

## CALIFORNIA BEETLE FAUNISTICS: 100 YEARS AFTER FALL

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### Abstract

In the 100 years since the last comprehensive faunistic treatment of California beetles, there have been many advances in knowledge of the region's Coleoptera diversity. The intervening years' published literature was scoured for additions at both species and higher taxonomic levels. Reviewed here are four families and 25 subfamilies that have been added to the fauna during this period. The state's species list has grown from 3,404 species in 1901 to over 7,300 today. These data establish a baseline for an incipient inventory of the region.

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### Introduction

The year 2001 marked the 100<sup>th</sup> anniversary of Henry Fall's (1901*a*) monumental synthesis of faunistic information for California beetles. No author before or since has provided as thorough an overview of the region's fauna. Appropriately, it also marked the inception of the California Beetle Project by the author of the present paper. This project's first few years have laid important groundwork, and with an infusion of National Science Foundation funding in 2005 it was truly elevated from a plan to a project. To call attention to the project, and to set a baseline for gauging its progress, this paper reviews progress over the past one hundred years of Coleoptera faunistics in California.

While a faunal study based on a politically defined unit may be questionable on biogeographic grounds, in California, the state's boundaries correspond rather well with those of the California Floristic Province. The California Floristic Province (CFP) is recognized on the basis of a highly distinctive biota, as well as one that is unusually diverse for a temperate zone. The CFP has accordingly been recognized as a biodiversity hotspot, due to both its biota and many anthropogenic threats to its existence (Myers *et al.* 2000). This review does not strictly adhere to the California Floristic Province boundary, as many unique elements of California's beetle fauna occur in the southeastern deserts, considered to lie outside the CFP proper. From a management perspective, these faunal elements are also of great concern to Californian biologists.

California's beetle fauna has intrigued naturalists from its earliest explorations. Evans and Hogue (2004) provide a valuable overview of the history of California Coleopterology, which I only briefly recap here. Some of the earliest significant work on beetle faunistics was by Russian explorers in the north coast region in the late 18<sup>th</sup> and early 19<sup>th</sup> centuries. These collections resulted in the description of several hundred California beetle species, principally by Dejean (1833), Mannerheim (1843, 1852, 1853), and Motschulsky (1859). The later 19<sup>th</sup> century brought a wave of American colonizers from the east, along with their armies, and especially their doctors; J. L. LeConte and G. Horn both spent time in California, making and describing significant collections. LeConte's (1859) list of the Coleoptera found around Ft. Tejon (Kern County, 34°55'N, 118°53'W, along Interstate 5) was the region's first truly faunistic

paper. Compiled from collections made by John Xantus de Vesey, as well as by LeConte himself and others (Davis 1932), this paper provided the first taxonomically inclusive snapshot of the region's beetle fauna.

Henry Clinton Fall (b.1862–d.1939) moved to southern California in 1889, and quickly became an authority on the region's beetle fauna. He published a few small faunistic papers in the early 1890s (*e.g.*, 1893, 1894), followed by a treatment of the beetle fauna of the California Channel Islands (1897), and then his magnum opus (insofar as California faunistics is concerned), 'A List of the Coleoptera of Southern California', in 1901 (1901*a*). In addition to its explicit focus, this paper in fact listed all species known to occur in California at the time, totaling 3,404. This was far more than a simple list – Fall included detailed notes on habitat associations, distributions, rarity, and taxonomic validity, all presented with a distinctive intellectual grace. This outstanding synthesis set a solid foundation for regional faunistics in the 20<sup>th</sup> century, and inspired the present project. In the intervening years, while many talented taxonomists have contributed tremendously to our knowledge of selected elements of the fauna, few have attempted to build on this foundation for the fauna as a whole. A few exceptions, especially the update of LeConte's Ft. Tejon list by Davis (1932), and more so, Ian Moore's (1937) list of beetles from San Diego County, have taken a broad taxonomic view, though narrow geographically. Evans and Hogue have recently done much to popularize this fauna as well (2004 and in press). A wealth of data exist to create a coherent, if still incomplete, picture of the region's beetle fauna. But they are scattered in literally thousands of publications, of varied, mostly limited, accessibility. Making the case for the value of beetles in this unique region's conservation management requires that these data be consolidated and made accessible. This paper is the first modern step toward this objective.

### Methods

I focus here exclusively on advances in faunistic knowledge as reflected in the published literature. Admittedly, many living systematists are aware of additional taxa occurring in the region that have not been officially reported. Such 'knowledge' is insecure, and often destined to oblivion. It is in part hoped that the present paper speeds publication of additional significant records and new taxa.

As for what records to include, it is acknowledged that the line between traditional publication and electronic publication is becoming increasingly blurry. As more collections make specimen data available online, many of these known but unpublished (and generally un-peer-reviewed) records will become available. Fortunately or not, this is not an issue for this review, as there is as yet virtually no California beetle data available in electronic form. Future reviews will have to tread a careful path between records published through peer-review, and those posted directly to the web, with varied degrees of reliability.

This paper focuses primarily on higher taxa, mainly families and subfamilies, known to occur in the region. Beyond searching the literature for reports of these higher taxa since 1901, I have also compiled provisional modern species lists for all families of California beetles, and compare their increases in known diversity since 1901. For some families, and many less inclusive taxa, no modern revisions exist, and for these my totals will include many species of dubious status. At the same time, the region's fauna contains hundreds to thousands of yet undescribed species, so these numbers are meant only to indicate our present knowledge, and will in few cases correspond to the state's true diversity. These species lists are available through the project website (<http://www.sbnature.org/calbeetles>). It is worth noting that the species totals given here do not distinguish between historical and modern records of species. Many of these have

not been officially recorded since, and some may no longer be found in California. Finally, this paper is concerned mainly with California's native fauna, though higher taxa known to be present through introduction are noted as well.

Coleoptera higher classification has changed tremendously in the past 100 years. I use the classification of Lawrence *et al.* (1999), as modified by Slipinski and Lawrence (1999). For all historic species records, only their current higher classification is considered. That is, all species reported by Fall (1901a) and others are cited here in their current higher taxa. Higher taxa new to the region only by virtue of taxonomic changes (priority of other names, elevation of tribes, subfamilies, etc.) are not discussed.

## Results

Of 111 families of Coleoptera currently known to occur in California, four (3.5%), Glaresidae, Diphyllostomatidae, Brachypsectridae and Derodontidae, have been first reported since Fall's (1901a) California list was published (Table 1). The first two of these were reported from the state by Fall himself shortly thereafter (1901b, 1907a, respectively). Brachypsectridae were a slightly later addition (Blair 1930), and Derodontidae by far the most recent (Lawrence and Hlavac 1979). A slightly higher percentage of subfamilies, 25 of 278 (8.9%; ignoring 32 families in which Lawrence *et al.* [1999] recognize no subfamilies), are among the last century's additions. Two of these, Erotylidae: Megalodacninae and Mycteridae: Hemipeplinae represent accidental introductions, while the rest are native taxa. Among the natives, the dates of first report are also more evenly distributed than for families, with several in the 1970s, '80s and even the '90s. The most recent subfamily level additions were both in 1992: Staphylinidae: Empelinae (Newton and Thayer 1992) and Pyrochroidae: Tydessinae (Pollock 1992).

While knowledge of the higher level fauna of California has grown slowly over the past 100 years, knowledge of species diversity in the state has increased tremendously (Table 2). Where Fall (1901a) reported 3,404 species as occurring in the state, there are now more than twice as many (7,376) described. Known species diversity in several larger families has nearly tripled.

## Accounts of Higher Taxa

### Polyphaga: Staphyliniformia

**Agyrtidae: Pterolomatinae.** The species *Apteroloma tenuicorne* (LeConte 1859) was known at the time of Fall's (1901) review. But it had not yet apparently been found in California (having been described from Washington's Puget Sound area; Peck and Miller 1982). Fall's (1907b) description of *Pteroloma* (now *Apteroloma*) *caraboides* was the first report of this genus and subfamily from the state. In addition to the above two species, *A. tahoecum* (Fall 1927) was also described from California.

**Leiodidae: Platypsyllinae.** The ectoparasitic platypsylline *Leptanillus aplodontiae* Ferris (1918), described from Plumas County, was the first member of this leiodid subfamily to be recognized from California. Much later, in 1952, the species now known as *Leptinus occidentoamericanus* Peck was reported for the state (as *L. testaceus* Müller; Gould and Beal 1952; Peck 1982). *Platypsyllus castoris* Ritsema is also known to occur in California (Arnett 1963).

**Staphylinidae: Empelinae.** The monotypic Empelinae contains only *Empelus brunnipennis* (Mannerheim), described originally from Alaska. It is both rare and enigmatic, having spent much of its taxonomic history in the Clambidae (*e.g.*, Leng

TABLE 1. Families and subfamilies of Coleoptera reported to occur in California (\* = not mentioned in Fall (1901a); † = not native to California).

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ARCHOSTEMATA

**Cupedidae**

MYXOPHAGA

**Hydroscaphidae**

**Microsporidae**

ADEPHAGA

**Gyrinidae:** Gyrininae

**Haliplidae**

**Trachypachidae**

**Amphizoidae**

**Dytiscidae:** Copelatinae, Laccophilinae, Hydroporinae, Colymbetinae, Dytiscinae

**Rhysodidae**

**Carabidae:** Paussinae, Omophrinae, Carabinae, Cicindelinae, Loricarinae, Elaphrinae, Scaritinae, Trechinae, Harpalinae, Pseudomorphinae, Brachininae.

POLYPHAGA

Hydrophiloidea

**Hydrophilidae:** Helophorinae, Georissinae, Hydrochinae, Hydrophilinae, Sphaeridiinae

**Sphaeritidae**

**Histeridae:** Abraeinae, Saprinae, Dendrophilinae, Onthophilinae, Tribalinae, Histerinae, Hetaerinae.

Staphylinoidea

**Hydraenidae:** Hydraeninae, Ochthebiinae

**Ptiliidae:** Ptiliinae, Nanosellinae, Acrotrichinae

**Agyrtidae:** Agyrtinae, Necrophilinae, \*Pterolomatinae

**Leiodidae:** Catopocerinae, Leiodinae, Coloninae, Cholevinae, \*Platypsyllinae

**Scydmaenidae:** Mastiginae, Scydmaeninae

**Silphidae:** Silphinae, Nicrophorinae

**Staphylinidae:** Omaliinae, \*Empelinae, Proteininae, Micropeplinae, Dasycerinae, Pselaphinae, \*Phloeocararinae, \*Olisthaerinae, Tachyporinae, \*Trichophyinae, Habrocerinae, Aleocharinae, Trigonurinae, Scaphidiinae, Piestinae, Osoriinae, Oxytelinae, Oxyporinae, Steninae, \*Euaesthetinae, \*Leptotyphlinae, Pseudopsinae, Paederinae, Staphylininae

Scarabaeoidea

**Lucanidae:** Syndesinae, Lucaninae

**Trogidae**

**\*Glaresidae**

**Pleocomidae**

**\*Diphyllostomatidae**

**Geotrupidae:** Bolboceratinae, \*Geotrupinae

**Ochodaeidae:** Ochodaeinae, \*Chaetocanthinae

**Hybosoridae**

**Glaphyridae**

**Scarabaeidae:** Aphodiinae, Scarabaeinae, Melolonthinae, Rutelinae, Dynastinae, Cetoniinae

Scirtoidea

**Eucinetidae**

**Clambidae:** Clambinae

**Scirtidae**

Dascilloidea

**Dascillidae:** Dascillinae, Karumiinae

Rhipiceridae

Buprestoidea

**Buprestidae:** Schizopodinae, Buprestinae, Agrilinae

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**Table 1.** Continued.Byrrhoidea**Byrrhidae:** Byrrhinae, Syncalyptrinae, Amphicyrtinae**Elmidae:** Larainae, Elminae

Dryopidae

**Limnichidae:** Limnichinae, Cephalobyrrhinae**Heteroceridae:** Heterocerinae**Psephenidae:** Eubriinae, Eubrianacinae, Psepheninae**Ptilodactylidae:** Anchyrtarsinae, \*Araeopidiinae**Eulichadidae**Elateroidea**Artematopodidae:** Artematopodinae\***Brachypsectridae****Cerophytidae****Eucnemidae:** Perothopinae, Phyllocerinae, Palaeoxeninae, Melasinae, Eucneminae, Macraulacinae**Throscidae****Elateridae:** Cebrioninae, Lissominae, Semiotinae, Pityobiinae, Agrypninae, Denticollinae, Negastrinae, Elaterinae, Cardiophorinae**Lycidae:** Lycinae, Erotinae, Calochrominae**Phengodidae****Lampyridae:** Pterotinae, \*Ototretinae, Lampyrinae**Omethidae:** Matheteinae, \*Omethinae**Cantharidae:** Cantharinae, Silinae, Malthininae, \*ChauliognathinaeDerodontoidea\***Derodontidae:** \*Peltasticinae, \*Derodontinae, \*LaricobiinaeBostrichoidea**Nosodendridae****Dermestidae:** Dermestinae, Orphilinae, †Thylodriinae, Attageninae, Egidyellinae, Megatominae**Bostrichidae:** Polyaoninae, Bostrichinae, Psolinae, Dinoderinae, Lyctinae**Anobiidae:** Euradinae, Ptininae, Emobiinae, Anobiinae, Ptilininae, Xyletininae, Dorcatominae, MesocoelopodinaeCleroidea**Trogossitidae:** Peltinae, Lophocaterinae, Calitinae, Trogossitinae**Cleridae:** Thaneroclerinae, Tillinae, Hydnocerinae, Clerinae, Epiphloeinae, Enopliinae, Korynetinae**Melyridae:** Rhadalinae, Dasytinae, MalachiinaeCucujoidea**Sphindidae:** Odontosphindinae, \*Sphindinae**Kateretidae****Nitidulidae:** Carpophilinae, Meligethinae, Nitidulinae, Cillaeinae, Cryptarchinae, Cybocephalinae**Smicripidae****Monotomidae:** Rhizophaginae, Monotominae**Silvanidae:** Brontinae, Silvaninae**Cucujidae****Laemophloeidae****Phalacridae:** Phalacrinae**Cryptophagidae:** Cryptophaginae, Atomariinae**Languriidae:** Languriinae**Erotylidae:** Dacninae, \*†Megalodacninae, Tritominae**Byturidae:** Byturinae**Biphyllidae****Bothrideridae:** Teredinae, Bothriderinae**Cerylonidae:** Ceryloninae

Table 1. Continued.

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<b>Endomychidae:</b> Merophysiinae, Leiestinae, Endomychinae, Lycoperdininae, Mycetaeinae, Anamorphinae, Xenomycetinae
<b>Coccinellidae:</b> Sticholotidinae, Coccidulinae, Scymninae, Chilocorinae, Coccinellinae
<b>Corylophidae:</b> Peltinodinae, Corylophinae, Orthoperinae
<b>Latridiidae:</b> Latridiinae, Corticariinae
<u>Tenebrionoidea</u>
<b>Mycetophagidae:</b> Mycetophaginae, Bergininae
<b>Ciidae:</b> *Sphindociinae, Ciinae
<b>Tetratomidae:</b> *Piseninae, Tetratominae
<b>Melandryidae:</b> Hallomeninae, Eustrophinae, Melandryinae, Osphyinae
<b>Mordellidae:</b> Mordellinae
<b>Rhipiphoridae:</b> Rhipiphorinae
<b>Zopheridae:</b> Zopherinae, Colydiinae
<b>Tenebrionidae:</b> Lagriinae, Pimeliinae, Tenebrioninae, Alleculinae, Diaperinae, Coelometopinae
<b>Prostomidae</b>
<b>Oedemeridae:</b> Calopodinae, Oedemerinae
<b>Stenotrachelidae:</b> Cephaloinae
<b>Meloidae:</b> Meloinae, Nemognathinae
<b>Mycteridae:</b> Mycterinae, Lacconotinae, *†Hemipeplinae
<b>Pythidae</b>
<b>Pyrochroidae:</b> *Tydessinae, Pedilinae, Pyrochroinae, Agnathinae
<b>Salpingidae:</b> Othniinae, †Agleninae, Salpinginae, Aegialitinae, Dacoderinae
<b>Anthicidae:</b> Eurygeniinae, *Ischaliinae, Anthicinae
<b>Aderidae</b>
<b>Scraptiidae:</b> Scraptiinae, Anaspidinae
<u>Chrysomeloidea</u>
<b>Cerambycidae:</b> Parandrinae, Prioninae, Spondylidinae, Necydalinae, Lepturinae, Cerambycinae, Lamiinae
<b>Megalopodidae:</b> Zeugophorinae
<b>Orsodacnidae:</b> Orsodacninae, Aulacoscelidinae
<b>Chrysomelidae:</b> Bruchinae, Donaciinae, Criocerinae, Hispinae, Chrysomelinae, Galerucinae, Cryptocephalinae, Eumolpinae
<u>Curculionoidea</u>
<b>Nemonychidae:</b> Doydirhynchinae
<b>Anthribidae:</b> Anthribinae
<b>Attelabidae:</b> Rhynchitinae
<b>Brentidae:</b> Apioninae
<b>Curculionidae:</b> Brachycerinae, Curculioninae, Dryophthorinae, Cossoninae, Scolytinae, *Platypodinae

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1920; Arnett 1963). This species does not appear to have been reported from California before Newton and Thayer (1992), where the subfamily was formally named.

**Staphylinidae: Phloeocharinae.** This subfamily's membership has varied significantly over the years. Currently three species, in three different genera are known to occur in California. The first of these to be reported was *Ecbletus leechi* Moore, from its original description (Moore 1965), from the central Sierra Nevada. The other two species, *Dytoscotes pacificus* Smetana & Campbell and *Phloeocharis californicus* Smetana & Campbell, were both described quite recently (Smetana and Campbell 1980). The first was described from Oregon, and appears only to have been reported in California by Newton *et al.* (2001) in American Beetles.

**Staphylinidae: Olisthaerinae.** It is unclear if this subfamily occurs in California or not. The Holarctic *Olisthaerus megacephala* (Zetterstedt) is listed by Leng (1920) from

TABLE 2. All families of Coleoptera reported to occur in California, with numbers of species as published by Fall (1901a) and at present.

Superfamily (Suborder)	Family	Fall, 1901	Recent count
(Archostemata)	Cupedidae	2	2
(Myxophaga)	Hydrosaphidae	1	1
	Microsporidae	1	1
(Adephaga)	Gyrinidae	4	9
	Halplidae	3	14
	Trachypachidae	2	2
	Amphizoidae	1	1
	Dytiscidae	59	157
	Rhysodidae	1	2
	Carabidae	365	691
Hydrophiloidea	Hydrophilidae	57	123
	Sphaeritidae	1	1
	Histeridae	80	159
Staphylinoidea	Hydraenidae	16	49
	Ptiliidae	17	18
	Agyrtidae	2	5
	Leiodidae	27	74
	Scydmaenidae	17	42
	Silphidae	6	10
	Staphylinidae	485	1179
Scarabaeoidea	Lucanidae	10	9
	Trogidae	5	8
	Glaresidae	0	9
	Pleocomidae	7	19
	Diphyllostomatidae	0	3
	Geotrupidae	3	5
	Ochodaeidae	1	4
	Hybosoridae	1	1
	Glaphyridae	5	6
	Scarabaeidae	111	291
Scirtoidea	Eucinetidae	1	2
	Clambidae	1	2
	Scirtidae	6	8
Dascilloidea	Dascillidae	3	3
	Rhipiceridae	1	2
Buprestoidea	Buprestidae	95	306
Byrrhoidea	Byrrhidae	3	13
	Elmidae	7	24
	Dryopidae	3	5
	Limnichidae	9	13
	Heteroceridae	5	10
	Psephenidae	4	3
	Ptilodactylidae	1	2
	Eulichadidae	1	1
Elateroidea	Artematopodidae	4	5
	Brachypsectridae	0	1
	Cerophytidae	1	1
	Eucnemidae	9	13
	Throscidae	6	5
	Elateridae	150	270
	Lycidae	5	7
	Phengodidae	6	9

**Table 2.** Continued.

Superfamily (Suborder)	Family	Fall, 1901	Recent count
	Lampyridae	5	18
	Omethidae	1	8
	Cantharidae	50	153
Derodontoidea	Derodontidae	0	4
Bostrichoidea	Nosodendridae	1	1
	Dermestidae	24	66
	Bostrichidae	21	29
	Anobiidae	48	133
Cleroidea	Trogossitidae	10	32
	Cleridae	31	70
	Melyridae	154	286
Cucujoidea	Sphindidae	1	2
	Kateretidae	4	6
	Nitidulidae	28	53
	Smicripidae	1	1
	Monotomidae	8	18
	Silvanidae	8	8
	Cucujidae	2	6
	Laemophloeidae	10	13
	Phalacridae	12	19
	Cryptophagidae	8	41
	Languriidae	2	3
	Erotylidae	3	6
	Byturidae	1	2
	Biphyllidae	1	1
	Bothrideridae	2	3
	Cerylonidae	4	5
	Endomychidae	6	13
	Coccinellidae	73	182
	Corylophidae	6	14
	Latridiidae	45	59
Tenebrionoidea	Mycetophagidae	5	6
	Ciidae	14	28
	Tetratomidae	1	5
	Melandryidae	5	14
	Mordellidae	9	26
	Rhiphoridae	4	19
	Zopheridae (incl. Colydiinae)	28	39
	Tenebrionidae <sup>1</sup>	268	453
	Prostomidae	1	1
	Oedemeridae	19	23
	Stenotrachelidae	3	4
	Meloidae	36	110
	Mycteridae	4	7
	Pythidae	1	3
	Pyrochroidae	14	31
	Salpingidae	7	11
	Anthicidae	64	106
	Aderidae	4	5
	Scaptiidae	8	13
Chrysomeloidea	Cerambycidae	163	360
	Megalopodidae	2	5
	Orsodacnidae	2	2
	Chrysomelidae	180	420

**Table 2.** Continued.

Superfamily (Suborder)	Family	Fall, 1901	Recent count
Curculionoidea	Nemonychidae	3	5
	Anthribidae	5	11
	Attelabidae	8	18
	Brentidae	16	34
	Curculionidae (incl. Scolytinae)	349	762
<b>All Coleoptera</b>		<b>3404</b>	<b>7376</b>

<sup>1</sup>This total for Tenebrionidae is particularly uncertain.

the state. Arnett (1963) hedges a bit on this, indicating that *Olisthaerus* comprises “two species, apparently one in California.” In 2001, Newton *et al.* (2001) give only “Alaska and across Canada to Quebec,” for both species of *Olisthaerus*. I can find no other records for its occurrence in California.

**Staphylinidae: Trichophyinae.** California is home to a single trichophyine, *Trichophya tarsalis* (Casey 1886). The species had been in fact described (as *Eumitocerus tarsalis*) from California, prior to Fall’s (1901a) treatment, but was among his very few accidental omissions.

**Staphylinidae: Euaesthetinae.** Two euaesthetine genera are presently known from California, each with one species: *Stictocranius mariae* (Hatch) and *Fenderia capizzii* Hatch. These were both first described in Hatch’s (1957) ‘Beetles of the Pacific Northwest’ (as Osoriinae). A paratype of the latter was from Crescent City (Del Norte Co.), California.

**Staphylinidae: Leptotyphlinae.** The Leptotyphlinae is a very obscure group of tiny, blind, soil-dwelling staphylinids. California is home to twelve described species (in seven genera). Coiffait (1962) described the first ten of these, though it seems they were first mentioned in his earlier (Coiffait 1959) monograph (Gusarov 2003). This group is currently under revision by Vladimir Gusarov, who has speculated California may be home to over 1000 species of the subfamily (Gusarov 2004).

### Polyphaga: Scarabaeiformia

**Diphyllostomatidae.** Though not mentioned in his 1901 summary, Fall described the California endemic genus *Diphyllostoma*, and the first of its three species, *D. fimbriata* Fall, later the same year (Fall 1901b). Originally considered an aberrant lucanid, *Diphyllostoma* is now considered the sole representative of the family Diphyllostomatidae.

**Geotrupidae: Geotrupinae.** Geotrupine Geotrupidae were reported in Fall (1901a) from California, as represented by *Geotrupes occidentalis* Horn. This species, however, was later argued to be an erroneous record, and a synonym of the Old World *G. laevistriatus* Motschulsky (Robinson 1938). The first confirmed native geotrupine from the state was the surprising *Ceratophyus gopherinus* Cartwright (1966). This lone New World representative of an otherwise Palearctic genus is only known from the sandy soils of western Santa Barbara County. Though Cartwright himself originally doubted that the species was native to North America, it is very distinct from any known Old World species (Cartwright 1966).

**Ochodaeidae: Chaetocanthinae.** This ochodaeid subfamily contains four genera, of which only the monotypic *Pseudochodaeus* Carlson & Ritcher occurs in the Western Hemisphere. Though its lone species *P. estriatus* (Schaeffer) was originally described as an *Ochodaenus* (Schaeffer 1906), recent authors have found it to be phylogenetically distinct (Carlson and Ritcher 1974; Scholtz *et al.* 1988).

**Glaresidae.** The genus *Glaresis* was known from the southwestern United States prior to 1901, but none of its species had been recorded from California. The first was *Glaresis ecostata* Fall (1907a), though later some of Horn's previously described species have later also been found to occur in the state.

### **Polyphaga: Elateriformia**

**Ptilodactylidae: Araeopidiinae.** This subfamily contains the single genus *Araeopidius* Cockerell, with one species, *A. monachus* (LeConte 1874), described originally from Oregon. It was apparently not noted to occur in California until Lawrence (1991) illustrated and briefly described a larva from Trinity County. Lawrence (1991), however, also indicates that this larva was unknowingly cited from California, incorrectly as that of *Helichus* (Dryopidae), as early as 1956 (Leech and Chandler 1956). Shepard (1993) calls the species 'widespread in northern California'.

**Brachypsectridae.** The 'Texas beetle', *Brachypsectra fulva* LeConte, has had a convoluted faunistic history. It is unusual in that it was first known from California from its larva, rather than its adult. Its distinctive larva was apparently first found in California in 1892 (Fleenor and Tabor 1999), and again found and described in some detail by H. S. Barber (1905). However, its identity was not known until Blair (1930) recognized a similar larva that had been reared in India. It is possible that adults still have not been collected in California (Fleenor and Tabor 1999).

**Lamypridae: Otoretinae.** In California, the lampyrid subfamily Otoretinae is represented only by two species in the genus *Brachylampis* Van Dyke. These species, *B. blaisdelli* Van Dyke and *B. sanguinicornis* Van Dyke, were both described from the state in 1939 (Van Dyke 1939).

**Omethidae: Omethinae.** Prior to 1901 *Matheteus theveneti* LeConte (Matheteinae) was the only species of this family known from California. The state's other matheteine genus, *Ginglymocladius* Van Dyke, was described in 1918, and the three genera (and four species) of Omethinae weren't described until the 1970s. *Troglomethes* Wittmer and *Symphyomethes* Wittmer were founded on one and two new species, respectively, all with Californian type localities (Wittmer 1970). The genus *Malthomethes* Fender (1975), and its lone species *M. oregonus* Fender, were not reported from California until 2002 (Ramsdale 2002).

**Cantharidae: Chauliognathinae.** Chauliognathinae is reportedly represented in California by three species of *Chauliognathus* (*C. lewisi* Crotch, *C. fasciatus* LeConte, and *C. discus* LeConte). All of these records appear first in Fender (1964a, b). The first two were reported only from the eastern Mojave, where many subtropical taxa reach their northwestern limits. The other was reported from 'Medea', a somewhat ambiguous locality. There is presently a Medea Creek in northern Los Angeles County, but I cannot find any historical town of that name. The species was only otherwise reported from south-central Arizona and eastward, and its occurrence in California seems questionable.

**Derodontidae.** California is presently known to have four species of Derodontidae, in three genera (each in its own subfamily), none of which were known to Fall in 1901. Fall himself later described *Laricobius laticollis*, though from Washington state (Fall 1916). I have not found records of it or any of California's other species (*Peltasticta tuberculata* Mannerheim, *Derodontus trisignatus* (Mannerheim), and *D. unidentatus* Lawrence) specifically from California until Lawrence and Hlavac's (1979) review of the family.

### Polyphaga: Cucujiformia

**Sphindidae: Sphindinae.** In 1901, the only sphindid known from California was the odontosphindine *Odontosphindus clavicornis* Casey. Sphindinae were not reported for the state until Lawrence & Newton (1980) cited *Sphindus crassulus* Fall (which had been described from Colorado) as feeding on Myxomycetes in the state, without specific locality.

**Erotylidae: Megalodacninae.** The eastern U.S. species *Megalodacne fasciata* (F.) is apparently established in northern California. Kitayama (1986) first reported the species from several localities in the north-central Sierra Nevada.

**Ciidae: Sphindocinae.** Sphindocinae is a monotypic subfamily of ciid beetles. Its only genus and species, *Sphindocis denticollis* Fall, was described from Alameda County, California, in 1917 (Fall 1917).

**Tetratomidae: Piseninae.** Piseninae is represented in California by the single species *Triphyllia elongatus* (LeConte 1875). It was originally described from Alaska (or 'Russian America'). Its distribution was given by both Leng (1920) and Arnett (1963) as 'Alaska and southward', in Arnett, followed by a question mark. The first definite record from California appears when Lawrence (1974) lists it (as *Eupisenus elongatus*) among California beetles likely to be confused with ciids.

**Mycteridae: Hemipeplinae.** It is not certain that *Hemipeplus* currently occurs in California. Arnett (1963) reports that it was introduced with 'cabbage palms' (*Sabal* spp.) at one point. However, it has not been mentioned in the literature since as occurring in the state, and specimens representing the original supposed introduction are unknown (Thomas 1985).

**Pyrochroidae: Tydessinae.** The only species of Tydessinae in North America is *Tydesa blaisdelli* Pollock, known from California and Nevada. This species, reported in California from Lake and Lassen counties, was described in 1992 (Pollock 1992), though the holotype specimen had been collected by F. E. Blaisdell in 1911.

**Anthicidae: Ischaliinae.** The subfamily Ischaliinae contains only the single genus *Ischalia*. Young (1985) indicates that California possess two species of *Ischalia*, *I. vancouverensis* Harrington and *I. californica* Van Dyke (1938). Though *I. vancouverensis* was described in the late 1800s (Harrington 1892), it was not known from California in 1901. Leng (1920) cites this species as occurring in California. Yet Young (1975) cites only the later *I. californica* from the state, not recognizing *I. vancouverensis* as Californian until describing its larva from collections made in Butte County (Young 1985).

**Scraptiidae: Scraptiinae.** *Allopora* LeConte is the only genus of Scraptiinae occurring in California. Its sole Californian species is *A. californica* Schaeffer (1917).

**Curculionidae: Platypodinae.** Among weevil subfamilies (either in the six subfamily system of Lawrence *et al.* [1999] or the more highly split eighteen subfamily system of Anderson [2002]), only Platypodinae was not recognized as occurring in California by Fall (1901a). Given their importance in forestry, one would expect platypodids to have been detected quite early. California's sole species, *Treptoplatypus wilsoni* (Swaine), is widespread in the state (Bright and Stark 1973). But the first mention I have found is in Essig's (1926) 'Insects of Western North America'.

### Discussion

What is most surprising about the above list of 'recently' added higher taxa to the state's fauna is how short it actually is. California's early collectors, especially Fall himself, did a remarkable job of documenting a diverse fauna, during times when many

areas were very difficult to access. And several of the taxa Fall missed in 1901 were added by him within just a few subsequent years.

The largest subset of recent additions among California's higher taxa are small litter or soil inhabitants (e.g., *Empelus*, *Trichophya*, Leptotyphlinae). This is probably reflective of a true shift in collecting methods. The richness of the leaf litter fauna might have been vaguely realized during Fall's time, but it wasn't until much later that litter sifting and the use of Berlese-type apparatus became commonplace. Other than these, there is little most of these share in biology that would explain their late discovery. Many are still considered very rare taxa, despite their being rather widespread (e.g., *Apteroloma*, *Araeopidius*, Omethinae, *Brachylampis*, *Brachypsectra*, *Ischalia*, *Tydessia*, *Triphyllia*). In part their rarity may have to do with their disinclination to be trapped (rarely attracted to light or common baits). But even when found, these are rarely if ever abundant, and they may truly exist at very low densities. *Ceratophyus gopherinus* is in a category by itself, an extremely localized species, known from only a few square miles. This is especially surprising in that it's a rather large (>10 mm) beetle. The CFP is home to many such localized *species*, but most are representatives of diverse and widespread lineages. Given the certainty that many such narrowly distributed isolates remain to be discovered, we must admit the possibility that additional lonely relicts may also persist in some of the less-explored parts of the state.

Several of the post-Fall additions owe their relative obscurity to geography, with their ranges extending only marginally into California. This particularly applies to desert (*Glaresis*, *Brachypsectra*, *Chauliognathus*), and north coastal (*Empelus*, *Euaesthetus*) elements. While explorations of both of these areas began relatively early, with the Russian presence along the north coast, and the U.S. Army's presence at Yuma along the Colorado River, they have nevertheless never been easily accessible, and remain difficult places to conduct fieldwork. Additional surveys in either area will likely yet turn up additional unrecorded taxa.

While we may be near knowing our full complement of higher beetle taxa, there is no question that we have a long way to go in knowing the California fauna at the species level. The past hundred years have seen more than a doubling of the state's known beetle diversity. Though the rate of species description in the region has declined in recent decades, this is due almost as much to a shift in effort to other areas as to a true nearing of any kind of asymptote. The remaining increases will mostly be in small-bodied, relatively obscure taxa, but great increases are there to be realized. Easily several hundred new species of California beetles are already known in collections, and as many probably exist unrecognized in collections. How many have yet to be collected at all is anyone's guess. A fauna of over 9,000 species is almost certain, and 10,000 is possible. That such uncertainty remains regarding one of the best-studied, and most populous areas in the world should be both humbling and motivating. We know nowhere near as much as we should, but there may be great discoveries waiting under every rock.

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