ADDITIONS TO THE KNOWLEDGE OF THE BUTTERFLY FAUNA OF BAJA CALIFORNIA NORTE

by JERRY A. POWELL

The State of Baja California Norte occupies approximately one-half the peninsula of Lower California, lying between the southern border of California and the 28° parallel. Generally speaking, most of the area is desert country receiving little rainfall. The northernmost part, as might be expected, resembles southern California in climate and fauna.

Two mountain ranges, the Sierra Juarez and the Sierra San Pedro Martir, lie in a chain running centrally down the length of the peninsula for some 200 miles and separate the low coastal area on the Pacific side from a very dry desert to the east which borders the Gulf of ower California. These mountains, which are a direct continuation of the coast ranges in southern California, in general drop abruptly in bare granite cliffs on the east and descend through gradual rolling foothills to the west. The west coast is characterized by light winter rains and dry summers. As one proceeds south from San Diego, California, average yearly rainfall ten inches, the floral and physiographic elements become more and more desert-like, due primarily to the diminishing rainfall, which drops to something like five inches annually toward the San Quintin Bay, only 200 miles south of the border. Below this region, south of the mountains, lies a vast expanse of true desert which extends into the southern part of the peninsula. The most complete general account of the geological and biological features of Baja California has been given by NELSON (1921).

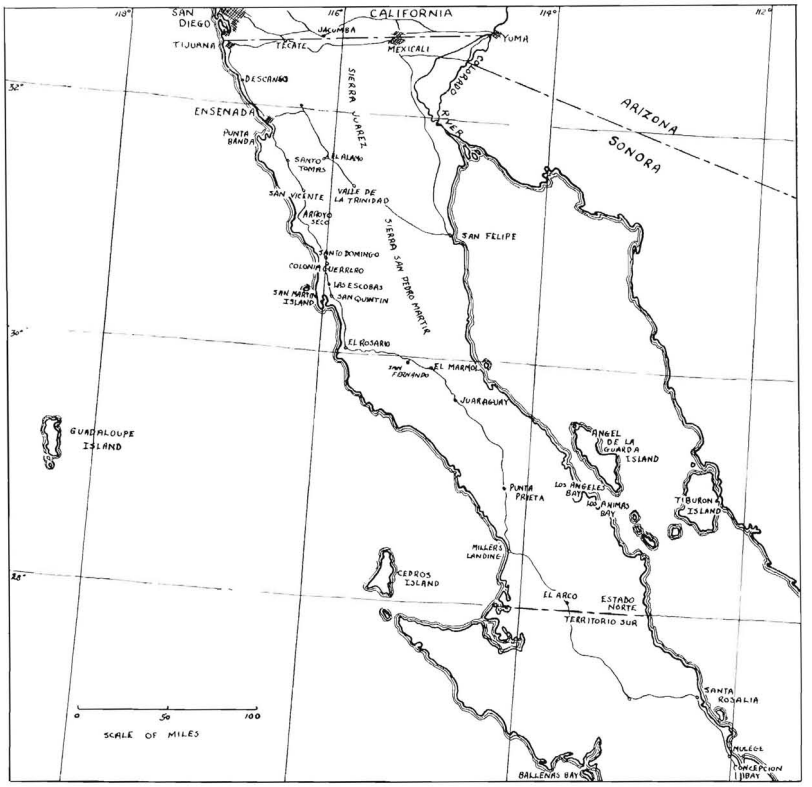
The butterfly fauna of the region, which consists essentially of elements from the north, has been only partially elucidated through relatively few publications. HOFFMANN (1940, 1941) in a list of the Rhopalocera of Mexico, gave distributions in broad terms, for the most part, but reported 28 species definitely from "Baja California Norte". These species undoubtedly do occur there, as do many of the other forms which he variously listed "En todo el pais" (In all the land), "Region Noroeste", or "Baja California" etc., but HOFFMANN did not give any specific locality records. RINDGE (1948) later published a list of the butterflies of Lower California, containing some 86 species, 35 of which were recorded from localities in the northern State. Of these latter, four had been previously reported by HOFFMANN. HARBISON (1957) described a new species, *Megathymus comstocki,* from the State, so that the total number of subspecies and species definitely known for Baja California Norte is 60.

The present paper consists of locality records for 31 additional forms for the area, indicated by an asterisk (*), as well as distributional data which seem significant on a number of previously recorded species.

Whereas this list brings the number of specifically recorded forms to 91, one would naturally expect the area to support a total approximating that of

adjacent San Diego County, California, for which over 140 species are known (Wright, 1930). Unfortunately, however, most of Baja California remains very poorly collected, primarily due to the inadequate roads and poor accommodations. Virtually all the collections have been made along the one main highway, on the west costal plain. Even this area has been only occasionally sampled. The eastern desert side, especially south of San Felipe, is almost entirely inaccessible, and the Sierra San Pedro Martir, which rises to elevations over 10,000 feet, is virtually uncollected.

I would like to express my appreciation to the persons who have made much of this list possible by making their collections available to me: PAUL H. ARNAUD, M. J. MCKENNEY, DON and BILL PATTERSON, BRUCE F. PROVIN, and RAYMOND E. RYCKMAN. In addition acknowledgement is gratefully made to Dr. E. G. LINSLEY of the Department of Entomology and Parasitology, University of California, Berkeley, and C. DON MACNEILL for reading the manuscript and suggestions, and especially to C. F. HARBISON of the San Diego Natural History Museum, who made possible certain of my



Sketch map of the general area of Baja California Norte showing the localities given in the text. Information compiled from the following sources: Anonymous (1953), Michelbacher & Ross (1942), and Nelson (1921).

collecting trips and who suggested the writing of this paper. In addition to the above cited private collections, material from the following institutions has been studied: California Academy of Sciences, San Francisco; California Insect Survey, University of California, Berkeley; Museum of Natural History, San Diego. I have seen all the specimens recorded in the following list.

For convenience of reference, the taxonomic and nomenclatorial systems followed are essentially those of McDUNNOUGH (1938) for the Papilionoidea and EVANS (1953, 1955) for the Hesperioidea. The localities are listed in a north-to-south sequence. Unless otherwise indicated in the data, the collection records are my own.

PAPILIONIDÆ

Papilio rutulus Lucas

Locality: Santo Domingo, Aug. 14, 1954.

A common southern California species which one would expect throughout the coastal foothills perhaps as far south as El Rosario. It was reported as occurring in Norte by HOFFMANN (1940).

Papilio eurymedon Lucas

Locality: Rancho Viejo, Sierra San Pedro Martir, June 14, 1953 (ARNAUD).

Like the preceding species, it was reported for the general area by HOFFMANN, but *eurymedon* probably ranges to higher elevations than *rutulus*. Rancho Viejo is at an approximate elevation of 7,000 feet.

PIERIDÆ

Anthocaris lanceolata australis (Grinnell)

Localities: 2 mi. south Jacumba (Calif.), Apr. 11, 1953; Valle de la Trinidad, Mar. 20, 1936 (HARBISON).

A mountain form which was listed for "Baja California Norte" by Hoffmann.

Anthocaris cethura cethura Felder & Felder

Locality: Valle de la Trinidad, Mar. 14 & 20, 1936 (HARBISON).

A. cethura deserti Wright is known from Cedros Island (Rindge 1948) and the nominate subspecies was given by HOFFMANN for the area in general.

Anthocaris sara sara Boisduval

Localities: 20 mi. east Descanso, Apr. 28, 1954; Punta Banda, Apr. 7, 1955 (PATTERSON); Valle de la Trinidad, Mar. 11 & 20, 1936 (HARBISON); 2 mile north El Rosario, Mar. 11, 1935 (HARBISON).

The early spring form (*reakirtii* Edwards) was reported by RINDGE from Cedros Island. Both forms probably range throughout the coastal hills up to 3000 or 4000 feet.

Euchloe ausonides andrewsi Martin*

Localities: 2 mi. south Jacumba (Calif.), Apr. 11, 1953; Valle de la Trinidad, Mar. 13 & 20, 1936 (HARBISON).

Colias eurytheme Boisduval*

Localities: Colonia Guerrero, Aug. 12 to 15, 1954; Las Escobas, Aug. 12, 1954. Common along the coast, especially around the alfalfa fields.

Zerene eurydice (Boisduval)*

Locality: Santo Domingo, Aug. 13, 1954.

Zerene cæsonia (Stoll)

Locality: Santo Domingo, Aug. 13 to 15, 1954.

Recorded by RINDGE from several widespread localities in the southern territory and San Geronimo Island (near Rosario) in the north.

Phœbis sennæ marcellina (Cramer)*

Locality: Ensenada, July 5, 1905 (Williams).

The records for *Phœbis eubule* (L.) for several southern district localities in the Rindge List probably were based on *marcellina* according to our present concepts, as this is the typical race of Mexico.

Nathalis iole Boisduval*

Localities: San Quintin, Sept. 7, 1955 (McKENNEY); Bahia de los Angeles, May 9, 1957 (PATTERSON).

Listed by RINDGE along the entire length of the southern part of the peninsula. The species is undoubtedly also widespread in the lower hills of the northern region.

Pieris beckeri Edwards

Localities: Ensenada, July 5, 1905 (WILLIAMS); Santo Tomas, May 5, 1957 (PATTERSON); Santo Domingo, Aug. 14, 1954; Jaraguay, June 28, 1957 (J. RYCKMAN).

Previously recorded from Norte in the Rindge List (Hamilton Ranch). The Jaraguay locality extends the known distribution well into the desert to the south.

Pieris sisymbrii sisymbrii Boisduval*

Localities: 2 mi. south Jacumba (Calif.), Apr. 11, 1953; Valle de la Trinidad, Mar. 14 & 20, 1936 (HARBISON).

Reported from the extreme southern tip of the peninsula by RINDGE. It is probably limited to the mountains in the north.

Pieris rapæ (Linné)*

Localities: 20 mi. east Descanso, Apr. 28, 1954; Colonia Guerrero, Aug. 13, 1954.

SATYRIDÆ

Minois silvestris (Edwards)*

Locality: Santo Domingo, Aug. 13 & 14, 1954.

NYMPHALIDÆ

Euphydryas chalcedona chalcedona (Doubleday & Hewitson)

Locality: 20 mi. east Descanso, Apr. 28, 1954.

Euphydryas chalcedona quino (Behr)

Locality: 2 mi. south Jacumba (Calif.), Apr. 11, 1953.

Both this, the desert race, and typical *chalcedona* were listed by HOFFMANN as occurring in the northern district.

Melitaea leanira wrighti Edwards*

Locality: Canyon del Tajo, Sierra Juarez, Mar. 30 & Apr. 2, 1953.

Nymphalis antiopa (Linné)*

Locality: 20 mi. east Descanso, Apr. 28, 1954.

Precis lavinia cœnia (Huebner)*

Localities: 20 mi. east Descanso, Apr. 28, 1954; Santo Domingo, Aug. 14, 1954.

Limenitis lorquini lorquini Boisduval*

Locality: Santo Domingo, Aug. 14 & 15, 1954.

RIODINIDÆ

Apodemia mormo virgulti (Behr)

Localities: Arroyo Seco, Apr. 5, 1955 (PATTERSON); Santo Domingo, Aug. 13 & 14, 1954; Sept. 10, 1955 (McKENNEY); Colonia Guerrero, Apr. 5, 1955 (PATTERSON); San Quintin, Sept. 7 ,1955 (McKENNEY); Santa Maria Valley (nr. San Quintin), Aug. 11, 1954; Sept. 9, 1955 (McKENNEY).

Although these records do not add materially to the distributional records indicated in the Rindge list, it seems worthy of remark that most specimens from this area appear much darker than typical *virgulti* and perhaps the population will warrant a subspecific designation when a more complete understanding of the complex is possible. A high degree of variation in wing color possibly indicates that the whole coastal region represents a zone of intergrade between *mormo virgulti* (Ensenada northward) and *mormo mormo* to the east (Angeles Bay). This type of situation might account for the Rindge List report of both forms at Cedros Island.

Calephelis nemesis (Edwards)*

Locality: Santo Domingo, Aug. 13 & 14, 1954.

Previously reported from Baja California only in the Cape district.

LYCÆNIDÆ

Atlides halesus (Cramer)*

Localities: Canyon del Tajo, Sierra Juarez, Mar. 31, 1953; Valle de la Trinidad, Mar. 20, 1936 (HARBISON).

Listed by RINDGE only from the southern territory (Concepcion Bay).

Strymon columella (Fabricius)

Localities: San Vicente, Aug. 16, 1954; Santo Domingo, Aug. 14, 1954; Colonia Guerrero, Aug. 15, 1954.

Reported by RINDGE from a number of localities along the east coast of the peninsula from the cape district (Nov., Dec.) north to Angel de la Guarda Island (June).

Strymon sylvinus sylvinus (Boisduval)*

Localities: 2 mi. south Jacumba (Calif.), July 1, 1952; El Rosario, May 6, 1957 (PATTERSON).

Mitoura nelsoni (Boisduval)*

Locality: Guadaloupe Island, N. E. landing, July 11, 1922 (HANNA & SLEVIN).

This is an extremely interesting record, since *nelsoni* is normally considered to be a mountain insect, rather than coastal, especially in southern California, and Guadaloupe is situated about 150 miles offshore. The food plant of *nelsoni* is thought to be *Libocedrus decurrens* (see Comstock & Dammers, 1932), a plant not known from the island. The Guadaloupe flora does include a Juniper and a striking endemic cypress, *Cupressus guadaloupensis.*

Mitoura loki (Skinner)

Locality: Valle de la Trinidad, Mar. 20, 1936 (HARBISON).

As was indicated in the Hoffman list, this species is to be expected in the mountain areas of Baja. It is associated with the juniper belt.

Callophrys dumetorum (Boisduval)

Locality: Punta Banda, Apr. 7, 1955 (PATTERSON).

The form *perplexa* Barnes & Benjamin was listed by HOFFMANN for Norte.

Incisalia iroides (Boisduval)*

Localities: Canyon del Tajo, Sierra Juarez, Apr. 2, 1953; Valle de la Trinidad, Mar. 20, 1936 (HARBISON).

Lycæna helloides helloides (Boisduval)

Locality: 2 mi. south Jacumba (Calif.), July 1, 1952.

Previously reported for "Norte" by HOFFMANN, but without a specific record.

Leptotes marinus (Reakirt)

Localities: 2 mi. south Jacumba (Calif.), July 1, 1952; San Quintin Bay, Aug. 12, 1954.

Among the localities in the Cape district given in the Rindge List for *marinus,* several (Cape San Lucas, El Tule Ranch, Espiritu Santo Island) have been found to be represented by erroneously identified specimens of *Leptotes cassius striatus* (Edwards), a species not reported by RINDGE. The Canipole record for *marinus* is correct, but I have not seen the material from the other southern localities, so that *marinus* may well occur in the Cape district along with *striatus.*

Hemiargus gyas gyas (Edwards)

Localities: 2 mi. south Jacumba (Calif.), July 1, 1952; 52 mi. north San Felipe, Dec. 23, 1954; San Vicente, Aug. 16, 1954; Colonia Guerrero, Aug. 13, 1954; Santa Maria Valley (nr. San Quintin), Aug. 11, 1954; El Rosario, May 6, 1957 (PATTERSON); 10 mi. southeast El Rosario, June 26, 1957 (RYCKMAN); Jaraguay, June 28, 1957 (J. RYCKMAN); 11 mi. northwest El Arco, July 3, 1957 (RYCKMAN).

The species was listed from numerous localities, all coastal, in the Rindge list.

Hemiargus isola (Reakirt)

Localities: 2 mi. south Jacumba (Calif.), July 1, 1952; San Quintin Bay, Aug. 12, 1954.

Previously recorded by RINDGE from Ensenada.

Everes amyntula (Boisduval)

Localities: 35 mi. south Tijuana, Mar. 9, 1946 (PROVIN); nr. Ensenada, Apr. 7,

1955 (PATTERSON); Punta Banda, Apr. 7, 1955 (PATTERSON); Arroyo Seco, Apr. 4, 1955 (PATTERSON); San Quintin, Sept. 7, 1955 (MCKENNEY).

Plebius melissa melissa (Edwards)*

Localities: Santo Domingo, Aug. 14, 1954; San Quintin Bay, Aug. 12, 1954.

Plebius acmon acmon (Westwood & Hewitson)

Localities: 2 mi. south Jacumba (Calif.), July 1, 1952; Canyon del Tajo, Sierra Juarez, Apr. 2, 1953; 20 mi. east Descanso, Apr. 28, 1954; Arroyo Seco, Apr. 4, 1955 (PATTERSON); San Quintin, Sept. 7, 1955 (MCKENNEY).

The species is listed by RINDGE from Ensenada. It undoubtedly is one of the most widespread and abundant butterflies in the area.

Philotes sonorensis (Felder & Felder)*

Localities: 35 mi. south Tijuana, Mar. 9, 1946 (PROVIN); Agua del Refugio, Apr. 1, 1935 (HARBISON).

Glaucopsyche lygdamus australis Grinnell*

Locality: 35 mi. south Tijuana, Mar. 9, 1946 (PROVIN).

HESPERIIDÆ

Pyrgus communis albescens (Ploetz)

Localities: 20 mi. east Descanso, Apr. 28, 1954; San Quintin, Sept. 7, 1955 (MCKENNEY).

While previously known in Baja California only as far north as Angeles Bay, *albescens* is a typical arid-country form and is to be expected throughout the peninsula. The Descanso specimen, a male, is intermediate between *albescens* and *communis communis* in genitalic structure, as is characteristic of populations in the San Diego area.

Heliopetes ericetorum (Boisduval)*

Locality: Santo Domingo, Aug. 14, 1954.

Systasea evansi (Bell)*

Localities: Canyon del Tajo, Sierra Juarez, Apr. 1 & 2, 1953; Valle de la Trinidad, Mar. 20, 1936 (HARBISON).

Erynnis zarucco funeralis (Scudder & Burgess)

Localities: Estero Beach, Apr. 24, 1950 (LANGSTON); Punta Banda, Apr. 7, 1955 (PATTERSON); San Quintin, Sept. 7, 1955 (MCKENNEY); Jaraguay, June 28, 1957 (J. RYCKMAN).

Erynnis juvenalis propertius (Scudder & Burgess)*

Locality: Canyon del Tajo (mesa west of), Sierra Juarez, Mar. 30, 1953.

This species is probably confined to the Sierra Juarez and Sierra San Pedro Martir in Baja California, as it is normally only encountered at elevations above 3000′ in the adjacent parts of California.

Pholisora catullus (Fabricius)*

Locality: Valle de la Trinidad, Mar. 20, 1936 (HARBISON).

Pholisora libya (Scudder)

Localities: San Quintin, larva on *Atriplex* May 12, 1955, adult emerged Aug. 8, 1955 (WILLIAMS); Santa Maria Valley (nr. San Quintin), Aug. 11, 1954; El Marmol, May 6, 1957 (PATTERSON); Bahia de los Angeles, May 9, 1957 (PATTERSON).

The species has previously been recorded from the more southern localities in Norte (Angeles Bay and Angel de la Guarda Island). It is a desert insect, not known from coastal areas in southern California equivalent to San Quintin.

Copæodes aurantiaca (Hewitson)*

Locality: Canyon del Tajo, Sierra Juarez, Mar. 31, 1953.

Recorded by RINDGE from a number of localities in the southern district, and it is probably quite widespread in Norte at low elevations.

Polites sabuleti sabuleti (Boisduval)

Localities: San Vicente, Sept. 6, 1955 (MCKENNEY); San Quintin Bay, Aug. 12, 1954; Punta Prieta, Mar. 28, 1935 (HARBISON).

Atalopedes campestris (Boisduval)*

Locality: Punta Banda, Apr. 7, 1955 (PATTERSON).

Ochlodes agricola agricola (Boisduval)*

Locality: 27 mi. south San Vicente, Apr. 25, 1950 (LANGSTON).

Ochlodes sylvanoides sylvanoides (Boisduval)*

Locality: Santo Domingo, Aug. 13, 1954.

Paratrytone melane melane (Edwards)*

Locality: 20 mi. east Descanso, Apr. 28, 1954.

On the basis of two specimens seen, it appears that the *Poanes melane* reported by RINDGE from the Sierra Laguna in the Cape district represents a distinct population and possibly will be better treated as another subspecies when more specimens are available for study.

Calpodes ethlius (Cramer)*

Locality: Colonia Guerrero, Aug. 12 to 14, 1954.

Although this species is not known to be established in southern California, individuals were relatively common (nine specimens taken) at the above locality, about 200 miles south of San Diego, flying among carnations in gardens. The foodplant, Canna, is also grown in gardens there and in nearby Santo Domingo, but no evidences of larval activity were found.

Panoquina panoquinoides errans (Skinner)

Localities: Colonia Guererro (beach west of), Aug. 15, 1954; San Quintin, Sept. 7, 1955 (MCKENNEY); San Quintin Bay, Aug. 12, 1954.

The species was very abundant at the San Quintin Bay locality, flying about fresh water lagoons. It is known from several spots along the gulf coast of the peninsula, as far north as Las Animas Bay, and may well range all along the Pacific side as well.

Megathymus neumoegeni stephensi (Skinner)*

Locality: Canyon del Tajo (mesa west of), Sierra Juarez, Oct. 25, 1955 (HARBISON).

A form characteristic of the deserts on the east side of the southern California coast ranges, associated with the distribution of *Agave deserti* Englemann, its foodplant.

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