap (L. W. Quate, N.U.).

Butte Co.: Durham, X-1947 (Douglas, U.C.D.).

Contra Costa Co.: Antioch, X-10-37 (E. P. Van Duzee, C.A.S.); X-12-47 (U. N. Lanham, W.S.C.); X-12-47 (U. N. Lanham, C.I.S.).

Fresno Co.: Firebaugh, 7 mi. S., IX-22-48 (R. F. Smith, C.I.S.).

Imperial Co.: Brawley, III-9-36 (U.C.D.). Hot Mineral Springs, IV-25-53 (U.C.L.A.). Imperial Dam, IV-27-53 (A. Fukushima, U.C.L.A.).

Inyo Co.: Saratoga Springs, Death Valley, V-30-53 (A. Fukushima, U.C.L.A.). Sheep Creek Springs, Death Valley, V-30-53 (A. Fukushima, U.C.L.A.).

Kern Co.: Kern Canyon, VII-28-46 (C.I.S.). Democrat Springs, X-16-51 (P. D. Hurd, Jr., E. G. Linsley, R. F. Smith, C.I.S.). Bodfish, X-16-51 (E. G. Linsley, C.I.S.).

Los Angeles Co.: Big Tujunga Canyon, VIII-15-52 to X-18-52 (R. X. Schick, U.C.L.A.). Los Angeles, XI-87 (N.U.).

Merced Co.: Dos Palos, VIII-24-47 (V. M. Stern, C.I.S.).

Mono Co.: Mono Lake, VII-31-40 (D. E. Hardy, K.U.).

Monterey Co.: Paraiso Springs, IX-27-28-1934 (L. S. Slevin, C.A.S.). Carmel, IX-6-31 (E. P. Van Duzee, C.A.S.).

Placer Co.: Auburn, IX-20-16 (L. Bruner, N.U.).

Riverside Co.: Chino Canyon, Palm Springs, XII-22-50, XII-27-50, XII-24-50, XII-25-50, XII-26-52, XII-28-52, I-2-53 (P. H. Arnaud, P.A.).

Hopkins Well, X-24-51 (P. D. Hurd, Jr., C.I.S.).

Blythe, X-29-40 (K. D. Snyder, C.I.S.); VIII-25-46 (W. F. Barr, C.I.S.). Indio, 6 mi. W., IV-30-49 (E. G. Linsley, J. W. MacSwain, R. F. Smith, C.I.S.); IV-24-26-1953 (R. Durbin, U.C.L.A.); IV-24-29 (U.C.L.A.). Indio area, IV-26-49 (U.C.L.A.). Riverside, (C.I.S.); VII-27-49, bait trap (L. W. Quate, N.U.); VII-26-49, bait trap (L. W. Quate, U.C.L.A.); II-7-33, II-10-33 (A. J. Basinger, U.C.D.). Whitewater, III-9-40, flowers *Geraea canescens* (R. M. Bohart, U.C.L.A.).

Magnesia Canyon, VII-2-52 (H. L. Mathis, U.C.D.); VII-2-52 (D. E. Barcus, U.C.D.). Gilman Hot Springs, V-30-41 (E. S. Van Dyke, C.A.S.).

Coachella, V-17-28 (E. C. Van Dyke, C.A.S.).

Sacramento Co.: Isleton, X-1-47 (R. Coleman, C.I.S.). Sacramento, X-3-16 (L. Bruner, N.U.).

San Bernardino Co.: Devore, 3 mi. S.W., VI-29-52 (R. H. and L. D. Beamer, Wally LaBerge, Cheng Liang, K.U.). Yermo, V-23-40 (W. Reeves, M. Cazier, P. Ting, C.I.S.). Apple Valley, X-21-51 (P. D. Hurd, Jr., C.I.S.). Mill Creek Canyon, IX-21-24-23 (E. P. Van Duzee, C.A.S.).

Chubrock, 6 mi. NE, X-17-51 (E. G. Linsley, C.I.S.). San Bernardino, VII-12-36, trap (S. C. Dorman, U.C.L.A.). Mountain Home, IX-12-53 (E. I. Schlinger, U.C.D.). Mouth of Deep Creek, X-25-53 (J. C. Hall, U.C.D.).

San Diego Co.: Anza State Park, IV-23-51 (E. I. Schlinger, U.C.D.). San Diego, IV-25-15 (E. P. Van Duzee, C.A.S.). Jucumba, XII-24-41 (R. H. Beamer, K.U.). Julian, IV-26-53 (A. Fukushima, U.C.L.A.).

San Luis Obispo Co.: Caliente Mt., 2 mi. N.E., X-18-52 (K. W. Tucker, U.C.D.).

San Joaquin Co.: Corral Hollow, X-21-46 (Ray Smith, U.C.L.A.).

Santa Clara Co.: Stanford University, XI-1905 (U.S.A.C.).

Solano Co.: Vacaville, IX-1-50, IX-23-50 (A. T. McClay, U.C.D.).

Sutter Co.: Verona, VII-30-26 (F. H. Wymore, U.C.D.).

Tulare Co.: Wood Lake, XI-3-47, rotary trap (N. W. Frazier, U.C.L.A.).

Ventura Co.: Pira, XII-28-53 (P. H. Arnaud, P.A.).

Yolo Co.: Davis, X-27-52 (A. T. McClay, U.C.D.); XI-22-50 (J. C. Hall, U.C.D.); IV-26-27 (F. H. Wymore, U.C.D.); IX-26-35 (U.C.D.); X-4-36 (M. A. Embury, C.I.S.).

#### Discussion:

This is the secondary screwworm. It is essentially a scavenger, though it occasionally becomes parasitic, and numerous cases of myiasis in man and animals are on record. This is the most important species involved in sheep strike in California, according to information furnished me by Dr. J. R. Douglas.

### Genus *Paralucilia* Brauer and Bergenstamm

*Paralucilia wheeleri* (Hough)

*Chrysomyia wheeleri* Hough, 1899, Zool. Bull., 2:284. Type ♂, Monterey, Calif.

#### Geographical distribution:

Washington to southern Mexico, eastward to Colorado and western Texas.

#### California records:

Alameda Co.: Strawberry Canyon, XII-9-48 (W. W. Middlekauff, J. W. MacSwain, C.I.S.). Berkeley, V-7-35 (S. C. Dorman, U.C.L.A.); IV-7-37, V-19-33, V-14-33 (G. E. and R. M. Bohart, C.A.S.); I-24-40, VI-11-40, VI-3-40, VI-2-40, VI-4-40, V-25-40 (Miller, C.I.S.); II-1925 (C.I.S.); VIII-11-20 (E. C. Van Dyke, C.I.S.); VI-15-48, VI-16-48, VI-29-46 (P. D. Hurd, Jr., C.I.S.); XII-8-48 (W. W. Middlekauff, C.I.S.); V-1-52 (J. W. Hinerman, C.I.S.); XI-1925 (C.I.S.). Melrose, VI-9-15 (C.I.S.). Russell City, VII-8-49, bait trap (L. W. Quate, U.C.L.A.). Hills back of Oakland, X-1-48 (S. A. Sher, C.I.S.). Oakland, X-28-49, bait trap (L. W. Quate, N.U.).

Contra Costa Co.: Mt. Diablo, VII-10-47 (P. D. Hurd, Jr., C.I.S.); V-27-31 (E. P. Van Duzee, C.A.S.); V-29-51 (W. J. Wall, U.C.D.). Mt. Diablo, Rock City, VI-5-40 (C.I.S.). Martinez, XI-24-39, IX-3-46 (H. E. Cott, U.C.D.). Fish Ranch Road, V-23-48 (P. D. Hurd, Jr., C.I.S.).

Lake Co.: Clear Lake, V-24-41 (K. Frick, C.I.S.).

Los Angeles Co.: Cape Canyon, Catalina Island, VI-11-38 (T. D. A. Cockerell, C.A.S.). Tanbark Flat, VII-8-50, VII-9-50 (W. A. McDonald, U.C.L.A.); VII-5-52 (H. L. Mathis, U.C.D.); VII-12-52 (S. Miyagawa, U.C.D.); VI-23-50 (H. F. Robinson, U.C.D.); VI-23-50 (W. O. Marshall, U.C.D.); VII-22-50 (T. R. Haig, C.I.S.); VI-21-50

(H. M. Graham, C.I.S.); VI-21-50 (J. D. Paschke, C.I.S.). Camp Baldy, VI-26-50 (H. L. Hansen, C.I.S.); VI-26-50 (J. G. Hall, U.C.D.); VII-7-52 (A. T. McClay, U.C.D.). Big Dalton Dam, VII-12-50 (T. R. Haig, C.I.S.); VII-19-52 (S. Miyagawa, U.C.D.). Crystal Lake, VII-9-52 (S. Miyagawa, R. L. Anderson, U.C.D.); VII-9-52 (D. E. Barcus, U.C.D.); VI-29-50 (D. C. Blodget, U.C.L.A.). Glendale, VI-8-52 (E. I. Schlinger, U.C.D.). Westwood Hills, V-5-38, V-10-40, V-8-38 (U.C.L.A.). Big Tujunga Canyon, X-12-51 (U.C.L.A.). Santa Monica, V-12-51, III-14-53 (U.C.L.A.). Stone Canyon, Santa Monica Mts., III-12-51 (U.C.L.A.). Brentwood, II-16-53 (A. Fukushima, U.C.L.A.). Sierra Madre, III-17-41 (J. Wilcox, P.A.).

Madera Co.: O'Neal (U.C.D.).

Marin Co.: Lagunitas, IV-28-40 (C.A.S.). Novato, IX-11-51, IX-15-51, IX-16-51 (E. L. Kessel, C.A.S.). Stinson Beach, V-6-51 (E. I. Schlinger, U.C.D.). Taylor State Park, IV-20-47 (P. H. Arnaud, P.A.).

Mariposa Co.: Yosemite, 3,880'-4,000', V-15-31, V-19-31 (C.I.S.). Wawona, VI-11-42 (E. G. Linsley, C.I.S.).

Monterey Co.: Carmel, IX-23-23, X-29-28 (L. S. Slevin, C.A.S.). Monterey, VIII-29-50 (R. C. Bechtel, U.C.D.). Paradise Canyon, nr. Prunedale, VI-14-49 (P. H. Arnaud, P.A.). Big Sur, 13 mi. N., VI-19-52 (R. H. and L. D. Beamer, W. LaBerge, A. Wolf, C. Liang, C. Weiner, K.U.). Gorda, 4½ mi. S., VII-2-54 (M. T. James, W.S.C.). Paraiso Springs, IX-25-28, IX-19-28 (L. S. Slevin, C.A.S.).

Placer Co.: Auburn, VIII-14-15 (L. Bruner, N.U.).

Riverside Co.: Palm Springs, XII-22-41 (R. H. Beamer, K.U.); XII-28-52, I-7-53 (P. H. Arnaud, P.A.). San Jacinto Mt. Tr., VII-1-52 (D. E. Barcus, U.C.D.).

Sacramento Co.: Sacramento, IV-26-36 (C.I.S.).

San Bernardino Co.: Snow Crest Camp, VII-7-52 (S. Miyagawa, U.C.D.).

San Diego Co.: La Jolla, VII-13-41 (Burt Hodgden, K.U.).

San Francisco Co.: San Francisco, XI-1925 (C.I.S.).

San Luis Obispo Co.: Oceano, VIII-4-38 (R. H. Beamer, K.U.).

San Mateo Co.: Woodside, IV-25-06 (J. M. Aldrich, U.I.). Kings Mt. Road, IX-20-52 (P. H. Arnaud, P.A.). Jasper Ridge, Sandhill Road, X-13-52 (P. H. Arnaud, P.A.). Redwood City, XI-15-42 (P. H. Arnaud, P.A.); flowers *Baccharis pilularis*, X-14-50 (P. H. Arnaud, P.A.). Skyland Blvd., nr. Skylonda, IX-21-48

(P. H. Arnaud, P.A.). La Honda Road, nr. Skyland Blvd., flowers *Baccharis pilularis*, X-22-52 (P. H. Arnaud, P.A.). La Honda, IX-12-48 (P. H. Arnaud, P.A.). Half Moon Bay, 4 mi. E., X-21-49 (C. I. Smith, C.I.S.). Sharp Park, 3 mi. N., X-21-49 (T. F. Heffernan, C.I.S.). Kings Mountain, X-8-48 (P. D. Hurd, Jr., C.I.S.). Memorial Park, VII-12-53 (P. H. Arnaud, P.A.).

Santa Clara Co.: San Jose, X-8-41 (K. Frick, C.I.S.). Stanford University (U.S.A.C.); I-30-51, X-1 to 5-49 (P. H. Arnaud, P.A.). Palo Alto, XI-24-94 (R. W. Doane, W.S.C.). Sargent, VII-22-35 (E. I. Beamer, K.U.). Alum Rock Park, IV-23-48 (P. H. Arnaud, P.A.). Headwaters, Stevens Creek, 2,500', X-19-46 (P. H. Arnaud, P.A.). Univ. Calif. Ranch, San Jose, IV-11-43 (P. H. Arnaud, P.A.). Mission San Jose, VI-12-40 (J. Fraser, C.I.S.). Santa Clara, VI-1930 (A. R. Mead, C.I.S.). Alma, XI-16-41 (K. Frick, C.I.S.).

Santa Cruz Co.: Santa Cruz Mts., VIII-13-38 (R. H. Beamer, K.U.).

Sonoma Co.: Mesa Grande, VII-11-08 (F. E. Blaisdell, C.A.S.).

Trinity Co.: Big Bar, IX-4-30 (Irene Wilson, U.C.L.A.).

Ventura Co.: Saticoy, VI-5-45 (R. F. Smith, C.I.S.).

Yolo Co.: Putah Canyon, X-24-48 (H. E. Cott, U.C.D.).

## Genus *Phormia* Robineau-Desvoidy

### *Phormia regina* (Meigen)

*Musca regina* Meigen, 1826, Syst. Beschr. Bekann. Eur. Zweifl. Ins. 5:58. Type, Europe.

#### Geographical distribution:

Northern Palaearctic region; Hawaii; Alaska and Quebec southward to Georgia and Mexico.

#### California records:

Alameda Co.: Berkeley, X-17-46 (M. H. Pauly, U.C.D.); VIII-31-49, bait trap (L. W. Quate, N.U.). VII-7-49, bait trap (L. W. Quate, U.C.L.A.); V-24-49 (U.C.L.A.); V-14-52 (D. E. Barcus, U.C.D.); VI-11-40, V-22-40 (Miller); VI-2-38, XI-1925, II-26-32 (C.I.S.). Oakland, VII-7-49, VIII-4-49, IX-14-49, bait trap (L. W. Quate, U.C.L.A.). Russell City, VII-8-49, bait trap (L. W. Quate, U.C.L.A.). Pleasanton, VI-2-38 (C.I.S.). Melrose, VI-9-15 (C.I.S.). Albany, IV-20-24 (C.I.S.).

Alpine Co.: Hope Valley, VII-18-48, VII-18-53 (R. A. Smith, C.I.S.); VII-18-48 (K. W. Tucker, C.I.S.); VII-18-48 (S. A. Sher, C.I.S.); VII-9-48 (P. D. Hurd, Jr., C.I.S.).

Butte Co.: Richardson's Spring, V-20-44 (C.A.S.). Oroville, V-5-21 (C.I.S.).

Colusa Co.: Wilbur Hot Springs, V-27-50 (L. W. Quate, C.I.S.); V-18-52 (D. E. Barcus, U.C.D.).

Contra Costa Co.: Walnut Creek, IV-22-40 (C.A.S.). Mt. Diablo, V-27-31, summit (E. P. Van Duzee, C.A.S.); V-30-42 (C. Reed, P.A.); V-30-42 (H. Madsen, P.A.); V-30-42 (P.A.). Martinez, X-13-38 (H. E. Cott, W.S.C.). Lafayette, I-26-50, I-29-50 (A. A. Hubert, K.U.). Richmond, VIII-18-49 (L. W. Quate, U.C.L.A.); VIII-18-49, bait trap (L. W. Quate, N.U.). Brentwood, VII-9-40, VII-15-40 (C.I.S.). Antioch, V-26-33 (E. O. Essig, C.I.S.); V-24-49 (J. W. MacSwain, C.I.S.); IV-9-49 (J. E. Gillaspy, C.I.S.); IV-9-49 (L. W. Quate, C.I.S.); V-24-49 (E. G. Linsley, C.I.S.).

Eldorado Co.: Bijou, Lake Tahoe, VI-27-? (R. L. Usinger, C.A.S.). Wright's Lake, VII-2-48 (R. A. Smith, C.I.S.); VII-2-48 (D. Carter, C.I.S.); VII-2-48 (P. D. Hurd, Jr., C.I.S.). Camino, 3 mi. S., VI-26-48 (R. A. Smith, C.I.S.); VI-28-48 (L. W. Quate, N.U.). Grizzly Flats, X-29-49 (H. A. Hunt, U.C.D.). Strawberry, VII-28-50, VIII-5-50, VII-4-53 (M. E. Gardner, U.C.D.). Pollock Pines, V-3-52 (E. I. Schlinger, U.C.D.); VI-22-48 (R. A. Smith, C.I.S.). Echo Portals, 7,300', VII-11-46, VII-9-46 (P. H. Arnaud, P.A.). Echo Lake, 7,400', VI-5-26 (F. H. Wymore, U.C.D.); VII-21-48 (P. D. Hurd, Jr., C.I.S.). Pacific, VIII-9-40 (R. H. Beamer, K.U.). Pyramid Ranger Station, VII-2-48 (L. W. Quate, N.U.). Chile Bar, VII-5-48 (L. W. Quate, N.U.). China Flat, VI-28-48, VII-2-48 (D. Carter, C.I.S.); VI-28-48 (S. A. Sher, C.I.S.). Snowline Camp, VI-19-48, VI-20-48 (P. D. Hurd, Jr., C.I.S.); VI-28-48 (L. W. Quate, N.U.). Fred's Place, VII-2-48 (L. W. Quate, N.U.).

Fresno Co.: Coalinga, 12 mi. W., IV-8-51 (P. D. Hurd, Jr., C.I.S.). Coalinga, III-19-31 (E. P. Van Duzee, C.A.S.). Panoche Creek, III-24-51 (J. C. Hall, U.C.D.).

Glenn Co.: Artois, VII-16-52, VII-11-52 (H. L. Hansen, C.I.S.); VII-15-52 (E. G. Linsley, R. F. Smith, C.I.S.).

Humboldt Co.: Ft. Seward, V-30-35 (E. W. Baker, C.I.S.).

Imperial Co.: Potholes, VII-2-22 (E. P. Van Duzee, C.A.S.). Palo Verde, 3 mi. S., IV-7-49 (P. D. Hurd, Jr., C.I.S.).

Inyo Co.: Lone Pine, VI-13-37 (E. C. Van Dyke, C.A.S.); VII-28-40 (D. E. Hardy, K.U.); V-23-37 (N. W. Frazier, C.I.S.); VI-14-37 (C.I.S.); V-17-37 (L. R. Gillogly, C.I.S.). Furnace Creek, Death Valley, III-15-47 (A. T. McClay, U.C.D.); III-31-51, IV-1-51 (P. D. Hurd, Jr., C.I.S.); III-31-51 (E. G. Linsley, C.I.S.). Sheep Creek Spring, Death Valley, V-31-53 (U.C.L.A.). Deep Springs Lake, VII-16-53 (J. W. MacSwain, C.I.S.).

Surprise Canyon, Panamint Mts., IV-28-53, IV-29-53 (P. D. Hurd, Jr., C.I.S.). Westgard Pass, VI-3-37 (L. R. Gillogly, C.I.S.). Independence, VI-11-37 (C.I.S.). Argus Mts., V-22-37 (C.I.S.).

Kern Co.: Taft, III-29-53 (J. W. Warren, U.C.L.A.). Glennville, IV-22-50 (R. M. Bohart, U.C.D.). Frazier Park, VII-17-46 (F. A. Ehrenford, C.I.S.). Devil's Den, IV-8-51 (P. D. Hurd, Jr., C.I.S.).

Lake Co.: Clear Lake Oaks, IV-19-54 (E. I. Schlinger, U.C.D.).

Lassen Co.: Bridge Creek Camp, VII-9-49 (H. A. Hunt, U.C.D.); VII-9-49 (A. S. Deal, U.C.D.); VII-9-49 (E. G. Linsley, C.I.S.); VII-9-49 (W. H. Wade, C.I.S.). Hallelujah Jct., VII-4-49 (A. S. Deal, U.C.D.). Blue Lake, 2 mi. N.W., VII-19-47 (T. F. Leigh, C.I.S.). Blue Lake, VII-19-47, VII-20-47 (C. A. Hanson, C.I.S.). Summit Camp, VII-9-49 (J. W. MacSwain, C.I.S.); VII-9-49 (E. G. Linsley, C.I.S.); VII-9-49 (C. I. Smith, C.I.S.). Susan River Camp, VII-10-49 (E. L. Atkinson, C.I.S.). Viewland, 4 mi. N., VI-20-54 (M. T. James, W.S.C.).

Los Angeles Co.: Claremont, V-10-27 (C.A.S.). Westwood Hills, V-13-36 (J. Hopper, U.C.L.A.); I-1952 (U.C.L.A.). Tanbark Flat, VI-20-50, VII-3-50 (D. C. Blodset, W. A. McLeod, U.C.L.A.); VI-23-50 (W. O. Marshall, U.C.D.); VII-12-52 (D. E. Barcus, U.C.D.); VI-30-50 (K. G. Whitesell, U.C.D.); VIII-30-50 (E. B. Goodwin, U.C.D.); VII-4-50 (J. D. Paschke, C.I.S.); VII-5-52 (Joan Linsley, C.I.S.). Elizabeth Lake Canyon, III-28-53, (U.C.L.A.). Crystal Lake, VI-29-50 (W. A. McDonald, U.C.L.A.); VI-29-50 (K. G. Whitesell, U.C.D.); VII-9-52 (A. A. Grigarick, U.C.D.); VII-9-52 (D. E. Barcus, U.C.D.). Camp Baldy, VII-11-50, VI-26-50 (W. A. McDonald, U.C.L.A.); VI-26-50 (J. C. Hall, U.C.D.); VI-26-50 (W. O. Marshall, U.C.D.); VII-11-50 (H. F. Robinson, U.C.D.); VI-26-50 (H. N. Yokoyama, U.C.D.); VI-26-50 (H. L. Hansen, C.I.S.). Big Dalton Dam, VII-13-50 (T. R. Haig, U.C.D.). Crater Camp, III-21-53 (A. Ebeling, U.C.L.A.); VII-12-50 (T. R. Haig, C.I.S.). Pine Canyon, VI-13-53 (W. A. McDonald, U.C.L.A.). Middle Ranch, Santa Catalina Island, III-26-38 (T. D. A. Cockerell, C.A.S.). Pebble Beach, Santa Catalina Island, IV-2-38 (T. D. A. Cockerell, C.A.S.). San Clemente Island, VI-19-38 (T. D. A. Cockerell, C.A.S.). Pomona, VII-20-31 (C.I.S.).

Madera Co.: Agnew Meadows, VIII-4-52 (W. A. McDonald, U.C.L.A.). San Joaquin Expt. Sta., near O'Neals, II-22-53, IV-18-53 (P. D. Hurd, Jr., C.I.S.).

Marin Co.: Novato, IX-16-51 (E. L. Kessel, C.A.S.). Black Point, II-11-50 (A. A. Hubert,

K.U.). Stinson Beach, II-12-50 (A. A. Hubert, K.U.). "Marin Co., elev. 1700 ft.", V-23-38 (N. A. Olson, C.I.S.).

Mariposa Co.: El Portal, V-18-48 (K. D. Snyder, C.I.S.); V-18-38 (N. A. Olson, C.I.S.). Yosemite, 3,880'-4,000', V-12-31, V-15-31, V-17-21, VI-1931, V-30-31, V-27-31, V-28-31 (C.I.S.). Miami Ranger Station, V-18-42 (A. J. Walz, C.I.S.); V-18-42 (E. G. Linsley, C.I.S.).

Mendocino Co.: No locality, VI-24-15 (C.I.S.). Albion, VII-7-54 (M. T. James, W.S.C.).

Merced Co.: Pacheco Pass, VI-6-51 (W. H. Lange, U.C.D.). Dos Palos, VIII-24-47, VII-17-47, VIII-5-47 (V. M. Stern, C.I.S.).

Modoc Co.: Alturas, X-12-52 (J. C. Hall, U.C.D.).

Mono Co.: Mono Lake, VII-31-40 (D. E. Hardy, K.U.). Coleville, VII-28-47 (A. C. Michener, K.U.). Blanco's Corral, White Mt., 10,000', VI-30-53 (J. W. MacSwain, C.I.S.). Mammoth Lake, VII-29-40 (E. E. Kenaga, K.U.).

Monterey Co.: Pfeiffer Big Sur State Park, VI-17-49, VI-20-49 (P. H. Arnaud, P.A.). Big Sur, IX-6-49 (U.C.L.A.). Jamesburg, VIII-11-38 (D. W. Craik, K.U.).

Napa Co.: Monticello, IV-8-50 (C. Fitch, U.C.D.). Samuel Spring, V-30-53 (E. I. Schlinger, U.C.D.).

Nevada Co.: Truckee, VIII-20-38 (Jean Russell, K.U.). Hobart Mills, 7 mi. N., VIII-26-48 (R. F. Smith, C.I.S.); VIII-26-48 (E. G. Linsley, C.I.S.).

Orange Co.: San Jacinto Mts., IV-26-53 (A. Fukushima, U.C.L.A.).

Placer Co.: Baxters, V-20-52 (E. I. Schlinger, U.C.D.). Colfax, V-20-52 (R. M. Bohart, U.C.D.). Auburn, IV-12-53 (D. E. Barcus, U.C.D.). Lake Tahoe, VIII-11-40 (L. J. Lipovsky, K.U.). Towle, VIII-20-38 (D. W. Craik, K.U.).

Plumas Co.: Quincy, 4 mi. W., VII-2-49 (L. W. Quate, U.C.L.A.); VI-25-49 (A. S. Deal, U.C.D.); VII-13-49 (R. L. Sisson, C.I.S.); VII-2-49 (L. W. Quate, C.I.S.); VI-22-49, VI-20-49, VI-19-49 (P. D. Hurd, Jr., C.I.S.); VI-20-49, VI-23-49 (J. W. MacSwain, C.I.S.). Graeagle, VI-18-49 (E. I. Schlinger, U.C.D.). Buck's Lake, VII-1-49, VI-23-49 (J. W. MacSwain, C.I.S.); VI-23-49 (W. H. Wade, C.I.S.); VI-23-49 (A. S. Deal, U.C.D.). Meadow Valley, 4,000'-5,000', VII-6-24 (E. C. Van Dyke, C.A.S.). Onion Flat, VII-7-49 (F. Morishita, C.I.S.). Almanor Dam, VII-17-47 (T. F. Leigh, C.I.S.). Keddie, VI-22-41 (F. H. Rindge, C.I.S.).

Riverside Co.: Riverside, VII-27-49, bait trap (L. W. Quate, U.C.L.A.). Hemet, V-11-52, (U.C.L.A.). Hemet Reservoir, VI-13-39 (B. Brookman, C.I.S.). Indio, V-11-52 (U.C.L.A.). The Gavilan, V-17-51 (E. I. Schlinger, U.C.D.); V-

21-41 (J. Wilcox, P.A.). Palm Canyon, II-10-52 (U.C.L.A.). Dead Indian Creek, VI-18-52 (U.C.L.A.). Idylwild, VII-10-52 (R. X. Schick, U.C.L.A.); VI-2-39 (A. N. Dunlop, C.I.S.); V-24-40 (F. H. Rindge, C.I.S.); VI-19-51 (R. C. Bechtel, U.C.D.). Santa Rosa Pass, IV-24-51 (E. I. Schlinger, U.C.D.). Andreas Canyon, IV-21-51 (E. I. Schlinger, U.C.D.). Marion Mts. Camp, VII-1-52 (U.C.D.). Magnesia Canyon, VII-2-52 (H. L. Mathis, U.C.D.). San Jacinto Mts., VII-21-29 (P. W. Oman, K.U.). San Jacinto Mt. Tr., VII-1-52 (H. L. Mathis, U.C.D.). Chino Canyon, Palm Springs, XII-23-50, XII-25-50 (P. H. Arnaud, P.A.). Palm Springs, IV-21-51 (E. I. Schlinger, U.C.D.); XII-28-52, XII-29-52, I-17-53, I-19-53 (P. H. Arnaud, P.A.). Temecula, 6 mi. E., IV-11-50 (L. W. Quate, C.I.S.). Herkey Creek, VI-12-39, VI-13-39 (A. N. Dunlop, C.I.S.). Pine Cove, San Jacinto Mts., VI-3-39 (E. S. Ross, C.I.S.). Cottonwood Springs, IV-26-49 (J. E. Gillaspy, C.I.S.).

Sacramento Co.: Sacramento, VI-12-26 (F. H. Wymore, U.C.D.). Elk Grove, IX-24-49 (H. A. Hunt, U.C.D.).

San Benito Co.: Pinnacles National Monument, IV-24-48 (P. D. Hurd, Jr., C.I.S.). Bitterwater, 15 mi. SE., IV-8-51 (P. D. Hurd, Jr., C.I.S.). Panoche, IV-30-22 (A. J. Basinger, C.A.S.).

San Bernardino Co.: Manix, 22 mi. N., IV-26-53 (P. D. Hurd, Jr., C.I.S.). Needles, IX-27-21 (J. A. Kusche, C.A.S.). Mojave Desert, V-1937 (R. H. Smith, U.C.L.A.). Twentynine Palms, III-29-52 (E. I. Schlinger, U.C.D.). Snow Crest Camp, VII-17-52 (A. T. McClay, U.C.D.). Mountain Home, IX-12-53 (J. C. Hall, U.C.D.). Mojave Deep Creek, IV-26-36 (P. M. Opitz, U.C.L.A.).

San Diego Co.: San Diego, VI-4-51 (John B. Plant, U.S.A.C.). Lake Henshaw, IV-10-50 (W. F. Barr, U.I.). Cuyamaca Lake, VII-6-29 (P. W. Oman, R. H. Beamer, K.U.). San Ysabel, IV-10-50 (L. W. Quate, C.I.S.). Yaqui Well, IV-25-49 (L. W. Quate, C.I.S.). Borego, IV-24-49 (J. E. Gillaspy, C.I.S.).

San Francisco Co.: San Francisco Beach, II-15-51 (E. I. Schlinger, R. C. Bechtel, U.C.D.).

San Joaquin Co.: Tracy, IV-6-33 (A. E. Michelbacher, C.I.S.); VI-7-49, IX-23-46 (R. F. Smith, C.I.S.). Vernalis, VI-22-49 (T. F. Leigh, C.I.S.).

San Mateo Co.: Redwood City, IV-19-06 (J. M. Aldrich, U.I.); X-6-41, V-11-47 (P. H. Arnaud, P.A.).

Santa Barbara Co.: San Miguel Island, IV-4-38 (T. D. A. Cockerell, C.A.S.).

Santa Clara Co.: Los Gatos, V-VI-1933 (J. A. Kusche, C.A.S.). Palo Alto, Woodside, IV-1906 (J. M. Aldrich, U.I.). Palo Alto, XI-6-94 (K.U.). Stevens Creek, IV-21-50 (D. J. Gould, N.U.).

Univ. Calif. Ranch, San Jose, IV-11-43 (P. H. Arnaud, P.A.). San Jose, V-25-42 (C. Reed, P.A.); V-25-42 (H. Madsen, P.A.). Alum Rock Park, V-25-50 (E. G. Linsley, C.I.S.); V-25-50 (P. D. Hurd, Jr., C.I.S.). Milpitas, V-12-41 (K. Frick, C.I.S.).

Santa Cruz Co.: Soquel, VI-22-24-50 (M. T. James, W.S.C.). Boulder Creek, VI-17-52 (R. H. and L. D. Beamer, W. LaBerge, A. Wolf, C. Liang, C. Weiner, K.U.). Big Basin, VI-30-46 (P. H. Arnaud, P.A.).

Shasta Co.: McArthur, X-12-52 (J. C. Hall, U.C.D.). Burney Springs, VI-24-47 (T. F. Leigh, C.I.S.). Hat Creek, 3 mi. N., VI-1-41 (C. W. Anderson, C.I.S.). Pot Springs, VI-24-47 (T. F. Leigh, C.I.S.). Viola, 2 mi. W., V-27-41 (P. D. Hurd, Jr., C.I.S.). Cassel, 5 mi. N., VII-15-47 (C. A. Hanson, C.I.S.). Shingletown, V-24-41 (P. D. Hurd, Jr., C.I.S.).

Sierra Co.: Weber Lake, VII-21-51 (E. I. Schlinger, U.C.D.); VIII-27-48 (J. W. MacSwain, C.I.S.). Gold Lake, VII-10-34 (L. S. Rose, C.A.S.).

Siskiyou Co.: Nr. Callahans, VI-13-34 (E. C. Van Dyke, C.A.S.).

Solano Co.: Vacaville, V-5-53 (E. Mezger, U.C.D.); VI-2-32 (H. Harrison, C.I.S.).

Sonoma Co.: Mesa Grande, VII-11-01 (F. E. Blaisdell, C.A.S.).

Stanislaus Co.: Adobe Creek, X-2-47 (R. E. Beer, C.I.S.).

Sutter Co.: Sutter Buttes, III-2-53 (D. E. Barcus, U.C.D.).

Trinity Co.: Eagle Creek, VI-1-51 (A. T. McClay, U.C.D.). Carrville, V-15-34 (G. E. Bohart, C.A.S.). Trinity River Camp, VII-16-53 (A. T. McClay, U.C.D.); VII-17-53 (M. E. McClay, U.C.D.).

Tulare Co.: Potwisha, Sequoia National Park, VII-10-29 (E. C. Van Dyke, C.A.S.). Woodlake, III-14-47, III-22-47, IV-7-44, IV-15-47 (N. W. Frazier, C.I.S.).

Tuolumne Co.: Strawberry, VI-19-51, VI-22-51 (E. L. Silver, U.C.L.A.); VI-21-51 (E. G. Linsley, J. W. MacSwain, C.I.S.); VI-23-51 (C. A. Downing, C.I.S.); VI-20-51 (R. W. Morgan, U.C.D.); VII-1-51 (S. M. Kappos, U.C.D.); VI-20-51 (A. T. McClay, U.C.D.). Dardanelles, VI-26-51 (E. L. Silver, U.C.L.A.). Pinecrest, VII-26-47, VII-4-47, VII-29-47, VII-15-47, VII-17-48, VIII-5-47, VIII-15-47 (P. H. Arnaud, P.A.). Sonora Pass, 9,264', VI-27-51 (T. R. Haig, U.C.D.). Cow Creek, VI-21-51 (T. R. Haig, U.C.D.). Tuolumne Meadows, VII-16-49 (L. L. Jensen, C.I.S.). Bumblebee, VII-8-51 (T. R. Haig, U.C.D.); VII-1-51 (A. T. McClay, U.C.D.); VI-28-51 (T. R. Haig, C.I.S.).

Ventura Co.: 34 mi. N. Ventura, VI-21-52 (R. H. and L. D. Beamer, W. LaBerge, A. Wolf, C. Liang, C. Weiner, K.U.).

Yolo Co.: Elkhorn Ferry, V-10-51 (E. I. Schlinger, U.C.D.). Putah Canyon, IV-8-51 (M. F. McClay, U.C.D.); IV-8-51 (A. T. McClay, U.C.D.); III-20-51 (R. M. Bohart, U.C.D.); III-15-53, III-26-53, III-27-53 (D. E. Barcus, U.C.D.); V-19-51 (J. C. Hall, U.C.D.). Broderick, V-25-51 (J. C. Hall, U.C.D.). Davis, VI-15-36 (A. R. Mead, C.I.S.); III-1950, IV-1950, IX-1949, VII-27-51, X-24-50 (J. C. Hall, U.C.D.); XI-26-35, X-1932, X-1942 (U.C.D.); III-4-53, fish meal bait (E. C. Carlson, U.C.D.); III-4-53, fermented-syrup bait, (E. C. Carlson, U.C.D.); IV-29-51, V-2-51, V-29-51, V-13-51, V-8-51, V-27-51, V-3-51 (A. T. McClay, U.C.D.); IV-27-51, V-10-52 (E. I. Schlinger, U.C.D.); V-7-49 (H. A. Hunt, U.C.D.); VI-16-32 (F. H. Wymore, U.C.D.).

#### Discussion:

This is the black blowfly, an occasional producer of human myiasis, and in some localities a common facultative parasite in wounds of domestic animals. It is an important sheep wool maggot in parts of the United States; in California, according to information furnished me by Dr. J. R. Douglas, it ranks third in importance in this role, being placed below *Callitroga macellaria* and *Phaenicia sericata*.

Plumas Co.: Buck's Lake, VI-24-49 (P. D. Hurd, Jr., C.I.S.).

San Bernardino Co.: Yucaipa, III-20-33 (A. J. Basinger, C.A.S.).

Shasta Co.: Hat Lake, Lassen National Park, VI-3-41 (C. W. Anderson, C.I.S.); VI-3-41 (C. D. Michener, C.I.S.). Lassen Peak, 7,500', VII-18-49 (D. Cox, C.I.S.). Mt. Lassen, 10,000', VI-15-49 (C.A.S.). Lassen Park Trail, VII-14-47 (T. F. Leigh, C.I.S.). Manzanita Lake, Lassen National Park, VI-10-41 (P. D. Hurd, Jr., C.I.S.).

Trinity Co.: Scott Mt., 5,350', VI-4-51 (A. T. McClay, U.C.D.).

Tuolumne Co.: Mt. Conness, Yosemite National Park, VII-23-26 (W. B. Herms, C.I.S.). Tioga Pass, Yosemite National Park, VII-29-36 (E. C. Hendee, C.I.S.). Sonora Pass, 10,000'-11,000', VII-11-51 (R. W. Morgan, U.C.D.); VI-28-51 (A. T. McClay, U.C.D.); VI-27-51 (T. R. Haig, U.C.D.).

#### Discussion:

This is a very abundant species in Arctic regions of North America, where it has been recorded as a serious contaminator and as a producer of myiasis in reindeer, sheep, and cattle. In California it occurs only in high altitudes or, possibly, as a winter or early spring form at lower elevations. It probably has little medical or veterinary significance in the state.

## Genus *Protophormia* Townsend

*Protophormia terraenovae* (Robineau-Desvoidy)

*Phormia terraenovae* Robineau-Desvoidy, 1830, *Essai sur les Myodaires*, 2:467. Type, North America.

#### Geographical distribution:

Northern and mountainous areas of Europe, north to Spitzbergen; Siberia; Greenland, Ellesmere Island, and Alaska south to northern Georgia, Arizona, and California.

#### California records:

Alameda Co.: Albany, IV-29-21 (C.I.S.).

Alpine Co.: Hope Valley, VII-9-48 (J. W. Mac Swain, C.I.S.); VII-9-48 (D. Carter, C.I.S.).

Eldorado Co.: Strawberry, VII-4-53 (M. E. Gardner, U.C.D.).

Fresno Co.: Lone Indian Lake, VIII-20-49 (E. I. Schlinger, U.C.D.).

Lassen Co.: Lassen National Park, V-30-24 (F. H. Wymore, U.C.D.). Summit Camp, VII-9-49 (P. D. Hurd, Jr., C.I.S.); same data (E. G. Linsley, C.I.S.).

Mono Co.: Benton's Crossing, VII-10-51 (U.C.L.A.). White Mt., Blanco's Corral, 10,000', VI-23-53 (U.C.L.A.).

Nevada Co.: Truckee, VI-25-43 (P. H. Arnaud, P.A.).

## Genus *Protocalliphora* Hough

Curtis W. Sabrosky, who at present is revising the American species of this genus, is of the opinion that the American and European species are congeneric and that, consequently, *Apaulina* Hall, proposed for the New World forms, has no validity. His arguments will be presented in a forthcoming paper. I am accepting his decision for the present study.

Members of this genus, in the larval stage, are blood-sucking parasites of nesting birds. The blood-sucking larval habit is unique among the North American Calliphoridae, but is shared by the well-known Congo floor maggot of Africa, which includes man among its hosts.

*Protocalliphora aenea* Shannon and Dobroscky

*Protocalliphora splendida* var. *aenea* Shannon and Dobroscky, 1924, *Jour. Acad. Sci. Wash.* 14:251-252. Type ♀, Franconia, N. H.

#### Geographical distribution:

According to Hall, "widespread from central California to British Columbia and eastward to New England, but not abundant anywhere."

#### California records:

None seen.

*Protocalliphora avium* Shannon and Dobroscky

*Protocalliphora avium* Shannon and Dobroscky, 1924, Jour. Acad. Sci. Wash., 14:250. Type ♂, Ithaca, New York.

## Geographical distribution:

Southern Canada and northern United States, southward to Arizona and California.

## California records:

Eldorado Co.: Strawberry, VI-26-53 (P. H. Arnaud, P.A.).

Lassen Co.: Summit Lake, VI-28-49, VII-9-49 (P. D. Hurd, Jr., C.I.S.).

Los Angeles Co.: Pomona, VII-7-31 (C.I.S.). Big Dalton Dam, VII-19-52 (S. Miyagawa, U.C.D.). Tanbark Flat, VII-5-52 (H. L. Mathis, U.C.D.). Mandeville Canyon, Santa Monica Mts., VII-22-52 (U.C.L.A.). No locality, VI-10-52 (R. Laxineta, U.C.L.A.).

Madera Co.: O'Neals, IV-26-47, reared from nest of great horned owl (A. T. McClay, U.C.D.). Agnew Meadow, VIII-8-52 (U.C.L.A.).

Mariposa Co.: Yosemite, 3,800'-4,000', VI-27-36 (C.I.S.).

Riverside Co.: The Gavilan, V-17-51 (E. I. Schlinger, U.C.D.).

Tuolumne Co.: Tioga Pass, VII-3-33 (R. M. and G. E. Bohart, C.A.S.).

*Protocalliphora basingeri* (Hall)

*Apaulina basingeri* Hall, 1948, The Blowflies of North America, p. 190. Type ♂, San Diego, California.

## Geographical distribution:

Southern California.

## California records:

None seen, other than type series.

## Discussion:

This species is probably a synonym of *avium*; if the two are distinct, the records of *avium* from Riverside, and probably from Los Angeles County, should be referred here.

*Protocalliphora cuprina* (Hall)

*Apaulina cuprina* Hall, 1948, The Blowflies of North America, p. 191. Type ♂, Riverside, California.

## Geographical distribution:

Montana, Idaho, Washington, Oregon, California.

## California records:

San Bernardino Co.: Camp Baldy, VII-7-52 (R. L. Anderson, U.C.D.).

*Protocalliphora hesperia* Shannon and Dobroscky

*Protocalliphora hesperia* Shannon and Dobroscky, 1924, Jour. Acad. Sci. Wash., 14:251. Type ♂, Ainsworth, British Columbia.

## Geographical distribution:

Western Canada southward to California.

## California records:

Los Angeles Co.: Tanbark Flat, VII-4-50 (W. O. Marshall, U.C.D.); VII-7-50 (P. D. Hurd, Jr., C.I.S.).

Tulare Co.: Farmerville, V-11-39, swallow's nest (T. G. H. Aitken, C.A.S.).

Ventura Co.: Santa Paula, VII-23-? (D. Burk, C.I.S.).

*Protocalliphora birundo* Shannon and Dobroscky

*Protocalliphora splendida* var. *birundo* Shannon and Dobroscky, 1924, Jour. Acad. Sci. Wash., 14:251. Type ♂, Stratford, Wash.

## Geographical distribution:

British Columbia, Washington, California.

## California records:

Kern Co.: Kern Canyon, VI-29-46 (C.I.S.).

Los Angeles Co.: Tanbark Flat, VI-22-50, (H. F. Robinson, U.C.D.); referred to this species, with a query.

*Protocalliphora metallica* (Townsend)

*Phormia metallica* (Townsend), 1919, Ann. Ent. Soc. Amer. 12:376. Type ♀, Fredonia, New Hampshire.

## Geographical distribution:

Northeastern United States, southward to Virginia and westward to California; rare in the West.

## California records:

Mariposa Co.: Sentinel Dome, Yosemite National Park, 8,117', VI-22-31 (C.I.S.).

Genus *Pollenia* Robineau-Desvoidy*Pollenia rufa* (Fabricius)

*Musca rufa* Fabricius, 1794, Ent. Syst., 4:314. Type, Germany.

## Geographical distribution:

Europe, North Africa, Nova Scotia and British Columbia to Florida and California.

## California records:

Alameda Co.: Oakland, V-21-37 (E. S. Ross, C.A.S.); VII-7-49, bait trap (L. W. Quate, U.C.L.A.).

Albany, IV-25-50 (E. I. Schlinger, U.C.D.). Russell City, VII-8-49, bait trap (L. W. Quate, U.C.L.A.). Hills back of Oakland, X-1-48 (S. A. Sher, C.I.S.). Berkeley, IV-2-54, III-30-48, IV-20-41, (P. D. Hurd, Jr., C.I.S.); III-13-47, IV-8-47 (C. A. Hanson, C.I.S.); II-11-15 (E. P. Van Duzee C.I.S.); VIII-15-47 (A. Bartel, C.I.S.); XI-15-51, XII-11-51 (J. W. Hinerman, C.I.S.); XI-1925, IV-1-21, X-1925 (C.I.S.). Pleasanton, IX-23-32, IX-27-32 (A. E. Michelbacher, C.I.S.). Melrose, VI-9-15 (E. O. Essig, C.I.S.); VI-9-15 (C.I.S.). Niles, IX-2-32 (A. E. Michelbacher, C.I.S.).

Contra Costa Co.: Richmond, XI-7-48, X-12-48 (S. A. Sher, C.I.S.). Brentwood, XI-7-48 (S. A. Sher, C.I.S.); VI-26-40 (C.I.S.).

Eldorado Co.: Camino, 3 mi. S., VI-23-48 (P. D. Hurd, Jr., C.I.S.).

Humboldt Co.: Eureka, VII-28-52 (L. A. Ruud, C.I.S.).

Kern Co.: Democrat Springs, X-16-51 (E. G. Linsley, C.I.S.).

Los Angeles Co.: Los Angeles (U.C.L.A.). U.C.L.A., IV-10-33 (U.C.L.A.). Westwood Hills, V-10-51 (U.C.L.A.). Santa Monica Mts., Stone Canyon, (U.C.L.A.). Santa Monica Mts. (U.C.L.A.). San Gabriel Canyon, V-24-50 (U.C.L.A.). Pacific Palisades, VI-24-52, VI-1-52 (W. A. McDonald, U.C.L.A.); V-14-52, X-19-51 (U.C.L.A.).

Marin Co.: Fairfax, VI-15-53 (H. L. Mathis, U.C.D.). Woodacre, III-31-49 (P. D. Hurd, Jr., C.I.S.). Phoenix Lake, VIII-21-48 (A. Bartel, C.I.S.).

Mendocino Co.: Ryan Creek, III-26-49 (P. D. Hurd, Jr., C.I.S.). Albion, VII-7-54 (M. T. and H. B. James, W.S.C.).

Modoc Co.: Mill Valley, V-16-26 (E. P. Van Duzee, C.A.S.).

Placer Co.: Auburn, VIII-12-16 (L. Bruner, N.U.).

Plumas Co.: Quincy, 4 mi. W., VI-25-49 (W. H. Wade, C.I.S.); VII-2-49 (U.C.L.A.); VII-6-49 (A. S. Deal, U.C.D.); VI-19-49, VII-3-49 (E. I. Schlinger, U.C.D.); VI-26-49, VI-22-49, VI-25-49 (P. D. Hurd, C.I.S.); VII-2-49, VI-30-49 (J. W. MacSwain, C.I.S.); VII-2-49 (L. W. Quate, C.I.S.); VII-7-49 (R. L. Sisson, C.I.S.); VII-3-49 (F. Moroshita, C.I.S.); VII-19-49 (J. N. Simons, C.I.S.); VII-14-49 (D. Cox, C.I.S.); VI-29-49, VII-6-49 (W. H. Wade, C.I.S.).

Riverside Co.: Indian Wells, IV-24-25-1953 (R. Durbin, U.C.L.A.).

Sacramento Co.: Sacramento, II-6-52, IV-28-50 (H. F. Robinson, U.C.D.).

San Diego Co.: Balboa Park, San Diego, IV-27-51 (J. I. Madigan, U.C.D.).

San Francisco Co.: San Francisco Beach, V-16-51 (E. I. Schlinger, U.C.D.). San Francisco, XI-1925 (C.I.S.).

San Joaquin Co.: Lodi, XI-26-50 (S. Kappos, U.C.D.).

San Mateo Co.: Half Moon Bay, II-23-51 (E. I. Schlinger, U.C.D.); XI-5-50, sand dunes (P. H. Arnaud, P.A.). Redwood City, III-27-48, V-2-48, VI-15-46, VI-27-46, VII-4-46, II-27-49, VI-4-46, III-6-48, III-14-48, III-17-48, III-21-48, III-27-48, V-11-47, VI-12-49, VI-15-46, VI-27-46, IX-9-48, XI-11-43 (P. H. Arnaud, P.A.). Memorial Park, VII-15-51 (P. H. Arnaud, P.A.). Portola State Park, V-7-50 (P. H. Arnaud, P.A.). Corte de Madera Cr., nr. Portola, V-23-49 (P. H. Arnaud, P.A.).

Santa Barbara Co.: Carpinteria, VII-1-54 (M. T. and H. B. James, W.S.C.).

Santa Clara Co.: San Jose, III-16-40, VI-20-41 (Harold Madsen); XI-22-43, X-14-43 (P. H. Arnaud, P.A.). Stanford University, V-10-05 (U.I.); V-21-53, V-18-49, I-28-52, VII-1-49, X-6-52, X-20-49 (P. H. Arnaud, P.A.). Alviso, VI-5-22 (C.I.S.).

Santa Cruz Co.: Soquel, VI-18-20-1950 (M. T. James, W.S.C.).

Shasta Co.: Viola, VI-27-47 (T. F. Leigh, C.I.S.). Shingletown, VII-2-41 (E. G. Linsley, C.I.S.).

Solano Co.: Vacaville, IX-19-52 (E. Mezger, U.C.D.).

Sonoma Co.: Triniti, III-7-37 (N. W. Frazier, C.I.S.).

Trinity Co.: Eagle Creek, V-25-49 (A. T. McClay, U.C.D.). Trinity River Camp, VI-3-51 (A. T. McClay, U.C.D.); VI-3-51 (M. F. McClay, U.C.D.).

Tuolumne Co.: Strawberry, VI-21-51 (J. W. MacSwain, C.I.S.).

Ventura Co.: Ventura, V-10-53 (U.C.L.A.).

Yolo Co.: Davis, V-13-51, VI-1-52, V-19-51 (A. T. McClay, U.C.D.). Elkhorn Ferry, V-13-51 (R. C. Bechtel, U.C.D.).

#### Discussion:

Though this species will at times enter houses in considerable numbers, it is not a health hazard to man. It has been recorded in enteric myiasis, but the record needs verification. The larvae are internal parasites of earthworms. The adults are "cluster flies," and enter houses for hibernation purposes; in the field, they may be found among shrubby vegetation, and, aside from their taking refuge in buildings to escape the effects of the elements, they are essentially silvan in their habits.

#### Genus *Melanodexia* Williston

*Melanodexiopsis* Hall, 1948, The Blowflies of North America, p. 356. New synonymy.

In my opinion, *Melanodexiopsis tristina* Hall and *Melanodexia tristis* Williston, the types of their respective genera, are congeneric; consequently, *Melanodexiopsis* is a synonym of *Melanodexia*. *Melanodexiopsis* was founded on the basis of a less strongly developed facial carina and a more distinctly pollinose and marmorate abdomen. These characters are too variable for generic separation; indeed, the variation in the form of the facial carina is sometimes so great as to make it a difficult character on which to separate species. I fail to find other substantiating characters except that in *Melanodexia satanica* and *M. californica* the male forceps complex is much broader than in the other species and the outer forceps end bluntly; however, in the two genotypes the forceps complex is narrow and the genitalia are practically indistinguishable.

This genus is in need of revision based on adequate material, including good series from various localities within its range. Hall had less than forty specimens, representing eight supposed species, five of which were known from only one sex. Hall's treatment is further complicated by a misstatement in his key (p. 341) in which the second alternative of couplet 2 should have read "third" instead of "second" antennal segment (cf. p. 356, fourth line from the bottom, for the correct statement), and by another misstatement as to the sex of the type of *pacifica*, which is a female.

Considerable care has to be used in selecting discriminating characters based on chaetotaxy. The postsutural acrosticals are too variable to be used for more than accessory characters. The middle tibia commonly lacks ventrals and the hind tibia, anteroventrals, in *tristis* and *tristina* males; but occasionally males of these species may have these bristles feebly to well developed, and the females regularly have them.

#### *Melanodexia tristis* Williston

*Melanodexia tristis* Williston, 1893, North Amer. Fauna, 7:257. Type ♂, Death Valley, California.

##### Geographical distribution:

Southern California.

##### California records:

Los Angeles Co.: Big Dalton Dam, 1 ♂, VI-25-50 (J. C. Hall, H.J.R.); 1 ♂, VI-25-50 (J. C. Hall, U.C.D.); 1 ♀, VI-30-50 (H. N. Yokoyama, U.C.D.); 1 ♀, VI-25-50 (J. W. MacSwain, C.I.S.); 1 ♂, VI-25-50 (J. D. Paschke, C.I.S.); 1 ♀, VII-

12-50 (T. R. Haig, C.I.S.). Tanbark Flat, 1 ♀, VII-5-50 (W. A. MacDonald, U.C.L.A.); 1 ♀, 1 ♂, VII-5-50 (J. F. Flowers, U.C.L.A.); 1 ♀, VI-27-50, 1 ♀, VII-8-50, 1 ♂, VII-1-50, 1 ♂, VII-10-50 (F. X. Williams, C.A.S.); 1 ♂, VII-3-50 (C.A.S.); 1 ♀, VI-21-50, 1 ♀, VI-22-50 (M. H. Graham, C.I.S.); 1 ♂, VI-27-50 (P. D. Hurd, Jr., C.I.S.); 1 ♂, VI-27-52, 1 ♂, VII-12-52 (S. Miyagawa, U.C.D.); 1 ♂, VI-24-52, 1 ♂, VI-26-52 (A. A. Grigarick, U.C.D.); 1 ♂, VI-19-50 (H. F. Robinson, U.C.D.); 1 ♂, VII-11-52 (R. M. Bohart, U.C.D.); 3 ♀, VI-19-50, VI-24-50 (A. T. McClay, U.C.D.); 1 ♀, VI-23-52 (R. L. Anderson, U.C.D.); 1 ♂, flowers *Adenostoma*, VI-22-50 (M. Stebbins, U.C.D.).

Plumas Co.: Lake Almanor, east end, 1 ♀, VII-8-49 (A. T. McClay, U.C.D.).

##### Discussion:

Notes on the type, furnished me by Curtis W. Sabrosky, indicate that this species cannot be a synonym of *M. glabricula*, as Hall thought. Williston's description and Sabrosky's notes conform well with what I am interpreting as the species.

#### *Melanodexia satanica* Shannon

*Melanodexia satanica* Shannon, 1926, Proc. Ent. Soc. Wash. 28:138. Type ♂, Los Gatos Canyon Divide to mouth of Mount Diablo Range, Fresno Co., California.

##### Geographical distribution:

California.

##### California records:

Alameda Co.: Berkeley, 1 ♂, VI-4-33 (M. Cazier, H.J.R.). Oakland, 1 ♀, VI-7-08 (E. P. Van Duzee, C.A.S.); 1 ♂, V-1936 (E. S. Ross, C.A.S.).

Calaveras Co.: Mokelumne Hill, 1 ♀, V-20-30 (E. P. Van Duzee, C.A.S.).

Eldorado Co.: Chile Bar, 1 ♀, VII-5-48 (P. D. Hurd, Jr., C.I.S.).

Fresno Co.: Los Gatos Canyon, Divide to mouth of Mt. Diablo Range, 1 ♂, VI-6-8-07 (J. C. Bradley, H.J.R.). Coalinga, 3 ♀, V-14-38 (M. Cazier, H.J.R.); 1 ♀, VI-8-41 (R. M. Bohart, U.C.L.A.).

Los Angeles Co.: Tanbark Flat, 2 ♀, 2 ♂, VI-19-50, VI-24-50 (A. T. McClay, U.C.D.). Nr. Pasadena, 1,200 ft., 1 ♀, V-9-11 (F. Grinnell, Jr., C.A.S.). Placerita Canyon, 1 ♀, 1 ♂, IV-22-39 (U.C.L.A.). U.C.L.A. campus, 1 ♀, V-15-33 (U.C.L.A.). Santa Monica Mts. 1 ♂, (U.C.L.A.), Westwood Hills, 1 ♂, V-1-51 (U.C.L.A.). Beverly Glen, 1 ♀, VI-1-49 (G. Heid, U.C.L.A.).

Marin Co.: Bolinas, 1 ♂, III-7-49 (D. Cox, C.I.S.). Fairfax, 1 ♂, V-14-54 (R. M. Bohart, U.C.D.); 1 ♂, V-13-54 (N. A. Browne, U.C.D.).

Mariposa Co.: El Portal, 2 ♀, V-23-38 (K. S. Snyder, C.I.S.).

Plumas Co.: Portola, 1 ♀, VII-10-49 (J. W. MacSwain, C.I.S.).

San Diego Co.: El Cajon, 1 ♀, IV-23-20 (E. P. Van Duzee, C.A.S.).

San Francisco Co.: San Francisco, 1 ♂, VI-1-10 (J. A. Kusche, C.A.S.).

San Joaquin Co.: Nr. Lodi, 2 ♀, IV-23-31 (F. E. Blaisdell, Jr., C.A.S.).

San Mateo Co.: Redwood City, 1 ♀, VI-2-51 (P. H. Arnaud, P.A.).

Santa Cruz Co.: Soquel, 1 ♀, VII-4-54 (M. T. James, W.S.C.).

Santa Barbara Co.: San Marcus Pass, 1 ♀, VI-18-53 (R. M. Bohart, U.C.D.).

Santa Clara Co.: Stanford University, 1 ♂, 3 ♀, V-29-53, 1 ♀, V-18-51 (P. H. Arnaud, P.A.). Alma, 2 ♂, VI-7-40 (Miller, W.S.C.).

Shasta Co.: Lake Britton, 1 ♀, VI-29-47 (T. F. Leigh, C.I.S.).

Tuolumne Co.: Pinecrest, 2 ♀, VIII-4-47, 1 ♀, VIII-30-47 (P. H. Arnaud, P.A.).

### *Melanodexia californica* Hall

*Melanodexia californica* Hall, 1948, The Blowflies of North America, p. 354. Type ♂, Placerville, California.

#### Geographical distribution:

California.

#### California records:

Alameda Co.: Sunol, 1 ♂, I-26-40 (J. Fraser, C.I.S.).

Calaveras Co.: Mokelumne Hill, 2 ♂, V-20-30 (E. P. Van Duzee, C.A.S.).

Contra Costa Co.: Antioch, 1 ♂, IV-25-36 (E. C. Van Dyke, H.J.R.).

Eldorado Co.: Camino, 1 ♂, VI-26-48 (L. W. Quate, N.U.).

Lake Co.: Blue Lake, 1 ♂, V-16-22 (E. P. Van Duzee, C.A.S.).

Los Angeles Co.: Santa Monica, 1 ♂, V-11-51 (U.C.L.A.).

Monterey Co.: Bryson, 1 ♂, V-18-20 (E. P. Van Duzee, C.A.S.).

Placer Co.: Colfax, 1 ♂, V-20-52 (R. M. Bohart, U.C.D.). Auburn, 1 ♂, IV-12-53 (D. E. Barcus, U.C.D.). Loomis, 1 ♀, V-1950 (J. C. Hall, U.C.D.).

Plumas Co.: Quincy, 4 mi. W., 1 ♂, VI-26-49 (E. I. Schlinger, U.C.D.); 1 ♂, VII-2-49, (L. W. Quate, C.I.S.).

Riverside Co.: S. Gorgonia Pass, 1 ♀, V-12-41 (E. C. Van Dyke, C.A.S.).

Sacramento Co.: Folsom, 1 ♂, V-12-53 (R. M. Bohart, U.C.D.).

Santa Clara Co.: Alma, 1 ♂, VI-1-40 (J. Fraser, C.I.S.). Palo Alto, 1 ♀, V-18-22 (C.I.S.).

Shasta Co.: Shingletown, 1 ♂, VI-16-41 (C.I.S.).

Tuolumne Co.: Sequoia National Park, Ash Mt., 1 ♂, VI-9-52 (R. C. Bechtel, H.J.R.); 1 ♀, VI-9-52 (R. M. Bohart, H.J.R.).

#### Discussion:

This species can be separated from *M. satanica* only with considerable difficulty. The male genitalia are precisely the same. The two may be merely variants of the same species.

### *Melanodexia glabricula* (Bigot)

*Nitellia glabricula* Bigot, 1887, Bull. Soc. Zool. France, 1887:594. Type ♀, California.

Geographical distribution:  
California.

#### California records:

Eldorado Co.: Chile Bar, 1 ♀, VI-5-48 (L. W. Quate, N.U.).

Humboldt Co.: Ft. Seward, 1 ♀, V-17-35 (P. Schultheiss, W.S.C.).

Marin Co.: Fairfax, 1 ♂, V-13-54 (N. A. Browne, U.C.D.).

Mariposa Co.: Mariposa, 1 ♀, V-25-46 (W. F. Barr, W.S.C.).

Mendocino Co.: Little River, 2 ♀, VIII-23-50 (Joan Linsley, C.I.S.).

Napa Co.: Samuel Springs, 2 ♀, 2 ♂, V-30-53 (E. I. Schlinger, U.C.D.). Samuel Springs, 1 ♀, V-11-54 (E. I. Schlinger, U.C.D.).

Plumas Co.: Quincy, 1 ♂, VI-22-49 (P. D. Hurd, Jr., C.I.S.); 1 ♀, VII-3-49 (J. W. MacSwain, C.I.S.).

San Luis Obispo Co.: Atascadero, 1 ♀, IV-22-32 (E. P. Van Duzee, C.A.S.).

Santa Clara Co.: San Jose, 2 ♂, 1 ♀, V-27-42, 1 ♀, V-30-42 (P. A.). Alum Rock Park, 1 ♀, IV-22-51 (P. H. Arnaud, P.A.); 1 ♀, IV-21-51 (P. D. Hurd, Jr., C.I.S.).

Santa Cruz Co.: Soquel, 1 ♂, VI-22-24-50 (M. T. James, W.S.C.).

Shasta Co.: Viola, 2 mi. W., 1 ♀, V-27-41 (P. D. Hurd, Jr., C.I.S.). Shingletown, 1 ♀, VI-2-41 (C. D. Michener, C.I.S.).

Yolo Co.: Cache Creek Canyon, 5 ♀, 1 ♂, IV-30-54 (E. I. Schlinger, U.C.D.); 1 ♀, 2 ♂, IV-30-54 (R. M. Bohart, U.C.D.); 1 ♀, IV-30-54 (R. C. Bechtel, U.C.D.).

*Melanodexia grandis* Shannon

*Melanodexia grandis* Shannon, 1926, Proc. Ent. Soc. Wash. 28:138. Type ♂, Monterey Co.: California.

*Melanodexiopsis pacifica* Hall, 1948, The Blowflies of North America, p. 359. New synonymy.

Geographical distribution:  
California.

California records:

Marin Co.: Mill Valley, 1 ♀, VI-19-49 (H. B. Leech, C.A.S.).

Monterey Co.: Jamesburg, Hastings Natural History Reserve, Santa Lucia Mts., 1,900-2,700 ft., 1 ♂, VI-13-38 (C. D. Michener, H.J.R.). Nr. Marshall's, 1 ♀, VIII-14-38 (E. C. Van Dyke, C.A.S.).

San Diego Co.: San Diego, 1 ♂, III-27-15 (W. S. Wright, H.J.R.); 1 ♂, IV-6-15 (M. C. Van Duzee, C.A.S.).

Discussion:

The type of *pacifica* is a female. Hall's statements that the type is a male, that the female is unknown, and that the one specimen known to him is a female, are self contradictory.

*Melanodexia tristina* (Hall)

*Melanodexiopsis tristina* Hall, 1948, The Blowflies of North America, p. 359. Type ♂, San Bernardino Co., California.

Geographical distribution:  
California.

California records:

Los Angeles Co.: Tanbark Flat, 1 ♀, VII-10-52 (W. V. Garner, C.I.S.); 1 ♂, VII-5-52 (R. M.

Bohart, U.C.D.); 1 ♀, VII-5-50 (T. R. Haig, C.I.S.); 1 ♀, VI-26-52 (A. A. Grigarick, U.C.D.).

Plumas Co.: Quincy, 1 ♂, VI-20-49 (P. D. Hurd, Jr., H.J.R.); 1 ♂, VI-19-49 (H. A. Hunt, U.C.D.); 1 ♀, VI-19-49 (W. F. Ehrhardt, U.C.D.).

Riverside Co.: Banning, 1 ♀, V-24-28 (E. C. Van Dyke, C.A.S.). Soloba Spgs., 2 ♂, V-5-17 (E. P. Van Duzee, C.A.S.). Temecula, 1 ♂, IV-8-50 (P. D. Hurd, Jr., C.I.S.); 1 ♂, IV-11-50 (L. W. Quate, C.I.S.).

San Bernardino Co.: Glen Ranch, 1 ♂, VII-6-52 (S. Miyagawa, H.J.R.). Lytle Creek, 1 ♀, VI-8-28 (E. C. Van Dyke, C.A.S.). Camp Baldy, 1 ♀, 2 ♂, VII-7-52 (A. T. McClay, U.C.D.); ♀, VII-8-52 (E. M. Evans, U.C.D.).

San Diego Co.: San Diego, 1 ♂, IV-6-15 (E. P. Van Duzee, C.A.S.).

Unknown Co.: Crystal Lake Park, 1 ♂, VII-11-31 (H.J.R.).

*Melanodexia nox* (Hall)

*Melanodexiopsis nox* Hall, 1948, The Blowflies of North America, p. 358. Type ♂, Hood River Oregon.

Geographical distribution:

Stated to be Washington, Oregon, and California.

Discussion:

The status of this species can be determined only by further study, but if the species is valid, it is probably extralimital. Hall's statement that the type series consists of four males, one of them from Claremont, California, is an error; the Claremont specimen is a female of *tristina*.

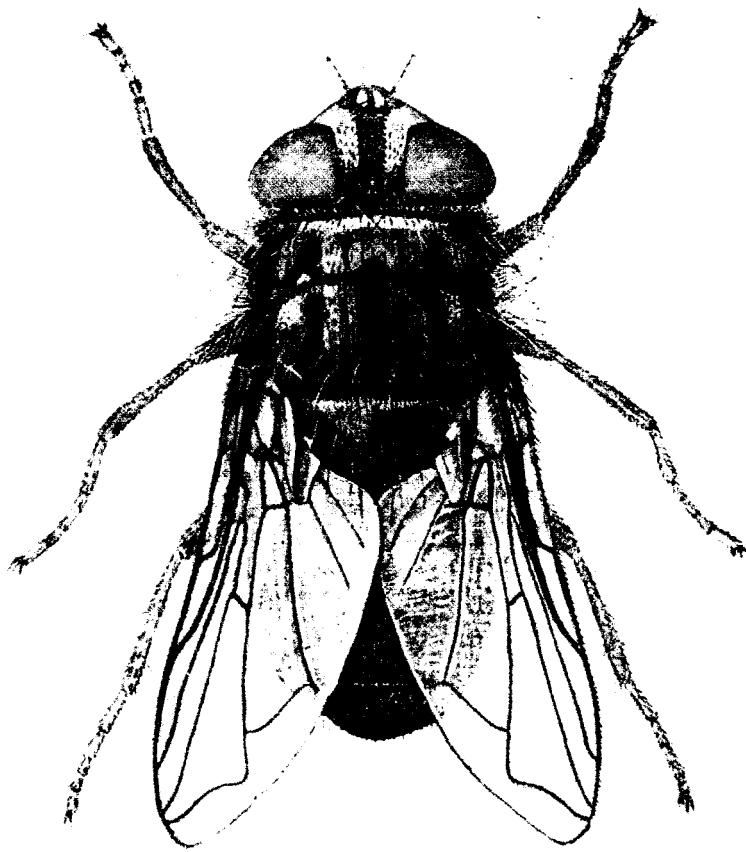


Fig. 1. Secondary screwworm fly, *Callitroga macellaria*. After Hall.

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## **PLATES**



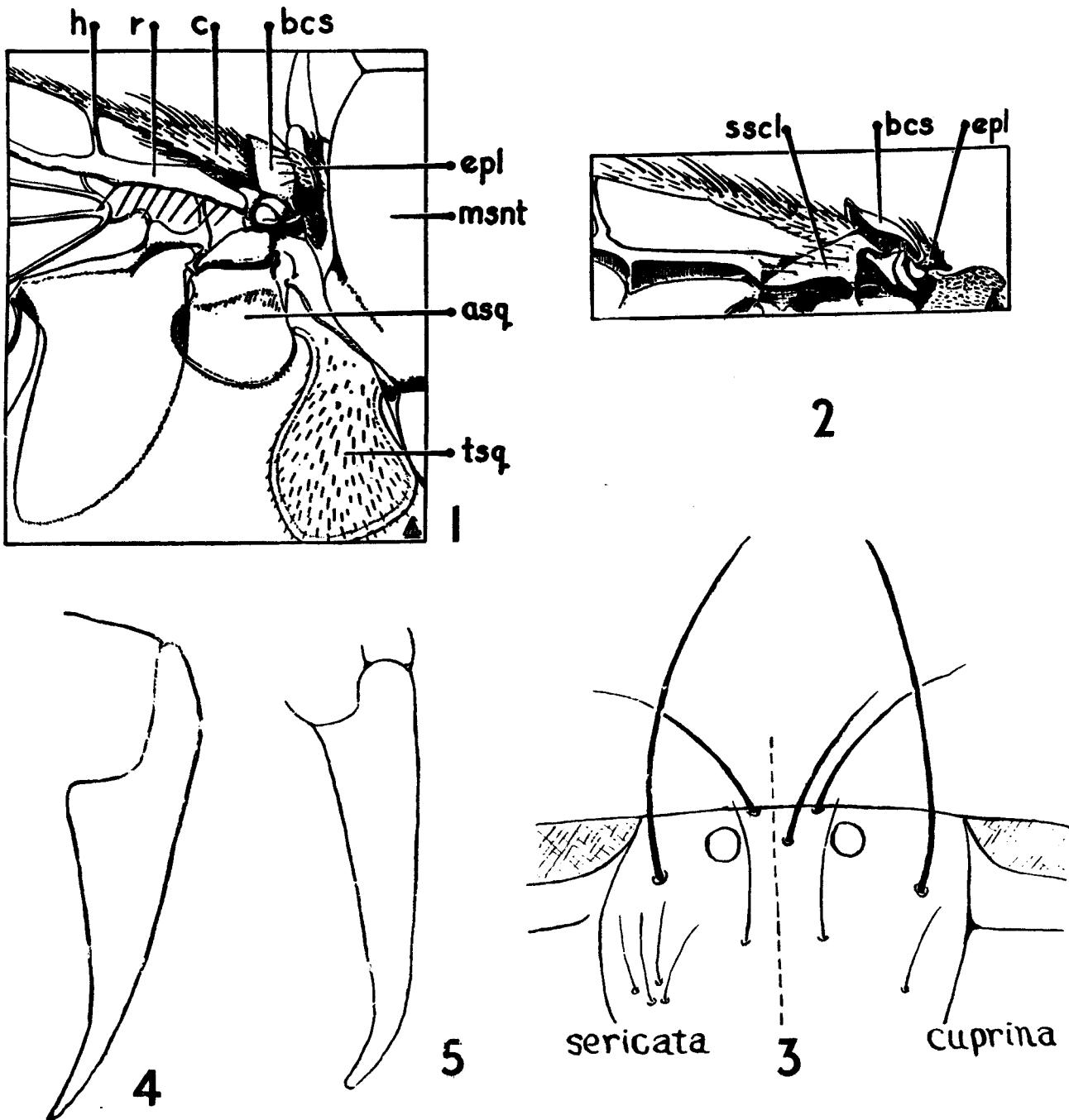


Plate 1

Fig. 1. Structures at the wing base of a calliphorid fly, dorsal view. *b*, humeral cross-vein; *r*, stem vein; *c*, costa; *bcs*, basicostal sclerite (basicosta); *epl*, epaulet; *msnt*, mesonotum; *asq*, alar squama (upper squamal lobe); *tsq*, thoracic squama (lower squamal lobe). After James, 1948.

Fig. 2. Structures at the wing base of a calliphorid fly, ventral view. *sscl*, subcostal sclerite. After James, 1948.

Fig. 3. Upper median occiput of *Phaenicia sericata* (Mg.) (left) and *P. cuprina* (Wd.) (right); males.

Fig. 4. *Melanodexia grandis* Shannon, forceps, side view.

Fig. 5. *Melanodexia tristina* (Hall), forceps, side view.

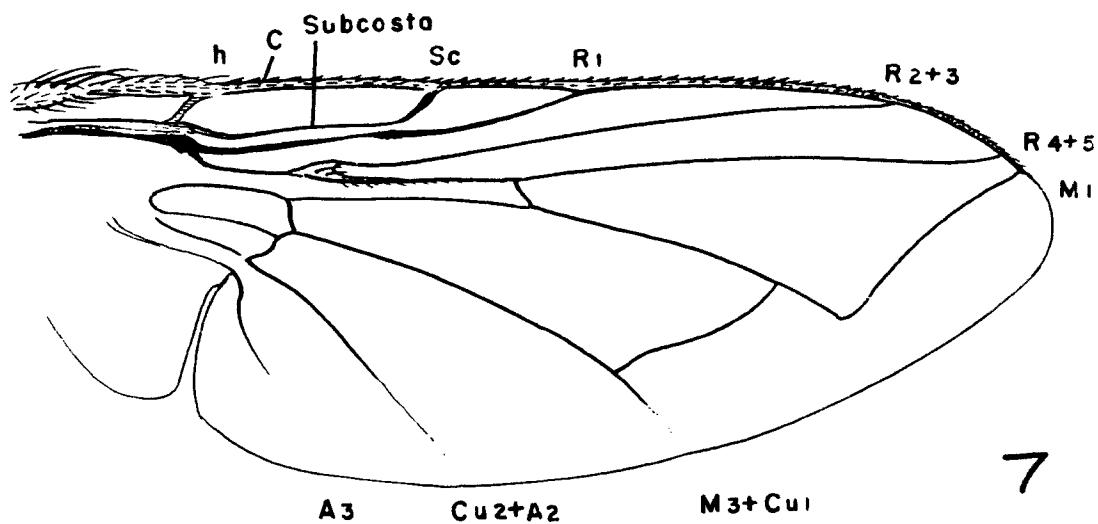
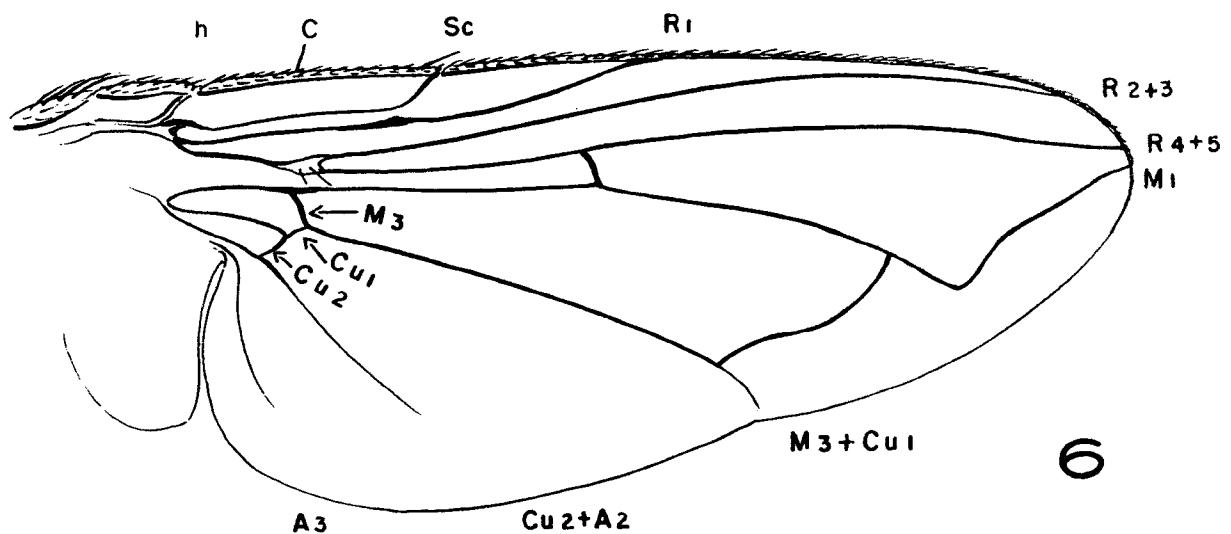


Plate 2

Fig. 6. Wing of *Calliphora* showing venation.  
 Fig. 7. Wing of *Lucilia* showing venation.