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Blow flies (Diptera: Calliphoridae) of the Baja California Peninsula

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Abstract

The blow fly fauna of the Baja California peninsula, Mexico has been sparsely documented. This study incorporates and lists recent and historical records of blow flies from collecting trips throughout the peninsula, visits to major southern California museums for historical collection records, and a literature search. Seven genera and 16 species are reported from the two peninsular Mexican States, Baja California, and Baja California Sur. Three species are recorded that are not included in the 2020 Catalog of Mexican Calliphoridae by Jaume-Schinkel, & Ibanez-Bernal (2020), they are: *Calliphora livida, Calliphora terraenovae,* and *Calliphora vomitoria*. One blow fly species, *Cochliomyia hominivorax* (the primary Screw-Worm Fly) is not included here but is found in museum collections. Once present in Baja, it is considered eradicated from continental North America as far south as the Panama Canal by the U.S. Department of Agriculture (USDA) however, it is occasionally reintroduced (Skoda *et al.* 2018) and is still present in some Caribbean islands. It is noteworthy that all calliphorid species from this mountainous desert peninsula are also found in the State of California, USA which supports 11 genera and 47 species in this family (Whitworth 2006) primarily because of its more varied climate and terrain. The Baja peninsula can be considered a southern extension of the State of California, with reduced species representation due to reduced climate and terrain variation, so no separate identification keys are necessary. Forensic entomologists and taxonomists can use the blow fly keys for North America by Whitworth, 2006, and 2017 for this region. The latest key by Jones, Whitworth, and Marshall (2019) is revolutionary and much welcome in taxonomy in that it is an online computer-aided key that has actual macro-photos of species identification characters and is intended to be used with a computer screen next to your microscope for identifications in place of printed material.

Key words: Blow flies, Calliphoridae, Diptera, Baja, Mexico

Introduction

There are two practical reasons for the value and necessity of this research. Human activity accelerates species extinction, a major concern for the San Diego Natural History Museum where I volunteer. Urban development and farming in Baja California is accelerating rapidly. Many collection sites were chosen specifically to document the presence of insect species on coastal sand dunes before they are turned into golf courses and resorts to increase tourism. With human development comes crime. There is a huge drug problem in Baja California as it is a major transportation corridor for drug cartels and traffickers shipping drugs to the USA and Canada. There are many military and police checkpoints along the length of the peninsula to intercept drug shipments. Drug wars between rival cartels and gangs are regularly reported in San Diego newspapers with consequential murders and dumping of bodies. According to the San Diego Union Tribune newspaper, December 12, 2023, the city of Tijuana has the most homicides in Mexico with about double the number of the next most dangerous city. Documenting the blow fly species in Baja will be useful for forensic entomologists who may need to identify the time and location of deaths.

The second reason is climate change which both reduces and expands species range. Whether it is warming or cooling, cold-blooded animals like insects will proliferate in the climate range they are most adapted to. They will follow the range of their preferred food source, either plant or animal as it moves. We already see what once were considered tropical species invading temperate regions. Therefore, it is important to document species composition at this point as a reference for future comparisons.

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Calliphoridae is a medically and forensically important family of insects in the Order Diptera (James 1948). Several species are cosmopolitan, invade dwellings, and are considered pests by everyone. All prey on a wide variety of animal species, and many are important to forensic entomologists. The primary goal of this study is to record a comprehensive listing of species and collection sites of a well-known medically and forensically important family of flies for this region. The family Calliphoridae is not considered monophyletic to taxonomists (Rognes1997) and has undergone extensive taxonomic revision in the last several years by elevating three subfamilies to the family level and reducing over 1,100 recognized species to approximately 932 species (Munguia-Ortega 2021). Many significant name changes, revisions, and additional records have been made to North American Calliphoridae species since Robert D. Hall published his classic book, *Blowflies of North America* in 1948. Maurice T. James, *Blowflies of California* (1955), is out of date but was the most recent nearby treatment of the family. James (1970) in his "Catalog of Diptera of the Americas south of the United States" also included distribution data for Calliphoridae. Sabrosky, Bennett, and Whitworth (1989) published a book on twenty-six bird blow fly species (genus *Protocalliphora*) in North America of which two are known to occur in Baja. Whitworth (2006) published keys to the genera and species of blow flies in America, North of Mexico, and was the most thorough revision of this family in decades. Whitworth and Rognes (2012) revised the Neotropical *Calliphora* which includes Mexico. In 2017, Tantawi, Whitworth, and Sinclair again revised the Nearctic species of *Calliphora* for the most current iteration. Additionally, Whitworth and Yusseff-Vanegas (2019) revised the Neotropical family Mesembrinellidae, formerly a subfamily of Calliphoridae, containing 53 valid species, many present in Mexico. Lastly, Jaume-Schinkel & Ibanez-Bernal 2020, produced the *Catalog of Mexican Calliphoridae* through a literature search, recording eleven genera and thirty species. Munguia-Ortega 2021, recorded three additional species from Baja that are not included in the 2020 Catalog of Mexican Calliphoridae. They are: *Calliphora livida, Calliphora terraenovae,* and *Calliphora vomitoria*.

Materials and Methods

Study area and fly collections

The Baja peninsula is primarily coastal scrub and desert climate. The Sierra San Pedro Martir mountains in Baja California Norte are a detached extension of the Sierra Nevada mountain range in California and form a terrestrial island. The Baja peninsula extends 1,247 km (775 mi) from Tijuana in the north to Cabo San Lucas in the south. It is divided approximately midway into two Mexican states, Baja California, and Baja California Sur, just north of the city of Guerrero Negro. The peninsula is 40 km (25 mi) wide at its narrowest with an average width of 153 km (95 mi). The width of the Gulf of California, also known as the Sea of Cortez, is 48–241 km (30–150 mi) wide. The gulf has more than 900 islets and islands, and there is daily commerce and ferry service across the gulf. Blow flies are the major household fly pest, surpassing the house fly *Musca domestica* in abundance, (personal observation).

I visited and recorded blow flies collected from the Baja California peninsula that have been deposited in four major West Coast museums: the California Academy of Sciences in San Francisco, the Los Angeles County Museum, the San Diego Natural History Museum, and the University of California, Riverside. Additionally, I collected over five thousand blow flies on several weeklong expeditions throughout the peninsula for the San Diego Natural History Museum in 2018–19, using inverted cone traps. Originally, fresh beef liver was used as bait, but it tends to dry out quickly in desert climates. Frozen Norway rats, *Rattus norvegicus* were purchased from a pet store and thawed for use as bait to mimic what blow flies would encounter in nature with satisfactory results when left for several days. Ketzaly Munguia-Ortega used raw shark and stingray for her bait traps on the recommendation of Dr. Whitworth that it is better to offer two options for bait, and fish is slow to dry out (personal communication). In searching for bait that stayed moist longer I also tried a variety of meats including raw chicken and settled on raw squid, octopus, or fish, including canned anchovies in water when transporting fresh bait was impractical. Trap netting was painted with a solution of permethrin insecticide to kill trapped flies quickly and reduce damage to bristles and seta used for identification.

I have included the locations and species that Ketzaly Munguia-Ortega reported in collecting 30,307 blow flies from nine locations in three latitudinal strips across the Baja peninsula: Lat. 32º: El Mogor (in the Guadalupe Valley), Sierra Juarez, Rancho Mil in El Delta in Mexicali. Lat 31º: Punta Colonet, Sierra San Pedro Martir, San Felipe. Lat 29º: Santa Catarina, Cerro Santo Tomas (near Catavina), and Punta Final (near Bahia San Luis Gonzaga). These

sites are distributed across five ecoregions in the State of Baja California which she did in 2017–19 for her Master of Science thesis on vegetation-based ecoregions (Munguia-Ortega, Ketzaly *et al.* 2021). She used NPT-80 modified traps and modified Blendon butterfly net traps baited with fish left for five hours (Personal communication). Her monumental efforts are included here for species collection sites but not with dates as her study lasted more than two years. She deposited representative voucher specimens in the ECSR collection.

On going survey work is facilitated by discrete record keeping in a spreadsheet presented here as Table 2, split into two parts representing specimen locations in Baja California and in Baja California Sur respectively.

Discussion of species and specimens examined

The following descriptive arrangement has been adopted in the discussion of species. Citations and synonymy; Type location when known; Geographical distribution; Remarks; Material examined and literature reviews, including detailed Baja records and locations as labeled on the pinned specimen, followed by the depository acronym as listed below.

Acronyms of collection depositories, followed by the number of their collection-dated locations:

CAS	California Academy of Science, San Francisco, California (79)
ECSR	Ensenada Center for Scientific Research & Higher Education, Ensenada, Baja California, Mexico (9)
LACM	Natural History Museum of Los Angeles County, Los Angeles, California (7)
SDM	San Diego Natural History Museum, San Diego, California (61)
UCR	University of California, Riverside, California (14)

On-line databases

Historically, numerous name changes and nomenclatural combinations have lead to confusion and perhaps misinterpretation of faunas through time. Considerable use was made of two on-line databases in the checking of synonymies for the taxa listed here. GBIF (2024), operating under Creative Commons licences, was interrogated for generic and species name synonymies. These names were then checked against the *Systema Dipterorum* (2024) database for correct combination, literature references and accuracy.

Results

Sixteen blow fly species were found to inhabit the Baja peninsula. All blow fly species on the Baja peninsula are also present in the State of California. The most common blow fly is *Cochliomyia macellaria* which is found throughout the peninsula. Three are introduced exotic species that have used commercial shipping to expand their range outside of their native continents. *Calliphora grahami*, originally from China has been present in California for many decades. *Chrysomya megacephala* (Old World Screwworm Fly), and *Chrysomya rufifacies* (Hairy Maggot Latrine Fly) from South Asia are believed to have been introduced at La Paz, the capital of Baja California Sur through ocean shipping sometime before 1987 (Greenberg 1988). Both these aggressive species have traveled up the peninsula to California and other States since their discovery. They have become common in southern California and continue to expand their range while displacing native species. I recently collected *Chrysomyia rufifacies* at the 7900 ft (2400m) elevation at Convict Lake, CA, a popular fishing spot on the eastern side of the Sierra Nevada Mountains.

Discussion

This is the first comprehensive survey of blow flies with the specific purpose of clarifying the species distribution in this part of Mexico. Of the 16 species of Calliphoridae found in Baja and Baja Sur (Table 1), there are more species (15) found in Baja than in Baja Sur (9). Of these, eight are found in both Baja and Baja Sur, seven are found in Baja

but not Baja Sur, and only one, *Compsomyiops callipes*, is found in Baja Sur but not Baja. The use of three types of searches, a literature search, field collections, and examining museum collections leads us to believe this list is comprehensive. The genus of bird blow flies (*Protocalliphora*) is represented by just two species *Protocalliphora asiovora,* and *P. beameri*. Bird blow flies inhabit bird nests and are rarely collected. Most collections are made by Ornithologists. Since there are 28 species of *Protocalliphora* reported from North America it is quite possible more species could be collected with further study. Listing the dates and locations of when and where these flies were collected provides valuable information to forensic entomologists in their attempt to determine the time and location of death.

TABLE 1. Species present in Baja in the order they are discussed. Genera and species names are those recognized by Whitworth (2006).

Species	Baja	Baja Sur
Calliphora coloradensis	X	
Calliphora grahami	X	
Calliphora latifrons	X	X
Calliphora ivida	X	
Calliphora terraenovae	X	
Calliphora vomitoria	X	
Chrysomya megacephala	X	X
Chrysomya rufifacies	X	X
Cochliomyia macellaria	X	X
Compsomyiops callipes		X
Phormia regina	X	X
Protocalliphora asiovora	X	
Protocalliphora beameri	X	
Lucilia cuprina	X	X
Lucilia mexicana	X	X
Lucilia sericata	X	X

Subfamily CALLIPHORINAE

Genus *Calliphora* Robineau-Desvoidy 1830

Sarcophaga Swinderen, 1822: 86. Reversal of Precedence—*nomen oblitum* status given by Evenhuis & Pape (2019: 104).

Calliphora Robineau-Desvoidy, 1830: 433. Type-species: *Musca vomitoria* Linnaeus, 1758: 595 [= Calliphora vomitoria (Linnaeus, 1758)], by original designation.

Somomya Bertoloni, 1861: 28. *nomen dubium*. Junior synonym.

Somomia Rondani, 1862: 234, unjustified emendation.

Somomyia Rondani, 1868: 51, 600, unjustified emendation.

Steringomyia Pokorny, 1889: 568. Type-species: *Steringomyia stylifera* Pokorny, 1889: 569, by original designation and monotypy. Junior synonym.

Acrophaga Brauer & Bergenstamm, 1891: 367 [67]. Type-species: *Sarcophaga alpina* Zetterstedt, 1838: 1304, by original designation. Junior synonym.

Neocalliphora Brauer & Bergenstamm, 1891: 391. Type-species: *Calliphora ochracea* Schiner, 1843: 287, by original designation; as subgenus. Junior synonym.

Neopollenia Brauer, 1899: 496. Type-species: *Musca stygia* Fabricius 1781: 438 [= *Calliphora stygia* (Fabricius 1781)], by original designation. Junior synonym.

Eucalliphora Townsend, 1908: 118. Type-species: *Calliphora latifrons* Hough, 1899b: 286, by original designation and monotypy = *Musca lilaea* Walker, 1849: 894 = *Cynomya cadaverina* Robineau-Desvoidy, 1830: 365. Junior synonym.

Paracalliphora Townsend, 1916c: 151. Type-species:*Calliphora oceaniae* Robineau-Desvoidy, 1830: 438, by original designation; = *Musca augur* Fabricius, 1775, 777 [= *Calliphora augur* Fabricius, 1775]. Junior synonym.

Abonesia Villeneuve, 1927: 357. Type-species: *Musca genarum* Zetterstedt, 1838: 658 =Calliphora genarum (Zetterstedt, 1838)], by original designation and monotypy. Junior synonym.

Triceratopyga Rohdendorf, 1931: 175. Type-species: *Triceratopyga calliphoroide*s Rohdendorf, 1931: 175, by original designation and monotypy. Junior synonym.
Aldrichiella Rohdendorf, 1931: 177. Type-species: *Calliphora grahami* Aldrich, 1930: 1, by original designation and monotypy. Junior homonym of *Aldrichiella* Vaughan, 1903: 101 and *Aldrichiella* Hendel, 1911: 35. Junior synonym.
Stobbeola Enderlein, 1933: 126. Type-species: *Stobbeola norwegic*a Enderlein, 1933: 126, by original designation and monotypy; = *Sarcophaga alpina* Zetterstedt, 1838: 1304. Junior synonym.
Aldrichina Townsend, 1934a: 111, unjustified/unnecessary new replacement name for *Aldrichiella* Rohdendorf, 1931.
Acronesia Hall, 1948: 272. Type-species: *Steringomyia aldrichia* Shannon, 1923: 112, by original designation. Junior synonym.
Australocalliphora Kurahashi, 1971: 195, as subgenus. Type-species: *Calliphora onesioidea* Kurahashi, 1971: 200, by original designation. Junior synonym.
Papuocalliphora Kurahashi, 1971: 167, as subgenus. Type-species: *Calliphora toxopeusi* Theowald, 1957: 158, by original designation. Junior synonym.

Remarks: Six Baja species, 15 Nearctic, and 116 species worldwide.

The Nearctic genus *Calliphora* was recently revised by Tantawi *et al.* (2017). The Neotropical blow flies of the genus *Calliphora* were revised by Whitworth & Rognes (2012).

Calliphora coloradensis Hough 1899

Calliphora coloradensis Hough, 1899b: 286. Type locality: USA (Colorado, without further detail).

Distribution: Western North America. Alaska to Mexico, eastward to Indiana, and Ontario, Canada.

Remarks: Uncommon.

Material examined: Baja California: Rancho Viejo 7000ft. Sierra San Pedro Martir, iv-13-1953 P.H. Arnaud Jr. (CAS); 0.2 mi. S. Colonia Guerrero, 24-27-iv-1963 H.B. Leach & P.H. Arnaud Jr. (CAS); (literature review): Sierra Juarez, Sierra San Pedro Martir, Rio Hardy, Representative voucher specimens 2017–19 Ketzaly Munguia-Ortega (ECSR); Baja California Sur: None known.

Calliphora grahami Aldrich 1930

Calliphora grahami Aldrich, 1930: 1. Type locality: China (Sichuan Province).
Calliphora boucardi Séguy, 1946: 82. Junior synonym.

Distribution: Northern Asia, Western North America.

Remarks: This species lacks a pre-sutural intra-alar bristle, which is unique in *Calliphora*.

Material examined: Baja California: Rancho Viejo 7000ft. Sierra San Pedro Martir, iv-13-1953 P.H. Arnaud Jr. (CAS) 0.2 mi. S. Colonia Guerrero 24-27-iv-1963, H.B. Leach & P.H. Arnaud Jr. (CAS); (literature review): Sierra Juarez, Sierra San Pedro Martir, Representative voucher specimens 2017–19 Ketzaly Munguia-Ortega (ECSR); Baja California Sur: None known.

Calliphora latifrons Hough 1899

Calliphora latifrons Hough, 1897: 1853 *nomen nudum*.
Calliphora latifrons Hough, 1899b: 286. Type locality: USA (Idaho, Moscow).

Distribution: Highlands of northern Mexico northward to Alaska, eastward to Ontario, Canada.

Remarks: This is the most widespread member of the Calliphorini in the western United States. Recorded in 46 of the 58 California counties. *C. latifrons* breeds in the freshly killed carcasses of small animals such as 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 small animal breeding preference, probably never will be. It may, however, readily contaminate food by mechanical transmission of pathogens.

Material examined: Baja California: Isla San Geronimo 11-iii-1953 Sefton Orca Expedition to Gulf, P.H. Arnaud (CAS); Sierras San Pedro Martir trail from La Jolla to La Zanja 10-vi-1953 P.H. Arnaud Jr. (CAS); Sierra San Pedro Martir 11-vi-1953 P.H. Arnaud Jr. (CAS); Arr. Santo Domingo 5.7mi. E. Hamilton Ranch dam site 23-iv-1963 Leach & Arnaud (CAS); 3.2 mi. S. Colonia Guerrero 24-27-iv-1963, H.B. Leach & P.H. Arnaud Jr. (CAS); 7 mi. W. Las Arrastras de Arricola 14-xi-1967 Don Patterson (CAS); 5.9 mi. E. San Matias 4 Apr 1981 Faulkner, Brown (SDM); Baja Mex. Santa Ines 20 Mar 1986, 30 Mar 1986 R. Parmenter (LACM); Mx-BC Ensenada, coastal sand dunes, bait trap *R. norvegicus* 8–15 Nov 2018 L Stotelmyre (SDM); (literature review): El Mogor, Punta Colonet, Sierra Juarez, Sierra San Pedro Martir, Santa Catarina, Cerro Santo Tomas, Rio Hardy, San Felipe, Punta Final, representative voucher specimens 2017–19 Ketzaly Munguia-Ortega (ECSR); Baja California Sur: Mex. Guadalupe Island, northwest Anchorage ii-14-1973 J.D. Pinto (UCR)

San Vicente 20 Mar 1986 R. Parmenter (LACM) Mx-BCS San Ignacio, bait trap *R. norvegicus* 10–16 Jan 2019 L Stotelmyre (SDM).

Calliphora livida Hall 1948

Calliphora livida Hall, 1948: 296. Type locality: USA (Georgia, Savannah).
Calliphora viridescens of authors (e.g., Hough 1899b: 286), not Robineau-Desvoidy, 1830. Misidentifications (see Hall 1948: 297).

Distribution: Widespread throughout North America.

Remarks: Widespread but infrequently collected, mostly in rural and higher elevations.

Material examined: Baja California: (literature review): El Mogor, Sierra Juarez, Sierra San Pedro Martir, Representative voucher specimens 2017–19 Ketzaly Munguia-Ortega (ECSR); Baja California Sur: none known.

Calliphora terraenovae Macquart 1851

Calliphora terraenovae Macquart, 1851: 217. Type locality: "Amerique septentrionale" = Canada (Newfoundland).
Calliphora nigribarba Shannon, 1923: 116. Junior synonym.

Distribution: Alaska to Newfoundland and Labrador. New York, New Mexico, and California.

Remarks: Widespread but infrequently collected, mostly in rural and higher elevations.

Material examined: Baja California: (literature review): Sierra Juarez, Sierra San Pedro Martir, Representative voucher specimens 2017–19 Ketzaly Munguia-Ortega (ECSR); Baja California Sur: None known.

Calliphora vomitoria (Linnaeus, 1758)

Musca vomitoria Linnaeus, 1758: 595. Type locality: Sweden (see Hall 1948: 313; Thompson & Pont 1994: 134).
Musca carnaria caerulea Degeer 1776: 57. Unavailable, polynomial suppressed by ICZN Opinion 2333 (2014).
Musca vomitoria minimus minimus Harris, 1780: 87. Junior synonym.
Musca *carnivora* Fabricius, 1794: 313. Junior synonym.
Musca obscoena Eschscholz, 1823: 113. Junior synonym.
Calliphora brunibarbis Robineau-Desviody 1830: 434. Junior synonym.
Calliphora fulvibarbis Robineau-Desviody 1830: 434. Junior synonym.
Calliphora affinis Macquart, 1835: 263. Junior synonym.
Calliphora rubrifrons Townsend 1908: 116. Junior synonym.
Calliphora pseudovomitoria Baranov, 1943: 62. Junior synonym.

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

Remarks: One of the largest Calliphoridae, with bright yellow setae on the back of the head. Occasionally recorded in wound myiasis (James 1955).

Material examined: Baja California: (literature review): Sierra Juarez, Sierra San Pedro Martir, Representative voucher specimens 2017–19 Ketzaly Munguia-Ortega (ECSR); Baja California Sur: None known.

Subfamily CHRYSOMYINAE

Genus *Chrysomya Robineau*-Desvoidy 1830

Chrysomya Robineau-Desvoidy manuscript name (Blainville *et al*., 1826: 11), unavailable name; suppressed by action of ICZN (1990: 162 [Opinion 1601]); treated under Chrysomya Robineau-Desvoidy, 1830.
Chrysomya Robineau Desvoidy, 1830: 444. Type species: *Chrysomya regalis* Robineau-Desvoidy, 1830: 449, by designation of Coquillett, 1910: 523, conserved by ICZN 1988: 236.
Chrysomyia Macquart, 1835: 251. Unjustified emendation of *Chrysomya* and preoccupied by *Chrysomyia* Macquart, 1834a: 262 (= *Microchysa* Loew, 1855: 148, Stratiomyidae).
Compsomyia Rondani, 1875: 425. Type species: *Musca dux* Eschscholtz, 1822: 114, by designation of Coquillett, 1910: 526 = *Musca megacephala* Fabricius, 1794: 317 [= Chrysomya megacephala (Fabricius, 1794)]. Junior synonym.
Pycnosoma Brauer & Bergenstamm, 1894: 624. Type-species: *Musca marginalis* Wiedemann, 1830: 395 junior primary homonym, preoccupied by *Musca marginalis* Geoffroy, 1785: 497, suppressed by ICZN 1988: 236 = *Chrysomya regalis* Robineau-Desvoidy, 1830: 449, by original designation. Junior synonym.
Paracompsomyia Hough, 1898: 184. Type-species: *Paracompsomyia nigripenni*s Hough, 1898; = *Chrysomya regalis* Robineau-Desvoidy, 1830: 449, by monotypy. Junior synonym.
Microcalliphora Townsend, 1916a: 618. Type species: *Lucilia varipes* Macquart, 1851: 222, by original designation = *Chrysomya varipes* (Macquart, 1851: 222). Junior synonym.
Psilostoma Surcouf, 1920: 58. Type species: *Ochromyia incisuralis* Macquart, 1851: 219, by original designation = *Chrysomya incisuralis* (Macquart, 1851: 219). Junior synonym.
Hemichrysomyia Séguy, 1926: 304. Type species: *Hemichrysomyia pachymera* Séguy, 1926: 304, by original designation. Junior synonym.
Hemichrysomia incorrect spelling of *Hemichrysomyia* Séguy, 1926. Junior synonym.
Achoetandrus Bezzi, 1927: 235. Type species: *Musca albiceps* Wiedemann, 1819: 38 [= Chrysomya albiceps (Wiedemann, 1819)], by original designation. Junior synonym.
Eucompsomyia Malloch, 1927: 325. Type species: *Eucompsomyia semimetallica* Malloch, 1927: 325, by original designation. Junior synonym.
Pycnosomops Townsend, 1934b: 277. Type species: *Musca putoria* Wiedemann, 1830: 403 [=Chrysomya putoria (Wiedemann, 1830)], by original designation. Junior synonym.
Ceylonomyia Fan, 1965: 196. Type species: *Chrysomya nigripes* Aubertin, 1932: 26, by original designation.
Achaetandrus, error for *Achoetandrus* Bezzi, 1927: 235. Junior synonym.

Remarks: Originally a tropical genus, however, several species are expanding territory worldwide via commercial shipping and travel. In 1981, Gagne' reported on the presence of the genus *Chrysomya* in the New World. More locations for this introduced genus were recorded by Baumgartner & Greenberg (1984, 1986, and 1993).
Baja Records: two introduced species.

Chrysomya megacephala (Fabricius 1794)

Musca megacephala Fabricius 1794 317, original description. Type locality: "Guinea," error [= ?"Ex. Ind. Or."; see Patton 1925a: 179].
Musca dux Eschscholtz, 1822:114 [1823:171]. Junior synonym.
Chrysomya duvaucelii Robineau-Desvoidy, 1830: 451. Junior synonym.
Chrysomya gratiosa Robineau-Desvoidy, 1830: 451. Junior synonym.
Musca bata Walker, 1849: 875. Junior synonym.
Musca combrea Walker, 1849: 876. Junior synonym.
Musca remuria Walker, 1849: 871. Junior synonym.
Lucilia macquartii Rondani, 1875: 426. Replacement name for *Lucilia flaviceps* Macquart 1844: 145, senior synonym; junior primary homonym.
Pollenia basalis Smith, 1876: 449. Junior synonym.

Somomya pfefferi Bigot, 1877: 257. Junior synonym.
Somomya pfeifferi Rye, 1879; unjustified emendation of *pfefferi*
Somomyia dives Bigot, 1888a: 600. Junior synonym.
Somomya cyaneocincta Bigot, 1888a: 604. Junior synonym.

Distribution: Austral-Asian, Old-World tropics, South Africa, South America, and expanding throughout the United States. It is abundant locally in collections and throughout Baja and Southern California.

Remarks: Apparently introduced into Baja California through commerce. It was first collected along with *Chrysomya rufifacies* on 20 February 1987 in a restaurant in the port city of La Paz, Baja California Sur on the Gulf of California (Greenberg 1988). The male fly is unique to North American calliphorids in that the upper half of the eyes have larger facets than the lower half. Common names are Oriental Latrine Fly, Old World Screwworm Fly, and Hairy Maggot Latrine Fly.

Material examined: Baja California: (literature review): El Mogor, Sierra Juarez, Cerro Santo Tomas, Rio Hardy, San Felipe, Punta Final, Representative voucher specimens 2017–19 Ketzaly Munguia-Ortega (ECSR); Mx-BC Ensenada, coastal sand dunes, bait trap *R. norvegicus*, 8–15 Nov 2018 L. Stotelmyre (SDM); Baja California Sur: (literature review): La Paz, Baja California Sur, 20 Feb 1987 B. Greenberg (depository unknown), (Greenberg 1988); Baja Calif. Sur, Rancho Las Cruces 6 Nov 1998 D.K. Faulkner (SDM); Mx-BCS Las Gatas, Rancho San Martin, bait trap 12–16 Apr 2018 MA Wall, JE Berrian, L Stotelmyre (SDM); Mx-BCS Punta Arena, coastal sand dunes, bait trap: *R. norvegicus* 10–18 Jan 2019 Michael Wall (SDM); Mx-BCS El Triunfo, bait trap: *R. norvegicus* 10–16 Jan 2019 L. Stotelmyre (SDM); Mx-BCS Cabo Pulmo, bait trap: *R. norvegicus* 13–15 Jan 2019 L. Stotelmyre (SDM); Mx-BCS Punta Arena, coastal sand dunes 18 Jan 2019 L. Stotelmyre (SDM); Mx-BCS La Paz, bait trap: *R. norvegicus* 10–16 Jan 2019 L. Stotelmyre (SDM); Mx-BCS Loreto, bait trap: *R. norvegicus* 10–16 Jan 2019 L. Stotelmyre (SDM); Mx-BCX 5 mi. e. San Jose Del Cabo, coastal sand dunes, 12–16 Jan 2019 L. Stotelmyre (SDM).

Chrysomya rufifacies (Macquart 1844)

Lucilia orientalis Macquart, 1844: 145. Junior synonym.
Lucilia rufifacies Macquart, 1844: 146, original description, attributed to Guérin. Type Location: "Nouvelle Hollande".
Lucilia pavonina Schiner, 1868: 305. Junior synonym.
Somomya melanifera Bigot, 1877b: 258. Junior synonym.
Somomyia barbata Bigot, 1877a: 39. Junior synonym.
Chrysomya cordieri Séguy, 1926: 303. Junior synonym.

Distribution: Austral- Asian, Old-World tropics, California, and throughout the southern US. It is abundant locally in collections and expanding throughout Baja and Southern California.

Remarks: It was first collected in Baja on 20 February 1987 from a restaurant in the port city of La Paz, Baja California Sur, along with *Chrysomya megacephala.* (Greenberg). This is a warm weather fly. The female produces unisexual progeny, an unusual feature among the higher Diptera (Baumgartner 1993). Field studies show it prefers large carcasses. Forensically, the hairy maggot is one of the most reliable indicators of post-mortem time intervals in human cadavers (Baumgartner 1993). Common name: Hairy Maggot Blow Fly.

Material examined: Baja California: (literature review): El Mogor, Punta Colonet, Sierra Juarez, Sierra San Pedro Martir, Santa Catarina, Cerro Santo Tomas, Rio Hardy, San Felipe, Punta Final, representative voucher specimens 2017–19 Ketzaly Munguia-Ortega (ECSR); Mx-BC Ensenada, coastal sand dunes, bait trap *R. norvegicus* 8–15 Nov 2018 L. Stotelmyre (SDM); Baja California Sur: (literature review): La Paz, Baja California Sur, 20 Feb 1987 B. Greenberg (depository unknown), (Greenberg 1988); Mx-BCS Sierra San Francisco, San Gregorio, 18 Oct 1997 D.K. Faulkner (SDM); Mx-BCS Las Gatas, Rancho San Martin, bait trap 12–16 Apr 2018 MA Wall, JE Berrian, L Stotelmyre (SDM); Mx-BCS Loreto, bait trap 10–16 Jan 2019 L. Stotelmyre (SDM); Mx-BCS El Triunfo, bait trap 10–16 Jan 2019 L. Stotelmyre (SDM); Mx-BCS Cabo San Lucas, dead dog on road, 11 Jan 2019 L. Stotelmyre (SDM).

Genus *Cochliomyia Townsend* 1915

Callitroga Brauer, 1883: 74. Type species: *Calliphora anthropophaga* Conil, 1878 (in Lesbini *et al.* 1878): 71, by original designation and monotypy = *Cochliomyia hominivorax* (Coquerel, 1858): 173; published in synonymy, not subsequently treated as valid before 1961.
Callitroga Hall 1948: 120. Type species: *Musca macellaria* Fabricius, 1775: 776 [=Cochliomyia macellaria (Fabricius, 1775)], by original designation. Junior synonym.

Remarks: *Cochliomyia* are known as New World Screwworm Flies. One species. Known genus distribution: Neotropical.

Cochliomyia macellaria (Fabricius 1775)

Musca macellaria Fabricius, 1775: 776, by original designation. Type Location: "America" [West Indies. Virgin Is., St. Croix].
Musca erythrocephala De Geer, 1776: 146. Junior synonym.
Musca erythrocephala Fabricius, 1787: 351, *nomen dubium*, preoccupied by *Musca erythrocephala* De Geer 1776: 146.
Chrysomya affinis Robineau-Desvoidy, 1830: 445. Junior synonym.
Chrysomya viridula Robineau-Desvoidy, 1830: 445. Junior synonym.
Chrysomya lherminieri Robineau-Desvoidy, 1830: 446. Junior synonym.
Chrysomya tibialis Robineau-Desvoidy, 1830: 446. Junior synonym.
Chrysomya alia Robineau-Desvoidy, 1830: 447. Junior synonym.
Chrysomya coerulescens Robineau-Desvoidy, 1830: 447. Junior synonym.
Chrysomya socia Robineau-Desvoidy, 1830: 447. Junior synonym.
Chrysomya decora Robineau-Desvoidy, 1830: 448. Junior synonym.
*Chrysomya lepid*a Robineau-Desvoidy, 1830: 448. Junior synonym.
Chrysomya plaei Robineau-Desvoidy, 1830: 448. Junior synonym.
Musca taniaria Wiedemann, 1830: 406. Incorrect original spelling of *Musca laniaria* Wiedemann, 1830, First Revisor Wiedemann (1830: 683)—see Dear 1985: 141.
Musca laniaria Wiedemann, 1830: 683. Junior synonym.
Musca macellaria Haliday, 1833: 165, Junior primary homonym, preoccupied by *Musca macellaria* Fabricius 1775; *nomen dubium*; junior primary homonym.
Calliphora violacea Macquart, 1844: 128. Junior synonym.
Lucilia vittata Macquart, 1844: 141. Junior synonym.
Lucilia durvillei Macquart, 1844: 142. Junior synonym.
Musca certima Walker, 1849: 873. Junior synonym.
Musca phauda Walker, 1849: 896. Junior synonym.
Calliphora tristriata Verhuell, 1850: 273. Junior synonym.
Calliphora tibialis Macquart, 1851: 215. Senior synonym; junior primary homonym, preoccupied by *Calliphora tibialis* Macquart, 1846: 323 = *Onesia tibialis* Macquart, 1846: 323.
Lucilia rubrifrons Macquart, 1851: 223. Junior synonym.
Musca turbida Walker, 1853: 336. Senior synonym; junior primary homonym, preoccupied by *Musca turbida* Wiedemann, 1830: 396.
Musca fasciata Walker, 1853: 337. Junior synonym.
Lucilia picicrus Thomson, 1869: 543. Junior synonym.
Lucilia curvipes Thomson, 1869: 544. Junior synonym.
Lucilia porticola Thomson, 1869: 544. Junior synonym.
Lucilia quadrisignata Thomson, 1869: 544. Junior synonym.
Somomya flavigena Bigot, 1877b: 249. Junior synonym.
Somomya aztequina Bigot, 1877b: 252. Junior synonym.
Somomyia iridicolor Bigot, 1888b: clxxxi. Junior synonym.
Calliphora trifasciata Brauer & Bergenstamm, 1894: 27. Subsequent misspelling of *Calliphora tristriata* Verhuell, 1850: 273.
Chrysomyia lynchi Lahille, 1915: 12. Junior synonym.
Protochrysomyia howardae Pierce, 1945: 8. Junior synonym.
Cochliomyia fontanai García, 1952: 71. Junior synonym.

Distribution: Western hemisphere from Quebec Canada, southward to Patagonia.

Remarks: Judging from the diverse collection in the San Diego Natural History Museum with its emphasis on Baja peninsula insects, and Ketzaly Munguia Ortega, this is the most common calliphorid fly in Baja California. The

secondary screwworm is essentially a scavenger, though it occasionally becomes parasitic, and numerous cases of myiasis in man and animals are on record. Common name: Secondary Screwworm Fly.

Material examined: Baja California: Angeles Bay, Gulf of Calif. May 5–7, 1921 & June 25–26, 1921 E.P. VanDuzee (CAS); Mulege Baja Calif. May 14, 1921 E.P. VanDuzee (CAS); Danzante Isl. May 24, 1921 E.P. VanDuzee (CAS); Santa Cruz Island Gulf of Calif. May 27, 1921 E.P. VanDuzee (CAS); San Jose Is. Amortajada Bay. May 29, 1921 E.P. VanDuzee (CAS); San Evaristo Baja Calif. June 10, 1921 E.P. VanDuzee (CAS); Conception Bay Gulf of Calif. June 18, 1921 E.P. VanDuzee (CAS); Angel de la Guardia Isl. Pond Island Bay, July 1, 1921 E.P. VanDuzee (CAS); Coyote Cove, Conception Bay Lower Calif. iv-29-1938 Michelbacher & Ross (CAS); El Mayor, Lower California iv-1939 C.D. Mitchner (CAS); 20 Mi. N. Mesquital, Lower California ix-27-1941 Ross & Bohart (CAS); 15 mi. N. San Ignacio, Lower California ix-29-1941 Ross & Bohart (CAS); 10 Mi. E. San Ignacio, Lower California ix-30-1941 Ross & Bohart (CAS); San Pedro, Lower California x-7-1941 Ross & Bohart (CAS); San Domingo, Lower California x-23-1941 Ross & Bohart (CAS); Isla Ceralbo Gulf of Calif Mx Gorda Pt. iii-20-1953 Sefton Orca Exped. P.H. Arnaud (CAS); Isla Ceralbo Gulf of Calif. Ruffo Ranch Sefton Orca Expedition iii-22-1953 Arnaud (CAS); Aqua Verde Bay, Gulf of Calif. Bay Sefton Orca Expedition iii-26-1953 Arnaud (CAS); Isla Carmen Gulf of Calif. Belandra Bay Sefton Orca Expedition iii-28-1953 Arnaud (CAS); Pulpito Anchorage Gulf of Calif. Bay Sefton Orca Expedition iii-31-1953 Arnaud (CAS); Isla San Estaban Gulf of Calif. Bay Sefton Orca Expedition iv-2-1953 Arnaud (CAS); Baja, Km 95 Rt. 1, vii-10-54 W. McDonald (LACM); Baja 3 mi. N. Mira Flores 19-i-1959 H.B. Leach (CAS); Baja Norte San Felipe 7-iii-1963 Arnaud (CAS); BN Arroyo Santo Domingo, 5.7 mi. N. Hamilton Ranch 23-iv-1963 Leach & Arnaud (CAS); Baja Norte North Foot Red Rock Hamilton Ranch 24-iv-1963 Leach & Arnaud (CAS); Baja Norte Arroyo Salado 3.2 Mi. N. San Vicente 28-iv-1963 Leach & Arnaud (CAS);26 mi. S. San Felipe, 15-iv-1965 D.Q. Cavagnaro, E.S. Ross, V.L. Vesterby (CAS);Punta Piedra 30mi. N. Ensenada, 9-i-1965 S.&S. Frommer (UCR);Baja Norte, dump N. of Bahia de L.A. ex. dead *Lamnia ditropis* 3-v-1968 R.P. Papp (CAS); N. San Felipe, iv-10-1968 M.E. Irwin (UCR); Baja Estero Beach 9 mi. S. Ensenada, sea level, 4-vii-1973 P.H. Arnaud (CAS); Baja Calif Norte, Rancho Santa Fe, 4 mi. S. Maneadero, 22-vi-1975 R. Kawin (CAS); turnoff Mx Hwy 1 3. Mi. S. Ensenada, coastal sand dunes 18-vii-1977 Arnaud (CAS); Baja Norte, San Esteban Island, 1 Apr 1980 (SDM); 2 km. N. of Maneadero, 6 Sep 1981 Faulkner, Brown (SDM); Isla de Cedros, canyon W. of Punta Norte 30 Mar 1983 (SDM); Isla de Cedros, Baja Norte, vicinity of fishing village 1-vii-1983 Geo. J. Mallick (CAS); Baja, Estero Punta Banda 3 mi. S. Ensenada, 20 Oct 1989 J.&J. Brown, J. Morton (LACM); Mx-BC Ensenada, coastal sand dunes, bait trap *R. norvegicus*, 8–15 Nov 2018 L. Stotelmyre (SDM); (literature review): El Mogor, Punta Colonet, Sierra Juarez, Sierra San Pedro Martir, Santa Catarina, Cerro Santo Tomas, Rio Hardy, San Felipe, Punta Final, Representative voucher specimens 2017–19 Ketzaly Munguia-Ortega (ECSR); Baja California Sur: MX, V. Trinidad, vii-1927 L.M. Huey (SDM); Muertos Bay, Baja California, Mch. ?-17-1928 Craig (CAS); Mex. Baja Calif., canyon North of De Mara's Well, Nov 21, 1936, C.F. Harbison (SDM); 10 mi. NW. La Paz, i-6-1941 Ross & Bohart (CAS); Las Animas, Sierra Laguna, Lower California x-12-1941 Ross & Bohart (CAS); El Arco, 28'55"N, 7 Apr 1947 Charles F. Harbison (SDM); Isla Ceralba, Gordes Point, Gulf of Calif. iii-20-1953 Sefton & Arnaud (CAS); Isla San Francisco, Gulf of Calif. iii-24-1953 Sefton Orca Exped. P.H. Arnaud (CAS); El Saltillo S.L.P. viii-24-54 (UCR); San Benedicto Is. Revillagigedo Group, iv-30-55 McDonald & Bladget (LACM); Baja Del Sur, N. Shore, Isla Del Carmen, iv-22-58 E. Yale Dawson (LACM); Baja Calif. Punta Arenas & Bahia Los Muertos Rds. 20-xii-1958 H.B. Leach (CAS); Cabo San Lucas, Baja California, on human feces, 17-i-1959 H.B. Leach (CAS); 25 mi. W. La Paz, ix-4-1959 K.W. Radford, & F.C. Werner (CAS); Mx. Agua Calientes Ridge NW of Jocoque Dam viii-19-1960 Arnaud, Ross, Drentz (CAS); Isla Espiritu Santo, Gulfo de Calif, 24'25N,110'20W, iv 21-1962 C. Harbison (SDM); 5 mi. N. San Jose Del Cabo, *Haplopappus sonoriensis,* xi-8-65 Ewart & Dickson (UCR); 1 mi. W.Sta Clara Rancho @base of San Pedro Martir Mts. v-3-1969 B. Cheary (UCR); Baja Calif. Sur, La Paz, alt. 25ft. 12 May 1969 Stanley C. Williams (CAS); Baja Calif. Sur, 21 mi. S. San Miguel de Comondo, 15 May 1969 S.C. Williams (CAS); San Ramon 4 mi. W. Colonia Guerrero vii-3-1969 L.F. LaPre' (UCR); Baja Calif. Sur, Isla de Carmen, Puerto Belandra 24-iii-1971 Vincent Lee (CAS); Baja Calif. Sur, San Jose Del Cabo 17-vii-1971 H.G. Real, R.E. Main (CAS); Baja Calif. Sur, Migrino 18-vii-1971 H.G. Real, R.E. Main (CAS); Baja Calif. Sur, Isla San Jose, Mangrove thicket 5 pm–8 am 7–8 iv-1974 J.T. Doyen (CAS); Baja Calif. Sur, Isla San Jose 1 mi. S. Punta Colorado 8–9 iv-1974 John T. Doyen (CAS); Mex Baja Sur, San Sabastian Bahia San Nicholas Lat. 26'36" N. v-14-75 P. DeBach (UCR); Baja Calif. Sur, 32 Km. N. Cabo San Lucas to Todos Santos 26-x-1977 Breedlove (CAS); Baja Cal. Mex., Loreto, 23' 16"N. 4 Oct 1977 (SDM); 25 mi. E. Todos Santos near La Burrera, 1829 m. 21-x-1977 D. & W. Breedlove (CAS); 10 Km. SE. Mulege (sand dunes Km 126) 24-25-viii-1977

E. Fisher, R. Westcott (CAS); 23 Km. W. La Paz, KM23 6-ix-1977 E. Fisher, R. Westcott (CAS); Baja Cal. Mex. Loreto 2 mi. SW. 9 Dec 1977 G.W. Forbes (SDM); Baja Calif. Sur, Las Barracas, malaise 2-v-1983, 13-vi-1983 P. DeBach (UCR); Baja Calif. Sur, Las Barracas, pan trap 27-v-1985 P. DeBach (UCR); Mx. Baja Calif. Sur, 25.5 mi. N.E. El Arco 2300' 11–15 Dec 1987 N. Bloomfield (SDM); Baja Cal. Sur, Sierra San Francisco San Gregario, 18 Oct 1997 D.K. Faulkner (SDM); Baja Cal. Sur, Rancho Las Cruces, 6 Nov 1998 D.K. Faulkner (SDM); Mx-BCX 2.1 mi. NNE, El Rosarito, San Nicolas Rd., elev. 24m. 10 Apr 2018 J. Berrian, L. Stotelmyre (SDM); Las Gatas, Los Muertos beach, human feces, 12 Apr 2018 Stotelmyre, Berrian (SDM); Mx-BCX Las Gatas, Ensenada de Las Muertos, 15 Apr 2018 M. Wall, J. Berrian, L. Stotelmyre (SDM); Las Gatas, Rancho San Martin, bait trap 12–16 Apr 2018 M.A. Wall, J.E. Berrian, L. Stotelmyre (SDM); Mx-BCX Guerrero Negro, bait trap *R. norvegicus*, 10–16 Jan 2019 L. Stotelmyre (SDM); Mx-BCX Loreto, bait trap *R. norvegicus*, 10–16 Jan 2019 L. Stotelmyre (SDM); Mx-BCX Cabo San Lucas, dead cow on road, 11 Jan 2019 L. Stotelmyre (SDM); Mx-BCX 5 mi. e. San Jose Del Cabo, coastal sand dunes, 12–16 Jan 2019 L. Stotelmyre (SDM); Mx-BCX Punt Arena, coastal sand dunes bait trap, 10–18 Jan 2019 (L. Stotelmyre, (SDM); Mx-BCX Cabo Pulmo, coastal sand dunes bait trap, 13–15 Jan 2019 (L. Stotelmyre, (SDM); Mx-BCX Punta Arena, coastal sand dunes bait trap, 18 Jan 2019 (L. Stotelmyre, (SDM).

Genus *Compsomyiops Townsend* 1918

Compsomyiops Townsend 1918: 153. Type species: *Calliphora fulvipes* Macquart, 1844: 132, by original designation = *Chrysomya fulvicrura* Robineau-Desvoidy, 1830: 446.

Myiolucilia Hall, 1948: 109. Type species: *Musca lyrcea* Walker, 1849: 873, by original designation; misidentified type species; type restricted to the actual (true) *Musca lyrea* of Walker, 1849: 87 not the species misidentified by Hall as Walker's species (Dear 1985: 118). *Musca lyrcea* Walker, 1849: 873 = *Compsomyiops fulvicrura* (Robineau-Desvoidy, 1830: 446). Junior synonym.

Remarks: Known genus distribution: Neotropical. 6 species.

Compsomyiops callipes (Bigot, 1877)

Somomya callipes Bigot, 1877b: 249, by original designation. Type Location: "Mexicus".
Somomya calopus Bertkau, 1879: 538, subsequent misspelling.
Chrysomyia wheeleri Hough 1899b. Junior synonym.
Paralucilia wheeleri (Hough, 1899), subsequent changed combination of *Chrysomyia wheeleri* Hough 1899 (Hall, 1948: 153).

Distribution: Washington to southern Mexico, eastward to Colorado, and western Texas. Throughout South America and Australia.

Remarks: The largest of the North American Chrysomyinae flies, Hall 1948.

Material examined: Baja California: (literature review): Parque Nat. S. Pedro Martir, 2 mi. E. border, 7600 ft., 20 Sep 1979 R.E. Love (SDM); Sierra San Pedro Martir, Representative voucher specimens 2017–19 Ketzaly Munguia-Ortega (ECSR); Baja California Sur: Sierra La Laguna 1770–1850m 31-viii-1977 E. Fisher, R. Westcott (CAS); 23 Km. W. La Paz (Km23) coll. on yellow flowers 6-9-1977 E. Fisher, R. Westcott (CAS).

Genus *Phormia Robineau*-Desvoidy 1830

Phormia Robineau-Desvoidy, 1830: 465. Type species: *Musca regina* Meigen, 1826 [= Phormia regina (Meigen 1826)], by subsequent designation of Robineau-Desvoidy 1849: v.

Euphormia Townsend, 1919: 542. Type species: *Musca regina* Meigen, 1826 [= Phormia regina (Meigen 1826)], by original designation. Junior synonym.

Remarks: 1 species.

Phormia regina (Meigen 1826)

Musca regina Meigen 1826: 58. Type Location: not given [= Germany. Aachen area].
Musca thalassina Meigen, 1826: 54. Junior synonym.
Musca accincta Wiedemann, 1830: 407. Junior synonym.
Phormia philadelphica Robineau-Desvoidy, 1830: 466. Junior synonym.
Phormia cuprea Robineau-Desvoidy, 1830: 467. Junior synonym.
Phormia fulvifacies Robineau-Desvoidy, 1830: 467. Junior synonym.
Phormia vittata Robineau-Desvoidy, 1830: 467. Junior synonym.
Phormia squalens Robineau-Desvoidy, 1830: 468. Junior synonym.
Musca mollis Walker, 1849: 892. Junior synonym.
Musca bicolor Walker, 1853: 339. Senior synonym; junior primary homonym preoccupied by *Musca bicolor* Villers, 1789: 511, new name for *Musca putris* Geoffroy, 1785: 490 (in Fourcroy, 1785), junior primary homonym, preoccupied by *Musca putris* Linnaeus, 1758: 597, [= *Themira* (*Themira*) *putris* (Linnaeus, 1758) (Sepsidae)].
Musca proxima Walker, 1853: 341. Junior synonym.
Somomya lucens Rondani, 1862: 189. Junior synonym.
Lucilia rufipalpis Jaennicke, 1867: 375. Junior synonym.
Lucilia stigmaticalis Thomson, 1869: 544. Junior synonym.
Somomya nigrina Bigot, 1877b: 247. Junior synonym.
Somomyia rufigena Bigot, 1887: clxxxi. Junior synonym.
Somomyia rupicola Bigot, 1888b: clxxx. Junior synonym.
Phormia aurisquama Villeneuve, 1928: 151. Junior synonym.

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

Remarks: The Black Blowfly is the second most abundant species recorded by Munguia-Ortega in Baja California and ubiquitous throughout California, having been recorded in 46 of the 58 California Counties. It is 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 to James in 1955 by Dr. J. R. Douglas, it ranked third in importance in this role, being placed below *Cochliomyia macellaria* and *Lucilia sericata.* It has a characteristic metallic blueish-green body with bright orange setae in the thoracic spiracle.

Material examined: Baja California: Baja Calif. V. Trinidad, vii-1927 L.M. Huey (SDM); Baja Calif. 26 mi. S. San Felipe, 15-iv-1965 D.Q. Cavagnaro, E.S. Ross, V.L. Vesterby (CAS); (literature review): El Mogor, Sierra Juarez, Sierra San Pedro Martir, Cerro Santo Tomas, Rio Hardy, San Felipe, Punta Final, Representative voucher specimens 2017–19 Ketzaly Munguia-Ortega (ECSR); Baja California Sur: Guadalupe Island, Baja Calif. NE anchorage 25-x-1957 J.W. Sefton Jr. (SDM); Guadalupe Island, Northwest Anchorage ii-14-1973 J.D. Pinto (UCR); Mexico Baja Calif. 2 mi. NNW San Matias, 13 APR 1980 J.W. Brown (SDM); Isla de Guadalupe 23 Apr 1984 D.K. Faulkner (SDM); Isla de Guadalupe, SE end Village Cyn. 9 Dec 1984 D.K. Faulkner (SDM).

Genus *Protocalliphora* Hough 1899

Protocalliphora Hough, 1899a: 66. Type species: *Musca azurea* Fallén 1817: 245 [= *Protocalliphora azurea* (Fallén, 1817)], by original designation.
Avihospita Hendel, 1901: 29. Type species: *Musca azurea* Fallén 1817: 245 [= Protocalliphora azurea (Fallén, 1817)], by original designation. Junior synonym.
Apaulina Hall, 1948: 179. Type species: *Protocalliphora avium* Shannon & Dobroscky, 1924: 249, by original designation. Junior synonym.

Remarks: Nestling bird parasites. 43 species. Characteristics: Members of this genus, in the larval stage, are blood-sucking parasites of nesting birds. (Sabrosky *et al*. 1989). This larval blood-sucking 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, (James 1955).

Protocalliphora asiovora Shannon & Dobroscky 1924

Protocalliphora avium var. asiovora Shannon & Dobroscky 1924: 250. Type Location: USA (Washington State).
Apaulina basingeri Hall 1948: 190. Junior synonym.

Distribution: Western United States, Baja California.

Remarks: Reported infesting nests of many species, especially large birds and raptors.

Material examined: Baja California: Sierra San Pedro Martir, La Grulla, 6900 ft. June 15, 1953 P.H. Arnaud, Jr. (CAS); Baja California Sur: None known.

Protocalliphora beameri Sabrosky, Bennett, & Whitworth 1989

Protocalliphora beameri Sabrosky, Bennett & Whitworth, 1989: 113. Type Location: USA (Arizona).

Distribution: California, Oregon, Washington, Arizona, Utah, Idaho, Baja California.

Remarks: Ecology and biology unknown.

Material examined: Baja California: Sierra San Pedro Martir 2 mi. W. Socorro, 3000 ft. vi-4-1958 J. Howell (2 Paratypes, CAS); Arroyo Santo Domingo 5.7 mi. E. Hamilton Ranch Dam Site, 22-iv-1968 H.B. Leach, Arnaud (CAS); Baja California Sur: None known.

Subfamily LUCILIINAE

Genus *Lucilia Robineau*-Desvoidy 1830

Lucilia Robineau-Desvoidy 1830: 452. Type species: *Musca caesar* Linnaeus, 1758 [= *Lucilia caesar* (Linnaeus, 1758: 595)], by subsequent designation of Macquart 1834: 162.
Lucilla Gimmerthal, 1842: 677. Subsequent misspelling of *Lucilia* Robineau-Desvoidy 1830: 452.
Phaenicia Robineau-Desvoidy, 1863: 750. Type species: *Phaenicia concinna* Robineau-Desvoidy, 1863: 778, by subsequent designation of Townsend 1916b: 8 = *Musca sericata* Meigen, 1826: 53 [= *Lucilia sericata* (Meigen, 1826)]. Junior synonym.
Phoenicia Robineau-Desvoidy, 1863: 900, incorrect original spelling, first revisor Evenhuis *et al*. (2010: 130).
Phenicia Coquillett, 1910: 588. Subsequent misspelling.
Phumonesia Villeneuve, 1914: 307. Type species: *Phumonesia infernalis* Villeneuve, 1914: 307, by original designation. Junior synonym.
Bufolucilia Townsend, 1919: 542. Type species: *Lucilia bufonivora* Moniez, 1876: 25, by original designation. Junior synonym.
Caesariceps Rohdendorf, 1926: 93. Type species: *Lucilia flavipennis* Kramer, 1917: 283, by monotypy = *Lucilia ampullacea* Villeneuve, 1922: 515. Junior synonym.
Francilia Shannon, 1924: 74. Type species: *Francilia alaskensis* Shannon, 1924: 74, by monotypy = *Sarcophaga fuscipalpis* Zetterstedt, 1845: 1306 Junior secondary homonym, preoccupied by *Lucilia fuscipalpis* Macquart, 1834b: 28 (*nomen dubium*).
Roubaudiella Séguy, 1925: 735. Type species: *Roubaudiella caerulea* Séguy, 1925: 735, by monotypy = *Phumonesia infernalis* Villeneuve, 1914: 307. Junior synonym.
Dasylucilia Rohdendorf, 1926: 92. Type species: *Lucilia pilosiventris* Kramer, 1910: 35, by monotypy. Junior synonym.
Luciliella Malloch, 1926: 507. Type species: *Lucilia fumicosta* Malloch, 1926: 507, by original designation (as a subgenus). Junior synonym.
Viridinsula Shannon, 1926: 131. Type species: *Musca pionia* Walker 1849: 880 [= *Lucilia pionia* (Walker 1849)], by original designation (as a subgenus). Junior synonym.
Chaetophaenicia Enderlein, 1936: 211. Type species: *Musca silvarum* Meigen, 1826: 53 [= *Lucilia silvarum* (Meigen, 1826)], by original designation (as a subgenus). Junior synonym.
Acrophagella Ringdahl, 1942: 64. Type species: *Sarcophaga fuscipalpis* Zetterstedt, 1845: 1306 junior secondary homonym, preoccupied by *Lucilia fuscipalpis* Macquart, 1834b: 28 (*nomen dubium*), by original designation.

Remarks: 247 species.; 8 California species. Numerous articles on *Lucilia* have been published in the past and recently using the synonym *Phaenicia*.

Lucilia cuprina (Wiedemann 1830)

Musca cuprina Wiedemann, 1830: 654. Type location: China.
Musca varians Wiedemann, 1830: 655. Junior synonym.
Lucilia amica Robineau-Desvoidy, 1830: 453. Junior synonym.
Lucilia dorsalis Robineau-Desvoidy, 1830: 453. Junior synonym.
Lucilia usta Robineau-Desvoidy, 1830: 456. Junior synonym.
Lucilia elegans Robineau-Desvoidy, 1830: 458. Junior synonym.
Lucilia pubens Macquart, 1844: 137. Junior synonym.
Lucilia argyricephala Macquart, 1846: 326. Junior synonym.
Musca fucina Walker, 1849: 883. Junior synonym.
Musca serenissima Walker, 1853: 340. Junior synonym.
Musca temperata Walker, 1853: 340. Junior synonym.
Phaenicia dorsalis Robineau-Desvoidy, 1863: 770. Changed combination of *Lucilia dorsalis* Robineau-Desvoidy, 1830: 453 = *Lucilia cuprina* (Wiedemann 1830).
Lucilia leucodes Frauenfeld, 1867: 453. Junior synonym.
Somomya pallifrons Bigot, 1877b: 258. Junior synonym.
Strongyloneura nigricornis Senior-White, 1924: 115. Junior synonym.
Lucilia pallescens Shannon, 1924: 78. Junior synonym.
Lucilia pseudosericata Gaminara, 1930: 1264. Junior synonym.

Distribution: China and Japan to India; East Indies; Fiji; Hawaii; Southern United States, Florida to Washington, D.C., and westward to California. Central and South America (Whitworth 2014).

Remarks: Remarkably similar to *L. sericata* in appearance and genetically but often a more coppery color. *L. sericata* can also appear coppery. Common name: Australian sheep blow fly.

Material examined: Baja California: Agua Caliente (San Carlos) 18.5 mi. E of Manadiero 6-viii-1973 P.H. Arnaud Jr. (CAS); Mx-BC Ensenada, coastal sand dunes, bait trap *R. norvegicus*, 8–15 Nov 2018 L. Stotelmyre (SDM); (literature review): El Mogor, Punta Colonet, Sierra Juarez, Sierra San Pedro Martir, Rio Hardy, Representative voucher specimens 2017–19 Ketzaly Munguia-Ortega (ECSR); Baja California Sur: Mx-BCX Cabo San Lucas, dead cow on road, 11 Jan 2019 L. Stotelmyre (SDM); Mx-BCX 5 mi. e. San Jose Del Cabo, coastal sand dunes, 12–16 Jan 2019 L. Stotelmyre (SDM)

Lucilia mexicana Macquart 1844

Lucilia mexicana Macquart 1844: 1844. Type location: "Mexique".
Lucilia unicolor Townsend, 1908: 121. Junior synonym.
Lucilia infuscata Townsend 1908: 123. Junior synonym.

Distribution: Texas, Arizona, New Mexico, Utah, California, and Mexico.

Remarks: Hall says it is a warm-weather species however, not abundant south of Mexico City.

Material examined: Baja California: San Louis Potosi, El Bonito 7 mi. S. Ciudad Valles, 300ft. 19-xii-1970 P.H. Arnaud Jr. (CAS); Agua Caliente (San Carlos) 18.5 mi. E of Manadiero 6-viii-1973 P.H. Arnaud Jr. (CAS)

Baja California Sur: Las Barracas 7-xi-1983 malaise P. DeBach (UCR); Mx-BCS Sierra San Francisco, San Gregorio, 18 Oct 1997 D.K. Faulkner (SDM).

Lucilia sericata (Meigen 1826)

Musca sericata Meigen, 1826: 53. Type location: Austria.
Musca nobilis Meigen, 1826: 56. Senior synonym; junior primary homonym, preoccupied by *Musca nobilis* Gmelin, 1790: 2829, unjustified/unnecessary new replacement name for *Thereva nobilitata* (Fabricius, 1775: 757)(Therevidae).
Chrysomya capensis Robineau-Desvoidy, 1830: 451. Junior synonym.
Musca tegularia Wiedemann, 1830: 655. Junior synonym.
Lucilia pruniosa Meigen, 1838: 294. Junior synonym.
Lucilia flavipennis Macquart, 1844: 139. Junior synonym.
Musca lagyra Walker, 1849: 885. Junior synonym.

Lucilia latifrons Schiner, 1861: 590. Junior synonym.
Phaenicia concinna Robineau-Desvoidy, 1863: 778. Junior synonym.
Lucilia sayi Jaennicke, 1867: 375. Junior synonym.
Lucilia frontalis Brauer & Bergenstamm, 1891: 420. Junior synonym.
Lucilia barberi Townsend, 1908: 121. Junior synonym.
Lucilia giraulti Townsend, 1908: 121. Junior synonym.

Distribution: Cosmopolitan. Recorded abundantly from all continents. Probably the most common blow fly worldwide, certainly, the most common fly encountered indoors by homeowners in California.

Remarks: 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 that were used in maggot therapy. Adults freely enter houses and other buildings, where they may contaminate food. (James 1955), reported it from 35 out of 58 California counties.

Material examined: Baja California: San Felipe 5-iii-1963 P.H. Arnaud Jr. (CAS); 0.5 mi. N. San Vicente 21-iv-1963 Leach & Arnaud (CAS); Arroyo Santo Domingo 5.7mi. E. Hamilton Ranch 23-iv-1963 Leach & Arnaud (CAS); N. foot Red Rock, Hamilton Ranch 24-iv-1963 Leach & Arnaud (CAS); 27.8 mi. S. Tijuana, iii-24-64 M.E. Irwin (UCR); Punta Piedia, N. of Ensenada ix-1-65 seashore S.&S. Frommer (UCR); Dump N. of Bahia de Los Angeles, x dead *Lamna ditropis* 3-v-1968 Richard P. Papp (CAS); Turnoff Mex Hwy 1, 3km. S. Ensenada coastal dunes 18-vii-1977 D. Weissman & C. Mullenex (CAS); Isla de Cedros, vic. Cerro de Cedros, 3 Apr 1983 (SDM); Mx-BC Ensenada, coastal sand dunes, bait trap *R. norvegicus*, 8–15 Nov 2018 L. Stotelmyre (SDM); (literature review): El Mogor, Punta Colonet, Sierra Juarez, Sierra San Pedro Martir, Santa Catarina, Rio Hardy, San Felipe, Representative voucher specimens 2017–19 Ketzaly Munguia-Ortega (ECSR);

Baja California Sur: San Benedicto Island, Revillagigedo Group, iv-30-55 McDonald & Blodget (LACM);

La Paz, el. 25ft. 5 May 1969 Stanley C. Williams (CAS); Mx. Isla De Guadeloupe, SE End Village Cyn. 23 Apr 1984 D.K. Faulkner (SDM); Mx. San Benedicto Island, Herrera Crater, 600' 15 Apr 1987 D.K. Faulkner (SDM); Mx-BCX Cabo Pulmo, coastal sand dunes bait trap, 13–15 Jan 2019 L. Stotelmyre (SDM); Mx-BCX Guerrero Negro, bait trap *R. norvegicus*, 10–16 Jan 2019 L. Stotelmyre (SDM); Mx-BCX San Ignacio, bait trap *R. norvegicus*, 10–16 Jan 2019 L. Stotelmyre (SDM).

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TABLE 2. Working data sheets for Calliphoridae collected in specimen locations in Baja California and in Baja California Sur respectively.

	C. coloradensis	*C. grahami*	*c. latifrons*	*C. livida*	*C .terraenovae*	*C. vomitoria*	*Ch.megacephala*	*Ch. rufifiaces*	*Co. macellaria*	*Co. callipes*	*P. regina*	*Pr. asiovora*	*Pr. beameri*	*L. cuprina*	*L. mexicana*	*L. sericata*
BAJA CALIFORNIA NORTE COLLECTION LOCATIONS	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**
Angel de la Guarda Island, Pond Bay, Gulf of Calif.									x							
Aqua Verde Bay, Gulf of California									x							
Arroyo Santo Domingo 5.7mi. E. Hamilton Ranch			x						x				x			x
Bahia de Los Angeles Bay, Gulf of California									x							
Bahia de Los Angeles, trash dump									x							x
Cerro SantoTomas			x				x	x	x		x					
Colonia Guerrero, 3.2 mi S.	x	x	x													
Conception Bay, Gulf of California									x							
Danzante Bay Island, Gulf of California									x							
El Mayor									x							
El Mogor			x	x			x	x	x		x			x		x
Ensenada, coastal sand dunes			x				x	x	x					x		x
Estero Beach 9 mi. S. Ensenada									x							
Estero Punta Banda, 3 mi. S. Ensenada									x							
Isla Carmen, Belandra Bay, Gulf of Calif.									x							
Isla Ceralbo, Gulf of California									x							
Isla de Cedros, Pacific Ocean									x							x
Isla de Guadalupe, Pacific Ocean			x								x					x
Isla San Estaban, Gulf of California									x							
Isla San Geronimo, Pacific Ocean			x													
Las Arrastras de Arricola, 7 mi. W.			x													
Manadiero, 18.5 mi. E.														x	x	
Maneadero, 2 km N.									x							
Maneadero, 4 mi. S. at Rancho Santa Fe									x							
Mesquital, 20 mi. N.									x							
Mira Flores, 3 mi. N.									x							
Mulege									x							
Pulpito Anchorage, Gulf of California									x							
Punta Colonet			x					x	x					x		x
Punta Final			x				x	x	x		x					
Punta Piedra, 30mi. N. Ensenada									x							x
Rio Hardy	x		x				x	x	x		x			x		x
Rt. 1, 95 km S. of U.S. border									x							
San Domingo									x							
San Esteban Island, Gulf of California									x							
San Evaristo									x							

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TABLE 2. (Continued)

BAJA CALIFORNIA NORTE COLLECTION LOCATIONS	*C. coloradensis*	*C. grahami*	*c. latifrons*	*C. livida*	*C .terraenovae*	*C. vomitoria*	*Ch.megacephala*	*Ch. ruffifaces*	*Co. macellaria*	*Co. callipes*	*P. regina*	*Pr. asiovora*	*Pr. beameri*	*L. cuprina*	*L. mexicana*	*L. sericata*
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**
San Felipe			x				x	x	x		x					x
San Felipe, 26 mi. S.									x		x					
San Ignacio, 10 mi. E.									x							
San Ignacio, 15 mi. N.									x							
San Louis Potosi, 7 mi. S.															x	
San Matias, 5.9 mi. E.			x													
San Pedro									x							
San Vicente, 0.5 mi. N.																x
San Vicente, Arroyo Salado, 3.2 mi. N.									x							
Santa Catarina			x					x	x							x
Santa Cruz Island, Gulf of California									x							
Santa Ines			x													
Sierra Juarez	x	x	x	x	x	x	x	x	x		x			x		x
Sierra San Pedro Martir	x	x	x	x	x	x		x	x	x	x	x	x	x		x
Sierra San Pedro Martir, Rancho Viejo 7000 ft.	x	x	x													
Tijuana, 27.8 mi. S.																x
Valle de la Trinidad											x					

BAJA CALIFORNIA SUR COLLECTION LOCATIONS	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**
Agua Calientes Ridge NW of Jocoque Dam									x							
Bahia Los Muertos beach									x							
Cabo Pulmo, coastal sand dunes							x		x							x
Cabo San Lucas								x	x					x		
Cabo San Lucas, 32 mi. N. Hwy 19 to Todos Santos									x							
El Arco, 25.5 mi. NE. 2300’									x							
El Arco, 28’55”N									x							
El Rosarito, 2.1 mi. NNE. San Nicolas Rd.									x							
El Triunfo							x	x								
Guerrero Negro							x		x							x
Isla Ceralba, Gordes Point, Gulf of Calif.									x							
Isla del Carmen, Gulf of Calif.									x							
Isla Espiritu Santo, Gulf of Calif, 24’25N,110’20W									x							
Isla San Francisco, Gulf of Calif.									x							
Isla San Jose, Amortajada Bay, near La Paz									x							

.....Continued on the next page

TABLE 2. (Continued)

BAJA CALIFORNIA SUR COLLECTION LOCATIONS	*C. coloradensis*	*C. grahami*	*c. latifrons*	*C. livida*	*C .terraenovae*	*C. vomitoria*	*Ch.megacephala*	*Ch. rufifiaces*	*Co. macellaria*	*Co. callipes*	*P. regina*	*Pr. asiovora*	*Pr. beameri*	*L. cuprina*	*L. mexicana*	*L. sericata*
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**
Isla San Jose, Mangroves									x							
La Paz city							x	x	x							x
La Paz, 10 mi. NW.									x							
La Paz, 25 mi. W.									x	x						
Las Animas, Sierra Laguna									x							
Las Barracas									x						x	
Las Gatas, Rancho San Martin							x	x	x							
Loreto							x	x								
Loreto, 2 mi. SW.									x							
Migrino									x							
Mulege, sand dunes 10 km SE.									x							
Punta Arena de la Ventana, coastal sand dunes							x		x							
Rancho Las Cruces							x		x							
San Benedicto Island, Revillagigedo Grp, Pacific Ocean									x							x
San Ignacio			x													x
San Jose Del Cabo									x							
San Jose Del Cabo, 5 mi. E. coastal sand dunes							x		x					x		
San Jose Del Cabo, 5 mi. N.									x							
San Matias, 2 mi. NNW.											x					
San Miguel de Comondo, 21 mi. S.									x							
San Sabastian, Bahia San Nicholas Lat. 26’36” N.									x							
San Vicente			x													
Sierra La Laguna										x						
Sierra San Francisco, San Gregario								x	x						x	
Todos Santos, 25 mi. E. near La Burrera									x							