

# ZOE

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### SOUTHERN EXTENSION OF CALIFORNIA FLORA.

BY T. S. BRANDEGEE.

The flora of the Peninsula of Baja California has usually been considered to be nearly the same as that of Southern Alta California, and Mr. Hemsley for that reason has given it no place in his *Botany of the Biologia Centrali-Americana*. A region extending through nine degrees of latitude, having California for its northern boundary and its southern portion lying within the tropics, with its northern vegetable life controlled by the alternation of winter and summer and its southern dependent on tropical rains, cannot possess a similar flora throughout its entire length.

There is a point situated between these extremes of latitude and differences of climate where there is a change in the flora, a change from that of the south to one that is in great part Californian. The middle latitudes of the Peninsula do not seem to have any well defined seasons of vegetable life, and the time of flowering may follow winter rains of the northern climate if they should extend southward, or the summer showers from the tropics when they reach northward. Even as far south as Magdalena Bay this shifting of growing season is apparent, and my own visits there have shown me that in two successive years all the annuals and most of the perennials burst into life with the new year in consequence of the December rains, but during a following year, in January, hardly a flower could be seen, most of the bushes were leafless and the only signs of vegetable life to be found were remnants from the profusion that existed in October after a series of heavy tropical rains. The point at which the most decided change in the flora is seen occurs at about latitude twenty-eight degrees, in the vicinity of El Campo Aleman, and Calmalli, on the divide between the drainage sloping

I have very little to add to this description of the insect by Mr. Ricksecker. It is true the description of *L. albida* by Stretch could be construed into a description of *L. Rickseckeri* ♀. Mr. Stretch states that the specimen (a unicum) from which he described was in very bad condition, so that the discal point may have been wiped off in both anterior wings, and even the sex may have been mistaken, as the circumstance of the specimen being a unicum prevented dissection. No entomologist likes to destroy a unicum. But the characteristic of the palpi distinguishes the species at once and leaves no doubt as to its specific distinction. Coloration and markings of the ♂ distinguish the species from all American Leucarctias, and approach it to an East Indian species in our collection, which I received in several specimens from the coast of Arracan. This otherwise very distinct species has the same coloration as the ♀.

In regard to its biology, I give here again the words of Mr. L. E. Ricksecker: "June 11, 1891, I found three larvæ about full-grown, similar in general appearance to those of *L. Acræa* on a species of *Senecio*. They commenced spinning cocoons June 18, and three males emerged July 18, 1891. June 18, 1893, I visited the same place, and after a long day's diligent search I had twelve caterpillars. June 15, they commenced spinning cocoons; June 20, eight cocoons (the remainder escaped from cage); July 5-12, six imagines—♂ 2, ♀ 4. Two cocoons contained parasites. Locality, Sonoma County." These are the notes of Mr. Ricksecker's journal.

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## CALIFORNIA EARTH-WORMS OF THE FAMILY OF EUDRILIDÆ.

BY GUSTAV EISEN.

California, although a dry and rainless country for six months in the year, still possesses a varied oligochætological fauna rich both in species and individuals. The earth-worms—angle and rain-worms—burrow deep in the soil during the dry and warm months and lie there encysted and closely rolled up in clay chambers and waiting for the rain to set in in the autumn.

With these first rains in October the worms leave their self-made clay chambers and ascend to the upper strata where they live and propagate during the winter months, until April and May, when the same process of summer-rest is gone through again. In the large and dry valleys earth-worms are always scarce, owing, of course, to the greater dryness of the plains in summer time. In the driest places the worms are entirely wanting, except, possibly, in some bogs and swamps, where an indigenous species of *Allolobophora* is always common.

The higher earth-worms (the water-worms excepted) in California can be referred principally to two large families, Lumbricidæ and Eudrilidæ, there being besides one single species of Acanthodrilidæ. It must, however, be stated that the Pacific Coast has not been thoroughly explored, and many more species, genera and families, are likely to be discovered. A species of *Perichæta* is found in a nursery hothouse in San Francisco, undoubtedly introduced from the tropics. In the Baja California cape region other tropical forms appear, and the common earth-worm there is a species of *Urochæta*, as well as one or more of *Allolobophora*.

So far no true earth-worms have been described or even enumerated from California with the exception of two species described by Kinberg. About thirty years ago he visited California and described *Lumbricus apii* from Sausalito near San Francisco and *Pheretima Californica* from the same place. But the descriptions of these species are so insufficient that the worms cannot even be identified as to family, much less to genera and species. They must of course be ignored.

“*Pheretima*,” he says, “has from forty to fifty-six setæ on every segment, and was found both in the hills of San Francisco and in soil at Sausalito.” But though I have repeatedly searched in those localities I never succeeded in finding any worms thus characterized, and I am inclined to think that Kinberg’s labels became mixed, and that *Pheretima* at least was never found in this State. Of the family Lumbricidæ California possesses probably a dozen species, some of which are common the world over. There are, however, a number of indigenous species, the description of which will be reserved for a future article. The most common of the Lumbricidæ is a large species of *Allolobo-*

phora, dark brown in color and which inhabits wet places. There is no *Lumbricus*. By far the most numerous worms belong to the family of *Eudrilidæ*. They are easily distinguished by their pinkish color, coupled with the fact that the male papillæ open in the posterior part of the clitellum. There are of this family two distinct genera with at least four or five species, some of which are large, others very small, resembling in size *Ocnerodrilidæ*, which latter genus is represented by at least one species, which however may be of southern importation, as its distribution is exceedingly limited. In Baja California two genera of this family are represented by at least two species, and in Mexico and Central America by many. It possesses a large southern distribution.

I have so far distinguished the following genera and species in California, of which a more detailed account is soon to be published in the publications of the California Academy of Sciences of San Francisco.

DELTANIA GEN. NOV.

Prostomium dovetails somite i. Eight setæ in four couples, beginning on somite ii. Setæ of the inner couples in the genital region converging towards the male pore. Buccal cavity, pharynx, œsophagus and sacculated intestine, but no gizzard and typhlosole, nor œsophageal pouches. Clitellum xiii to xvii. No dorsal pores. Testes in x and xi. Spermsacs present and free. Spermatheca present or absent. Ovary one pair in xiii, oviduct in xiv. No ovisac. Spermducts open in xvii together with a large paired prostate. The spermducts join the muscular part of the prostate in the body wall. Penial setæ open in the same duct as the prostate. No subneural vessel. The anterior few nephridia open in front of seta 4, the posterior nephridia in front of seta 3. All nephridia furnished with a large terminal bladder near the body wall.

Small, transparent, glossy worms with orange-colored clitellum, living in moist, especially sandy soil. The genus differs from *Microsclex* principally by the deltoid arrangement of the ventral setæ in the vicinity of the male pore.

The genus appears indigenous to the American Continent, species having, however, been found in Australia and Madeira,

though it is probable that the Australian species has been introduced from some other country.

There are at least three California species.

*DELTANIA ELEGANS* n. sp. Size two to four inches. Septal glands very small, the posterior one being the smallest. Spermatheca variable, very pellucid, assuming the nature of a spermsac. Spermsacs small, deeply lobed, one pair in xi and one in xii. Prostate helix-like at the top. Penial papillæ with two or more penial setæ in each sac.

Habitat.—San Francisco, Berkeley, Mount Diablo, Santa Rosa, or in general, the country surrounding San Francisco Bay. Is probably of a much wider distribution.\* This is the largest species of the genus so far known.

The most important feature of this species is the abnormal construction of the spermatheca. Instead of being a highly muscular and glandular organ with a muscular duct, it simply consists of a very thin-walled sac or membrane in which spermatozoa are stored. But the most peculiar fact connected with the spermatheca is, that it is variable in position, sometimes being median, sometimes paired, or sometimes entirely absent, thus demonstrating the great variability of the organ. This species differs from *Deltania dubia* Fletcher by having the anterior nephridium commencing already in somite ii, the latter species having the first nephridium in v.

*DELTANIA TROYERI* n. sp. A very minute species of the size of an *Enchytræus*, largest specimen about one and one-fourth inches by one-half line, while most specimens are smaller. Septal glands large, the one in vi the largest. One pair of large, opaque and permanent spermatheca with one pair of diverticula in ix opening viii/ix. One developed seta in each sac of penial setæ. Prostate tubular, not helix-like at the top. Penial exterior papillæ not prominent. The inner couples of setæ are further apart than in the following species. The diverticula of the spermatheca are about one-half or more longer than the spermatheca.

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\* Since writing the above I have found two species of *Deltania* in Baja California at Ensenada; the genus has thus a wide distribution.



Habitat.—Golden Gate Park, San Francisco, together with the former species. First found by Mr. Carlos Troyer, to whose interest and kindness I owe the possession of several new species of *Oligochæta*.

*DELTANIA BENHAMI* n. sp. Size about one inch by one-sixteenth. The inner couples of setæ as well as the setæ in the inner couples are much closer together than in any of the other species. The spermatheca large, opaque, in ix, opening viii, ix, with two diverticula, which are less than one-half as large as the central spermathecal sac.

A small, very hyaline worm, entirely distinct from the preceding species and at once characterized by the closeness of the ventral setæ, and by the size of the spermathecal diverticula. Much more pellucid than the preceding species. Blood yellow.

Habitat.—In the small cañon coming from Lake Chabot, Alameda County, Cal., under moss or in the top soil at the foot of trees near the creek.

#### ARGILOPHILUS GEN. NOV.

A genus related to *Plutellus* Perrier, but characterized as follows: Prostomium encroaches on the peristomium. Eight setæ in four couples, commencing in ii. The setæ of the inner couples not converging toward the male-pore, but closer set than the setæ of the outer couples. Buccal cavity, pharynx, œsophagus, gizzard, tubular-intestine, sacculated intestine, typhlosole, but no œsophageal glands or pouches. Clitellum not developed ventrally. Spermathecal pores between vii/viii and viii/ix. One or two longitudinal rows of ventral papillæ. Two pair of spermathecæ. Testes in x, xi. Spermsacs paired in x, xi, xii, some of which enclose the ciliated funnels. Two pair of spermducts, which join their respective very large coiled prostates in xviii, at the upper end of the muscular duct. Two penial setæ open in the same pore, but not in the same duct as the prostate. Nephridia without any vesicle at the body wall. Nephridia pores open variably, some in front of the third, some in front of the fourth, and others outside of, or lateral of the fourth setæ, without any serial regularity. Blood red.

Large earth-worms with thick round bodies and pale flesh—

color, marbled bluish. As far as known, California possesses two outwardly distinct forms, but which on account of their exact similarity as regards their internal anatomy, I must refer as subspecies to the same general species.

*ARGILOPHILUS MARMORATUS ORNATUS* n. sp. The ventral side of the genital somites furnished with two longitudinal rows of ventral sensory papillæ, one row on each side of the median line. The number of papillæ, which are strictly intersegmental, varies from one to seven or more.

Habitat.—North of San Francisco Bay as far up as Oregon. Very common in the vicinity of Santa Rosa, etc., especially in heavy moist, and rich clayey soil. The most common earthworm of the region. This species was first found by Miss A. Eastwood of California Academy of Sciences.

*ARGILOPHILUS MARMORATUS PAPILLIFER* n. sp. The ventral region of the genital somites and posterior to the clitellum furnished with a single row of median intersegmental papillæ, varying in number up to seven or eight or more. The papillæ are generally longer than in the preceding species. Although I have examined hundreds of specimens I have never seen any transitions between these forms. If the papillæ in these subspecies were of constant number I would not have hesitated to pronounce them as equal in importance as species characteristics to the tubercula pubertatis in the true Lumbricidæ. The great variability in the number of the papillæ, however, place them in a somewhat different light, the only constancy of outward character being that in one form they are paired, in the other median. In the paired form they are situated one on each side of the ventral ganglion, while the median ones are situated directly under the ventral ganglion, one or one pair in each segment.

Habitat.—This form is, so far, found only south of the region inhabited by the former. I have specimens from Berkeley, San Joaquin Valley, Monterey, San Francisco, Palo Alto, etc., but only one single specimen from Santa Rosa, where the former form is most abundant. The species prefers very heavy adobe soil, and occurs only in the richest ground, never in poor soil. The occurrence of *Argilophilus* is always a sign of the fertility of

the soil. A single specimen of what appears to be a new species of this genus was brought by Mr. Louis King from Portland, Or., but being very badly preserved I must leave its description for some future time.

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CONTRIBUTIONS TO WESTERN BOTANY. No. 5.

BY MARCUS E. JONES.

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REVISION OF THE AMERICAN SPECIES OF *AQUILEGIA* NORTH OF MEXICO.

In studying the species of this genus a person is struck with the amount of labor wasted in describing them, and the uncertainty attaching to the species recognized. This is due largely to the multitude of characters belonging to the genus that are not given in any book and which most people do not know are generic. The really specific characters are few. There are two distinct lines of species in the genus so far as our western ones are concerned, which hybridize among themselves and possibly with each other. One line has petal-limb dilated above and flowers never truly red; the other has petal-limb not dilated above and red or reddish flowers. The following gives my views of this genus, though I am inclined to think that further research may prove that *A. flavescens* will become a variety of *cærulea*, *A. formosa* a variety of *A. Canadensis*, while the margin between *cærulea* and *chrysantha* is very slight.

AQUILEGIA L. COLUMBINE.

Parts of flowers in fives (except stamens) petal-like, alternate, stamens many. *Sepals* narrowed at base into a short claw and bent at base, usually acute, equaling the limb of petal or longer, widely spreading or reflexed, rather veiny, often green-tipped and simulating a gland. *Petals* either saccate at insertion or prolonged backward into hollow, usually tapering spurs which are short to four inches long and with a nectary in the tip set obliquely on the spur; limb of petals either almost obsolete or nearly equaling the sepals, usually rather thick, erect, and yellow, or sometimes white at least at the tip. *Stamens*