BEETLES OF SANTA BARBARA ISLAND, CALIFORNIA (COLEOPTERA)

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INTRODUCTION

Santa Barbara Island, with an area of 2.6 km^2 (1 mi^2), is the smallest of the eight California Channel Islands. It is part of Channel Islands National Park and is in Santa Barbara County (not Los Angeles County as indicated by many maps and locality labels). Santa Barbara Island lies 61 km (38 mi) from the nearest point on the California mainland, and 39 km (24 mi) from the nearest island, Santa Catalina (Philbrick 1972).

Prominent features on the island are Signal Peak (193 m, 637 ft) and North Peak (171 m, 564 ft), which are connected by a low north-south trending ridge (for maps and photographs see Lipps et al. 1968, Philbrick 1972, Rentz and Weissman 1982). From this ridge, gradually undulating alluvial slopes and marine terrace deposits recede to the shoreline, most of which is rocky and extremely precipitous. Sandy beaches are absent, and most of the rocky littoral is submerged at high tide.

Rainfall monitored by Dunkle (1950) indicate average annual precipitation to be 296 mm (11.84 in). Weissman and Rentz (1977) examined rainfall data during that period on other islands, concluding that Dunkle's measurements represented a wetter than normal period. Annual average precipitation is probably closer to 175-250 mm (7-10 in), usually occurring between October and April. However, dense fogs are frequent throughout the dry months. Although very small temporary seeps have been reported, there is no permanent fresh water on the island (Philbrick 1972). The average temperature varies slightly during the year, with extremes of 34.5° C (94° F) and 4° C (39° F) (Dunkle 1950). Temperature and soils are strongly influenced by wind which averages more than 27 km per hour (16.8 mph) at exposed sites and about 12.6 km per hour (7.8 mph) at sheltered sites (Philbick 1972).

The geology of the region is complicated and poorly understood, so eustatic and tectonic causes of changes in island elevation and submergence are hard to differentiate (Lipps et al. 1968, Miller 1984). During the Middle Pleistocene, most of the Channel Islands (apparently including Santa Barbara Island) were submerged with only the higher parts of the larger islands remaining above water (Johnson 1978). Thus the biota of the island has probably arrived since Middle Pleistocene. Late Pleistocene climate in southern California probably had mild winters resembling modern winters and summers which were cooler and more moist than present (Johnson 1977, Miller and Peck 1979). The Holocene brought summer drought conditions and resultant increases in seasonality.

During the winter and spring, Santa Barbara Island is mostly covered with suffrutescent and herbaceous plants, while in the dry season the vegetation becomes dormant and the island appears bare and grayish brown (Philbrick 1972). Vegetation consists predominately of grassland, coastal bluff (much in the iceplant phase), and maritime scrub plant communities. Woodland, chaparral, riparian, and beach communities are absent. Major portions of the slopes are covered with introduced grasses and iceplant,

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but of the 96 total vascular plant species, 68 are native (Philbrick 1972).

Only two terrestrial vertebrates occur on Santa Barbara Island: The endemic island night lizard shared with San Nicolas and San Clemente Islands (Bezy et al. 1980), and a supposedly endemic subspecies of deer mouse (Gill 1980). The hoary bat (Brown 1980), California sea lion, harbor seal and northern elephant seal (Le Boeuf and Bonnell 1980) also occur on Santa Barbara Island. Bird diversity is discussed by Hunt and Hunt (1974) and Power (1976). The terrestrial invertebrates, other than Orthoptera (Rentz and Weissman 1982) and gastropod molluscs (Hochberg ms.), have been poorly studied (see also Miller and Menke 1981).

Human activities have greatly impacted Santa Barbara Island's vegetation (documented in detail by Philbrick 1972). Goats were introduced, apparently prior to 1846. Farming and grazing took place from about 1915 until 1926. The island has had various uses subsequently. In the early 1980's, the National Park Service eliminated the feral European rabbit, leaving management of recreational use as the major problem facing island administrators.

COLLECTIONS

Dates for various entomological collections made on Santa Barbara Island, and the repositories of specimens are listed below. We have included all known literature records (e.g. Miller and Menke 1981) and examined the original specimens in most cases. The specimens examined are housed at California Department of Food and Agriculture (CDFA), Museum of Comparative Zoology (MCZ), Natural History Museum of Los Angeles County (LACM), Santa Barbara Museum of Natural History (SBMNH), and Yale Peabody Museum (YPM).

1. Sometime between 1857 and 1860, Charles M. Bache. Beetles described by LeConte (1861) and now in MCZ.
2. 13-18 May 1897, Joseph Grinnell and others (Grinnell 1897). Beetles reported by Fall (1897) and now in the MCZ.
3. 1 October 1913, J. R. Slevin. California Academy of Sciences (not examined) and MCZ.
4. 27-30 May 1939, Lloyd M. Martin, Jack C. Von Bloeker and others (Comstock 1939); LACM.
5. 16-23 March 1940, Lloyd M. Martin, Don C. Meadows and others (Comstock 1946); LACM.
6. 1 July 1940, George P. Kanakoff; LACM
7. 1 August 1968, Charles L. Remington and L. S. Matlovsky; YPM.
8. 5-6 June 1974, Eldon L. Paddock, Robert F. Hobza, John Johnson and others; CDFA. Some of the CDFA data, denoted by an asterisk (*), are taken from CDFA identification records as we could not locate the specimens.
9. 11-14 June 1978, James C. Trager, F. G. Hochberg and others; SBMNH.
10. 18-22 September 1978, Scott E. Miller and others; SBMNH.
11. 5-9 March 1979, Paul W. Collins and John Storrer; SBMNH.
12. 2-6 April 1979, Scott E. Miller and others; SBMNH.
13. Various dates in 1981 and 1982, Charles A. Drost, while working for National Park Service; voucher specimens in SBMNH.

Because of the overlap in species composition between different collections, we feel our species list is relatively complete, although we expect some additions will be made, especially among the small soil inhabiting species. We have no samples from the rocky beaches (access to which is restricted by topography and protected marine mammal habitat) or from Sutil Islet (southwest of Santa Barbara Island). The early collections were not comprehensive enough to allow use as baselines in testing the equilibrium theory of island biogeography (Gilbert 1980).

SPECIES LIST

All Coleoptera known from Santa Barbara Island are listed below. The following format is used for species entries: (1) Santa Barbara Island records (SBI); (2) Distribution

on other California Islands and the mainland (DIST). The island distributions represent only specimens and literature we have seen and are not comprehensive. Collection abbreviations are those already used, plus USNM for National Museum of Natural History; (3) Identification references (ID); and (4) remarks (REM). An asterisk (*) after CDFA denotes localities taken from CDFA identification records, the specimens for which we could not locate. For the nonspecialist, simple keys are included for species that can be sorted in the field; all identifications made with these keys should be verified elsewhere. See Powell and Hogue (1980) or White (1983) for family identifications.

CARABIDAE
(ground beetles)

Length under 13 mm ..... Amara species
Length over 20 mm ..... Calosoma semilaeve

Amara species

SBI: Over 100 individuals from various localities, collected from 1897 to 1979 in March, April, May, June, August, and September (CDFA, LACM, MCZ, SBMNH, YPM).
REM: Amara insularis Horn 1875, described from San Clemente Island, was recorded from SBI by Fall (1897), Hayward (1908), and Cockerell (1940) but these identifications cannot be trusted, since the genus needs revision. Species of Amara occur also on San Miguel, Santa Rosa, Santa Cruz, Santa Catalina, San Nicolas, San Clemente, and Guadalupe Islands. A. insularis was redescribed by Lindroth (1968).

Calosoma semilaeve LeConte 1851

SBI: 4 April 1979, on bluff between Cat and Graveyard Canyons (Miller: SBMNH), 1.
DIST: Santa Rosa, Santa Catalina, San Nicolas, Guadalupe Is. (Gidaspow 1959, SBMNH, USNM); western United States (Gidaspow 1959).
ID: Gidaspow 1959 (revision).

HISTERIDAE
(hister beetles)

Length over 5 mm ..... Saprinus lugens
Length under 3 mm ..... Carcinops species

Carcinops species

SBI: 6 June 1974, from stems of Coreopsis gigantea (Paddock and Hobza: CDFA*).
ID: Casey 1916.

Saprinus lugens Erichson 1834

SBI: No further data (Fall 1897: 237; specimen not found in MCZ); 12 March 1981 (Drost: SBMNH), 1.
DIST: Santa Rosa, Santa Cruz, San Nicolas, San Clemente, Guadalupe Is. (Fall 1897, Fall and Davis 1934, MCZ, SBMNH); North America and Mexico (Hatch 1929).
ID: Hatch 1929 (key), 1961 (key, figures).

HYDROPHILIDAE
(water scavenger beetles)

Cercyon haemorrhoides (Fabricius), 1775

SBI: 24 March 1983, North Peak (Drost: SBMNH), 1.
DIST: North America (introduced) and Palearctic (Smetana 1978).
ID: Smetana 1978 (revision).

STAPHYLINIDAE
(rove beetles)

Aleochara curtedens Klimaskewski

SBI: 17 May 1897 (MCZ; recorded by Fall 1897: 236 as Polistoma arenaria), 1.
DIST: Coastal California (Klimaskewski 1984).
ID: Klimaskewski 1984. (revision).

Aleocharinae, genus near Oxypoda

SBI: 4 April 1979, northwestern terrace (Miller: SBMNH), 1.
REM: Superficially similar to, but not, the genus Aleochara (J. Klimaskewski pers. comm.).

Staphylinus ater (Gravenhorst), 1802

SBI: 16 Oct. 1982, west side, from Suaeda (Drost: SBMNH), 1; 28 Oct. 1982, Signal Peak (Drost: SBMNH), 1 female.
DIST: San Miguel I. (SBMNH); North America (probably introduced) and Europe (A. F. Newton, pers. comm.).
ID: Hatch 1957 (key, figures).

Sunius species

SBI: 31 March 1982, east side terrace, in pitfall among Opuntia (Drost: SBMNH), 1.
REM: This species is near S. cuneicollis (Casey), 1886, but the group needs revision. Generic nomenclature is also uncertain in this group; we follow Moore and Legner (1975).

SILPHIDAE
(carrion beetles)

Nicrophorus nigrita Mannerheim 1843

SBI: 8 March 1979, between Graveyard Canyon and Signal Peak, 8 March 1979 (Collins, vert. sta. 76: SBMNH), 1; 2-6 April 1979 (Collins and Miller, rearing record SEM 79D1: SBMNH, larva described), 2; 10 May 1979 Campsite (J. Sayce: SBMNH), 1.
DIST: Santa Rosa, Santa Cruz, Anacapa, Santa Catalina, San Clemente, Guadalupe Is. (Horn 1876, Miller and Peck 1979, LACM, SBMNH, etc.); Pacific Coast (British Columbia to California and Nevada) (Miller and Peck 1979).
ID: Miller and Peck 1979 (key, figures), Anderson 1982 (larva).
REM: Specimens have been collected on SBI under dead mice and at lanterns, and most of these specimens have mites.

SCARABAEIDAE
(scarabs)

1. Length over 10 mm 2
- Length under 10 mm ..... Serica species
2. Elytra smooth and shining ..... Phobetus species
- Elytra covered with fine whitish hairs ..... Parathyce palpalis

Parathyce palpalis (Horn) 1880

SBI: May 1939, "3 dead and badly damaged adults" (Von Bloeker 1939: 155, as Thyce blaisdelli Casey, now a synonym; specimens not found at LACM).
DIST: San Nicolas, San Clemente Is. (Von Bloeker 1939, Hardy 1974); Southern California

(Hardy 1974).
ID: Hardy 1974 (revision).

Phobetus species

SBI: May 1939, "two dead adults beneath ice-plant (Mesembryanthemum crystallinum)" (Von Bloeker 1939: 155, as P. comatus LeConte; specimens not found at LACM); 6 June 1974, found dead under Hemizonia (Hobza and Paddock: CDFA*); 15 Jan. 1981 (Drost: SBMNH), 1; 1 Feb. 1982 (Drost: SBMNH), 1.
ID: Cazier 1937 (revision), Hardy 1978 (key).

Serica species

SBI: May 1939 (Von Bloeker 1939: 154, as S. alternata LeConte; specimen not found at LACM).
ID: Dawson 1933 (figures, descriptions).
REM: We do not accept Von Bloeker's identification, because Dawson (1933) revised the species which had previously been lumped under the name alternata. Von Bloeker evidently ignored this paper.

ELATERIDAE
(click beetles)

Anchastus cinereipennis (Eschscholtz) 1829

SBI: 17 March 1940, North Hill (Martin: LACM), 1.
DIST: San Nicolas I. (SBMNH); California (Van Dyke 1932).
ID: Van Dyke 1932 (key).

DERMESTIDAE
(dermestid beetles)

1. Length over 5 mm, black 2
- Length under 3 mm, brown ..... Trogoderma sternale
2. Elytra black with white mottling ..... Dermestes caninus
- Elytra entirely black ..... Dermestes frischii

Dermestes caninus Germar 1824

SBI: 17 May 1897 (MCZ), 3 (recorded by Fall 1897: 237 as D. mannerheimii LeConte); 18 Sept. 1978, near Signal Peak, under dead gull (Miller: SBMNH), 3; 21 Sept. 1978, near North Peak, under dead mouse (Collins: SBMNH), 11; 4 April 1979, northwest terrace (Miller: SBMNH), 1.
DIST: Santa Rosa, San Nicolas, San Clemente Is. (Fall 1897, as D. mannerheimii, MCZ); North America (Casey 1900).
ID: Casey 1900 (key), Lepesme 1946 (revision).

Dermestes frischii Kugelann 1792

SBI: 21 Sept. 1978, near North Peak, under dead mouse (Collins: SBMNH), 2.
DIST: San Miguel, Santa Cruz, San Clemente Is. (Fall and Davis 1934, MCZ, SBMNH); Cosmopolitan (Hinton 1945).
ID: Casey 1900 (key), Hinton 1945 (key, figures, description), Lepesme 1946 (revision).

Trogoderma sternale Jayne 1882

SBI: 5 June 1982 (Drost: SBMNH), 1.
DIST: Santa Catalina I. (Fall 1897, Beal 1954, MCZ); North America (Beal 1954).
ID: Beal 1954 (revision).

ANOBIIDAE
(deathwatch and drugstore beetles)

Xestobium marginicolle (LeConte 1859)

SBI: 6 June 1974, on Hemizonia (Paddock and Hobza: CDFA), 2.
DIST: Western North America (White 1975).
ID: White 1971 (key to genera), 1975 (key to species).

MELYRIDAE
(soft-winged flower beetles)

Amecocerus species

SBI: 7 March 1979, North Peak, on Coreopsis (J. Storrer: SBMNH, USNM), 12.
ID: Blaisdell 1921 (key to species), 1938 (key to genera).
REM: This genus, known as Listrus in some literature, needs revision.

Trichochrous (s.l.) species

SBI: 17 March 1940, North Hill (Martin: LACM), 2; 6 June 1974, on Avena and Frankenia (Paddock and Hobza: CDFA*); 5 April 1979, Cliff Canyon (Miller: SBMNH, USNM), 30; 5 April 1979, Cave Canyon (Miller: SBMNH), 3.
ID: Blaisdell 1938 (key to genera).
REM: One or two species are represented in available material. The family needs revision.

CORYLOPHIDAE
(minute fungus beetles)

Aenigmaticum californicum Casey 1889

SBI: 5-6 June 1974, on Eriophyllum, Frankenia, and Hemizonia (Paddock and Hobza: CDFA*).
DIST: West Anacapa I. (SBMNH); California (Casey 1900).
ID: Casey 1900 (key).

COCCINELLIDAE
(lady beetles)

1. Length over 5 mm 2
- Length 2 mm ..... Scymnus falli
2. Elytra red with black spots 3
- Elytra entirely red (except scutellar spot) ..... Coccinella californica
3. Pronotum black with front and side rim yellowish white, and pair of diagonal, converging, narrow yellowish spots ..... Hippodamia convergens
- Pronotum with yellowish white spots anterolaterally, remainder black .... Coccinella johnsoni

Coccinella californica Mannerheim 1943

SBI: 28-30 May 1939 (Von Bloeker: LACM), 15; 17-18 March 1940 (Martin and Kanakoff: LACM), 2; 19 March 1940, North Point (Meadows: LACM), 1; 5 June 1974, on Hemizonia (Paddock and Hobza: CDFA), 1; 6 June 1974 (Paddock and Hobza: CDFA), 1.
DIST: Santa Rosa, Santa Cruz, Anacapa, Santa Catalina, San Nicolas, San Clemente, and Guadalupe Is. (Dobzhansky 1932, SBMNH, USNM): Pacific Coast (British Columbia to Baja California) (Dobzhansky 1932, Brown 1962).
ID: Brown 1962 (revision).

Coccinella johnsoni Casey 1908

SBI: 28-29 May 1939 (Von Bloeker: LACM), 2; 19 March 1940 (Kanakoff: LACM), 1.
DIST: San Nicolas, San Clemente Is. (Brown 1962); Pacific coast (Alaska to California) (Brown 1962).
ID: Brown 1962 (revision).

Hippodamia convergens Guérin-Méneville 1846

SBI: 5 April 1979, Cliff Canyon (Miller: SBMNH), 1.
DIST: San Miguel, Santa Rosa, Santa Cruz, Anacapa Is. (SBMNH, LACM); North America (Chapin 1946).
ID: Chapin 1946 (revision).

Scymnus falli Gordon 1976

SBI: 5 June 1974, on Hemizonia (Paddock and Hobza: USNM), 1 male; 6 June 1974 (Paddock and Hobza: USNM), 1 male.
DIST: Santa Rosa, Santa Cruz Is. (Gordon 1976, SBMNH, USNM).
ID: Gordon 1976 (revision).
REM: Apparently endemic to the Channel Islands.

LATHRIDIIDAE
(minute brown scavenger beetles)

Akalyptoschion hormathos Andrews 1976

SBI: 6 June 1974 (Paddock and Hobza: CDFA, recorded by Andrews 1976a), 2.
DIST: Central Coastal California (Andrews 1976a).
ID: Andrews 1976a (revision).

Corticaria species

SBI: 5-6 June 1974, on Avena, Frankenia, Hemizonia, and Suaeda (Paddock and Hobza: CDFA*).
ID: Andrews 1976b (generic characters).

Corticarina herbivagens (LeConte) 1855

SBI: 6 June 1974 (Paddock and Hobza: CDFA, SBMNH); 4 Feb. 1983, residence area (Drost: SBMNH), 1.
DIST: San Miguel I. (CDFA, SBMNH); California.
ID: Andrews 1976b (generic characters), Johnson 1972 (figure, description).

Cortilena casta (Fall) 1899

SBI: 6 June 1974, on Avena and Frankenia (Paddock and Hobza: CDFA*); 19 Sept. 1978, Cat Canyon (Miller: SBMNH), 1.
DIST: San Nicolas I. (SBMNH); Southern California (Fall 1899).
ID: Andrews 1976b (generic characters), Fall 1899 (revision).

COLYDIIDAE
(cylindrical bark beetles)

Rhagodera tuberculata Mannerheim 1843

SBI: 17 March 1940, North Hill (Martin: LACM), 1; 18 March 1940, Cat Canyon (Martin: LACM), 4; 19 Sept. 1978, Cat Canyon (Miller: SBMNH), 2.
DIST: San Clemente I. (USNM); Pacific Coast and Arizona (Horn 1878).

ID: Horn 1878 (revision).

MORDELLIDAE
(tumbling flower beetles)

Mordellistena (s.l.) species

SBI: 5 June 1974, on Suaeda (Paddock and Hobza: CDFA, SBMNH), 16; 6 June 1974 (Paddock and Hobza: CDFA), 19; 4 April 1979, northwest terrace (Miller: SBMNH), 1.

REM: This species seems to belong in the group which includes M. nubila (LeConte) 1858, M. ruficeps LeConte 1862, and M. subfucus Liljeblad 1945, but it cannot be identified because the group needs revision. The revision by Liljeblad (1945) is of poor quality. Ermisch (1941, 1950, 1969) revised the higher classification proposing many new genera, but did not discuss the North American species.

MELOIDAE
(blister beetles)

Meloe barbarus LeConte 1861

SBI: "Island of Santa Barbara, Mr. C. M. Bache" (LeConte 1861, holotype in MCZ); 11 Feb. 1981 (Drost: SBMNH), 1; 10 Jan. 1982 (Drost: SBMNH), 1.

DIST: Santa Cruz, Santa Catalina, San Nicolas, San Clemente Is. (Pinto and Selander 1970, J. D. Pinto, pers. comm.); Pacific Coast (Pinto and Selander 1970).

ID: Pinto and Selander 1970 (revision).

TENEBRIONIDAE
(darkling ground beetles)

1. Length over 25 mm ..... Eleodes laticollis
- Length under 20 mm 2
2. Length under 12 mm; elytra smooth 3
- Length over 12 mm; elytra ridged, tuberculate, or punctate 4
3. Form ovate; pronotum widest at rear ..... Coniontis lata
- Form elongate; pronotum widest at middle ..... Helops .. 6
4. Elytra ridged ..... Apsena grossa
- Elytra tuberculate or punctate 5
5. Elytra and pronotum microtuberculate ..... Cibdelis bachei
- Elytra and pronotum punctate ..... Eleodes inculta
6. Elytra with all strial punctures connected; elytra more rounded laterally ..... Helops bachei
- Elytra with many strial punctures not connected; elytra parallel sided ..... Helops species

Apsena grossa (LeConte) 1866

SBI: 86 specimens from various localities, collected from 1897 to 1979 in March through October (CAS, LACM, MCZ, SBMNH, YPM). Recorded by Fall 1897: 238 (as Eulabis grossa) and Blaisdell 1932:75.

DIST: Santa Catalina, San Nicolas, San Clemente Is. (Blaisdell 1932, MCZ, SBMNH, etc.); Known from the mainland only by questionable records (Blaisdell 1932).

ID: Blaisdell 1932 (revision).

REM: Apparently endemic to the California Channel Islands.

Cibdelis bachei LeConte 1861

SBI: "Island of Santa Barbara, Mr. C. M. Bache" (LeConte 1861, holotype in MCZ).

DIST: Santa Cruz, Santa Catalina Is. (J. T. Doyen, pers. comm.).

REM: This species and Eleodes inculta (see below) have not been recorded from Santa Barbara Island since the original description. We suspect mislabelling, especially since Bache is known to have collected on Santa Cruz Island (LeConte 1861, U.S. Congress 1859, 1860, 1861). We have not included these two species in our zoogeographic analysis.

Coniontis lata LeConte 1866

SBI: 13-17 May 1897 (MCZ, recorded by Fall 1897: 238), 5; 20-22 March 1940, North Hill (Martin and Meadows: LACM), 18; 1 August 1968, plateau above rangers' hut (Remington and Matlovsky: YPM), 7; 5-6 June 1974 (Paddock and Hobza: CDFA*; also larvae probably this species); 19 Sept. 1978, Cat Canyon (Miller: SBMNH), 3; 19 Sept. 1978, Signal Peak (Miller: SBMNH), 2; 5 April 1979, southeast side Signal Peak, near top, under rocks (Hochberg: SBMNH), 1.
DIST: San Miguel, Santa Rosa, Santa Cruz, Anacapa, San Clemente Is. (Fall 1897, MCZ, SBMNH, etc.).
ID: Casey 1908 (key), Doyen 1977 (synonymy).
REM: Blaisdell (1921) recorded unidentified Coniontis (as Coniontides) from SBI. Conionitis lata is apparently endemic to the California Channel Islands.

Eleodes inculta LeConte 1861

SBI: "Island of Santa Barbara, Mr. C. M. Bache" (LeConte 1861, holotype in MCZ).
DIST: San Miguel, Santa Rosa, Santa Cruz, Anacapa Is. (R. E. Somerby, pers. comm.; specimens in SBMNH, LACM, MCZ, etc.).
ID: Blaisdell 1909 (revision), Somerby (unpublished revision).
REM: See Cibdelis bachei. Blaisdell 1909: 331 mistakenly cited Santa Rosa Island as the type locality of this species.

Eleodes laticollis apprima Blaisdell 1921

SBI: No data (Blaisdell 1921); 1 Aug. 1968, plateau above rangers' hut (Remington and Matlovsky: YPM), 5; 11 June 1978 (Trager: SBMNH), 2; 19 Sept. 1978, Signal Peak (Miller: SBMNH), 1; 20 Sept. 1978, campsite, Landing Cove (Miller: SBMNH), 3.
DIST: San Miguel (and Prince Islet), Santa Rosa, Santa Cruz, Anacapa, San Nicolas, San Clemente Is. (Blaisdell 1921, Cockerell 1940, SBMNH, USNM, etc.).
ID: Blaisdell 1909 (revision), Tanner 1961 (key to subgenera).
REM: This is a poorly differentiated island subspecies.

Helops bachei LeConte 1861

SBI: "Island of Santa Barbara, Mr. C. M. Bache" (LeConte 1861, syntypes in MCZ); 1 July 1940 (Kanakoff: LACM), 1.
DIST: San Miguel (and Prince Islet), Santa Rosa, Santa Cruz, Anacapa, Santa Catalina, San Nicolas, San Clemente Is. (SBMNH, LACM, USNM, CAS); coastal southern California (T. J. Spilman, pers. comm.).
ID: Spilman in prep. (revision).
REM: We have also seen one specimen labelled only Santa Barbara Island, from the H. Klages collection now in the Carnegie Museum of Natural History, which may be mislabelled.

Helops species

SBI: 28 May 1939 (Von Bloeker:LACM), 1; 19 March 1940, North Point (Meadows: LACM), 16; 20 March 1940, North Hill (Martin: LACM), 3; 1 April 1981, 17 June 1981, 6 Dec. 1981 (Drost: SBMNH), 3; 26 Jan. 1983, residence area (Drost: SBMNH), 1.
DIST: Santa Catalina, San Nicolas, San Clemente Is. (SBMNH, LACM, USNM).
ID: Spilman in prep. (revision).
REM: This new species being described by Spilman is endemic to the Channel Islands (T.

J. Spilman, pers. comm.).

ALLECULIDAE
(comb clawed beetles)

Isomira comstocki Papp 1956

SBI: 19 March 1940, North Hill (Martin: LACM), 1 female.
DIST: Santa Cruz, San Clemente Is. (CDFA, MCZ, SBMNH, Fall 1897:238 [as I. variabilis Horn]); California and Arizona.
ID: Papp 1956 (description).

CERAMBYCIDAE
(longhorned beetles)

Body globular; brown ..... Ipochus fasciatus
Body elongate; pronotum black, elytra red to black with coarse punctures, abdominal venter reddish ..... Callidiellum rufipenne

Ipochus fasciatus LeConte 1852

SBI: 19 May 1939 (LACM), 1; 17 March 1940, North Hill (Martin: LACM), 1; 6 June 1974, on Coreopsis gigantea (Paddock and Hobza: CDFA, SBMNH).
DIST: San Miguel, Santa Rosa, Santa Cruz, Anacapa, Santa Catalina Is. (LACM, SBMNH, USNM); Southern California.
ID: Linsley and Chemsak in prep. (revision).

Callidiellum rufipenne (Motschulsky) 1860

SBI: 31 March 1981 (Drost: SBMNH), 1.
DIST: Eastern China, Japan, Korea (Gressitt 1951).
ID: Gressitt 1951 (key).
REM: This species is "commonly encountered in quarantine" (J. A. Chemsak pers. comm.). It is not known if a breeding population exists on SBI, so this species is not included in the zoogeographic discussion.

CHRYSOMELIDAE
(leaf beetles)

1. Length over 5 mm; elytra green with black spots ..... Diabrotica undecimpunctata
- Length under 4 mm 2
2. Metallic blue-green; body oval, dorsum convex ..... Phaedon prasinella
- Brown; body parallel sided, elongate ..... Monoxia sordida

Diabrotica undecimpunctata undecimpunctata Mannerheim 1843

SBI: 20 Sept. 1978, Cave Canyon (Miller: SBMNH), 1.
DIST: Santa Cruz I. (Smith 1966); Pacific coast (British Columbia to Baja California) (Smith 1966).
ID: Barber 1947 (revision), White 1964 (figure).
REM: Agricultural pest on mainland (White 1964).

Monoxia sordida (LeConte) 1865

SBI: 19 Sept. 1978, Cat Canyon (Miller: SBMNH), 1; 21 Sept. 1978, northwest terrace (Miller: SBMNH, CDFA, LACM), 10; 4 April 1979, northwest terrace (Miller: SBMNH), 1; 9 May 1981 (Drost: SBMNH), 1.
DIST: San Clemente I. (USNM); southwestern United States and Mexico (Blake 1939).
ID: Blake 1939 (revision).
REM: CDFA specimens collected 5-6 June 1974 on Frankenia and Suaeda could not be located, but are probably this species.

Phaedon prasinella LeConte 1861

SBI: 3 April 1979 (Miller: SBMNH), 1; 7 May 1981 (Drost: SBMNH), 1.
DIST: Western United States (Fall 1929).
ID: Fall 1929 (key, description).

CURCULIONIDAE
(weevils)

1. Length under 6 mm 2
- Length over 6 mm; silver grey ..... Trigonoscuta species
2. Length about 3 mm 3
- Length over 5 mm; form subovate; light brown to gray ..... Sciopithes setosus
3. Form cylindrical, narrow; dark brown to black ..... Rhyncolus species
- Form ovate; body covered with brown and white scales 4
4. Suture between abdominal sternites 2 and 3 straight ..... Anthonomus subvittatus
- Suture between abdominal sternites 2 and 3 strongly produced posterad ..... Sibinia maculata

Anthonomus subvittatus LeConte 1876

SBI: Emerged "6-7-39" from Hemizonia clementina (Martin: LACM), 1; 8 April 1981 (Drost: SBMNH), 1.
DIST: San Miguel I. (SBMNH); California, Oregon, Idaho.
ID: Dietz 1891 (revision).

Rhyncolus species

SBI: 6 June 1974, from dead stems of Coreopsis gigantea (Paddock and Hobza: CDFA, SBMNH), 4; 20 Feb. 1982 (Drost: SBMNH), 1.
REM: Buchanan (1946) revised part of the genus, but Rhyncolus needs a thorough review.

Sciopithes setosus Casey 1888

SBI: 6 June 1974, on Coreopsis gigantea (Paddock and Hobza: CDFA*).
DIST: California (Van Dyke 1935).
ID: Van Dyke 1935 (key, description).
REM: S. insularis Van Dyke 1935 was described from San Clemente Island from unique holotype; relationship unknown.

Sibinia maculata (LeConte) 1876

SBI: "7/17/40" [sic], "sage brush" (Kanakoff: LACM), 1. Field notes under the specimen's accession number (1940-1340) indicate 1 July 1940, Cat Canyon.
DIST: San Miguel I. (Clark 1978); western United States (Clark 1978).
ID: Clark 1978 (revision).

Trigonoscuta species

Pierce (1975) described Trigonoscuta santabarbarae santabarbarae, T. s. mesembryanthemi, T. s. lycii, and T. curviscroba from Santa Barbara Island, from various localities and plants. Due to Pierce's practice of extreme taxonomic splitting, the validity of these taxa is doubtful and we do not feel they should be recognized until critically evaluated.

SCOLYTIDAE
(bark beetles)

Pseudopityophthorus species

SBI: 6 June 1974, on Eriophyllum (Paddock and Hobza: CDFA*).
ID: Bright and Stark 1973 (key, figures), Wood 1982 (revision).

ERRONEOUS RECORDS

In addition to the original descriptions of Cibdelis bachei and Eleodes inculta, four other beetles have been recorded erroneously from Santa Barbara Island: Fall (1897) listed Eleodes scabripennis LeConte 1861 (Tenebrionidae); Fall (1897) listed Trichochrous aenescens (LeConte 1852) (Melyridae) from Santa Barbara Island following LeConte's (1866) record of "islands off Santa Barbara"; and Fall (1901) listed Eusattus politus Horn 1883 and Coelus pacificus Fall 1897 (Tenebrionidae).

DISCUSSION

Zoogeographic conclusions are limited at this time by the poor taxonomic understanding of many genera, and the limited collections available for study from Santa Barbara and other Channel Islands. Many groups have not been revised since the 1800's and often species cannot be identified using available keys and descriptions (e.g. Hodges 1976). Because of this, 13 species (27 percent of the known fauna of Santa Barbara I.) in our study remain unidentified.

Ignoring Pierce's Trigonoscuta, Santa Barbara Island's known beetle fauna includes five endemic taxa shared with other California Channel Islands (Apsena grossa, Coniontis lata, Eleodes laticollis apprima, Helops new species, and Scymnus falli), but none are endemic to Santa Barbara Island alone. It is quite possible that taxonomic investigation of the unidentified species will reveal further endemism. Limited endemism among beetles on the island may be due to its small area and low habitat diversity, as well as human-induced disturbances.

About half of the identified Santa Barbara Island beetles also occur on the California mainland but only along the Pacific Coast (from British Columbia to Baja California). The remaining species are more broadly distributed. Only one coastal mainland fauna in Southern California is sufficiently documented for comparison. The Ballona Creek coastal wetlands (100 acres of degraded salt marsh and sand dune habitats), adjacent to Marina del Ray in Los Angeles County (Nagano et al. 1984) shares at least ten species (Anchastus cinerepennis, Calosoma semilaeve, Coccinella californica, Dermestes caninus, D. frischii, Diabrotica u. undecimpunctata, Hippodamia convergens, Ipochus fasciatus, Parathyce palpalis, and Saprinus lugens) which comprise 22 percent of the Santa Barbara Island fauna (more may be "hidden" by unidentified species in both faunas).

Becker (1975) compared beetle faunas of diverse island groups, and found that carnivores are relatively better represented than herbivores on these islands. He suggested that "carnivores are trophic generalists and so find it easier to establish and persist than herbivores". In comparing the percentage of carnivorous species (Cantharidae, Carabidae, Cicindelidae, Cleridae, Coccinellidae, Cucujidae, Melyridae, Pythidae, and Staphylinidae only) to phytophagous species (Bostrichidae, Bruchidae, Buprestidae, Cerambycidae, Chrysomelidae, Curculionidae, and Languriidae only) he found, for example, 66 and 41 percent for Jamaica and Cuba respectively, while percentages for mainland Latin America range only between 21 and 37. Askew (1980) found a carnivore percentage of 59 on Little Cayman Island. The percentage of carnivorous beetles on Santa Barbara Island, counting only species in families used by Becker, is 60. Although Santa Barbara Island appears to fit Becker's observations, the implications are not clear due to the large variation in island climates and ecology, as well as quality of data, represented in Becker's study.

In summary, the known beetle fauna of Santa Barbara Island is a depauperate aggregation of species, most of which are common in coastal Southern California. Four

insular endemics have been identified but none are known to be restricted to Santa Barbara Island. Detailed zoogeographic considerations must await further studies of the beetles of mainland California and the other California Islands.

ACKNOWLEDGEMENTS

This study was initiated as part of National Park Service Contract No. CX-2000-8-0040 to SBMNH, and was completed with support of the SBMNH, LACM, USNM and MCZ. Throughout the study CDFA personnel have been very helpful, especially R. F. Hobza in providing data and F. G. Andrews and T. N. Seeno in providing identifications. Additional aid was received from TRW Inc. and the American Association for the Advancement of Sciences (via Southern California Academy of Sciences). The study was made possible by generous assistance of the following systematists: R. D. Gordon, J. M. Kingsolver, T. J. Spilman, R. E. White, D. R. Whitehead (Systematic Entomology Laboratory, USDA); J. A. Chemsak, J. T. Doyen, L. J. Orsak (Univ. of California, Berkeley); E. C. Becker, J. M. Campbell, J. Klimaszewski, A. Smetana (Biosystematics Research Institute, Ottawa, Canada); H. R. Burke (Texas A & M Univ., College Station, Texas); A. F. Newton (Museum of Comparative Zoology, Cambridge, Mass.); A. R. Hardy, and especially F. G. Andrews and T. N. Seeno (California Dept. of Food and Agriculture, Sacramento, Calif.). P. W. Collins, F. G. Hochberg, S. Newswanger, K. W. Rindlaub, J. Sayce, J. Storrer, and J. Trager assisted with SBMNH collecting on the island, undertaken with permission of the National Park Service. F. G. Hochberg, C. L. Hogue, D. L. Johnson, J. Johnson, P. K. Lago, A. S. Menke, C. D. Nagano, A. F. Newton, E. L. Paddock, R. N. Philbrick, J. D. Pinto, C. L. Remington, R. E. Somerby, D. Verity, and N. Whelan provided information and assistance. C. A. Drost provided important specimens taken during recent research on SBI vertebrates.

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ENTOMOLOGY

OF THE
CALIFORNIA CHANNEL ISLANDS

Proceedings of the First Symposium

Edited by

Arnold S. Menke

Douglass R. Miller

Santa Barbara Museum of Natural History