

**The Project Gutenberg eBook of Journal of Entomology and Zoology, Vol. 09,
No. 1, March 1917, by Various**

This ebook is for the use of anyone anywhere in the United States and most other parts of the world at no cost and with almost no restrictions whatsoever. You may copy it, give it away or re-use it under the terms of the Project Gutenberg License included with this ebook or online at www.gutenberg.org. If you are not located in the United States, you'll have to check the laws of the country where you are located before using this eBook.

Title: Journal of Entomology and Zoology, Vol. 09, No. 1, March 1917

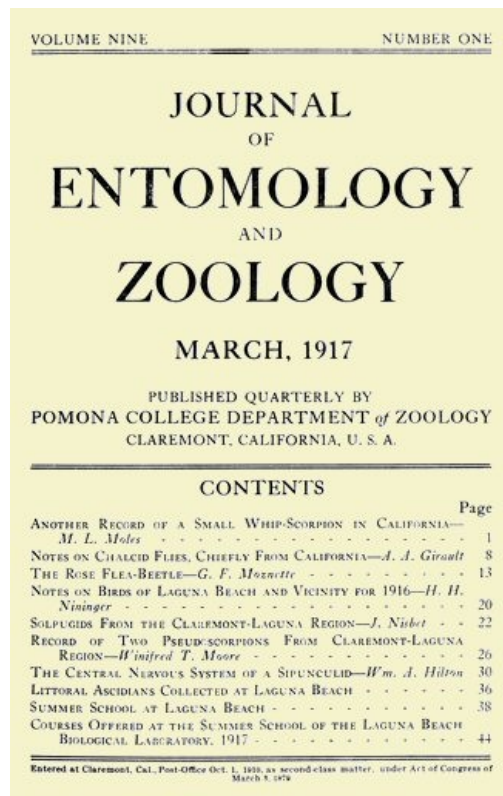
Author: Various

Release date: January 28, 2015 [EBook #48101]

Language: English

Credits: Produced by Larry B. Harrison, Tom Cosmas and the Online Distributed Proofreading Team at <http://www.pgdp.net> from images made available on The Internet Archive (<https://archive.org/>).

*** START OF THE PROJECT GUTENBERG EBOOK JOURNAL OF ENTOMOLOGY AND ZOOLOGY, VOL. 09, NO. 1, MARCH 1917 ***



**VOLUME
NINE**

**NUMBER
ONE**

JOURNAL
OF
ENTOMOLOGY
AND

ZOOLOGY

MARCH, 1917

PUBLISHED QUARTERLY BY

POMONA COLLEGE DEPARTMENT *of* ZOOLOGY

CLAREMONT, CALIFORNIA, U. S. A.

CONTENTS

	Page
ANOTHER RECORD OF A SMALL WHIP-SCORPION IN CALIFORNIA— <i>M. L. Moles</i>	1
NOTES ON CHALCID FLIES, CHIEFLY FROM CALIFORNIA— <i>A. A. Girault</i>	8
THE ROSE FLEA-BEETLE— <i>G. F. Moznette</i>	13
NOTES ON BIRDS OF LAGUNA BEACH AND VICINITY FOR 1916— <i>H. H. Nininger</i>	20
SOLPUGIDS FROM THE CLAREMONT-LAGUNA REGION— <i>J. Nisbet</i>	22
RECORD OF TWO PSEUDOSCORPIONS FROM CLAREMONT-LAGUNA REGION— <i>Winifred T. Moore</i>	26
THE CENTRAL NERVOUS SYSTEM OF A SIPUNCULID— <i>Wm. A. Hilton</i>	30
LITTORAL ASCIDIANS COLLECTED AT LAGUNA BEACH	36
SUMMER SCHOOL AT LAGUNA BEACH	38
COURSES OFFERED AT THE SUMMER SCHOOL OF THE LAGUNA BEACH BIOLOGICAL LABORATORY, 1917	41

Entered at Claremont, Cal., Post-Office Oct. 1, 1910, as second class matter, under Act of Congress of March 3, 1879

Journal of Entomology and Zoology

EDITED BY POMONA COLLEGE, DEPARTMENT
OF ZOOLOGY

Subscription \$1.00 to domestic, \$1.25 to foreign countries.

This journal is especially offered in exchange for zoological and entomological journals, proceedings, transactions, reports of societies, museums, laboratories and expeditions.

The pages of the journal are especially open to western entomologists and zoologists. Notes and papers relating to western and Californian forms and conditions are particularly desired, but short morphological, systematic or economic studies from any locality will be considered for publication.

Manuscripts submitted should be typewritten on one side of paper about 8 by 11 inches. Foot notes, tables, explanations of figures, etc., should be written on separate sheets. Foot notes and figures should be numbered consecutively throughout. The desired position of foot notes and figures should be clearly indicated in the manuscript.

Figures should be drawn so that they may be reproduced as line cuts so far as possible. An unusually large number of half tones must be paid for in part by the author. Other more expensive illustrations will be furnished at cost. Figures for cuts should be made to conform to the size of the page when reduced, that is, 5 by 7-1/2 inches or less. The lettering should be by means of printed numbers and letters pasted on the drawings, in most cases.

Authors of articles longer than a thousand words will receive fifty reprints of their publications free of cost. If more than this are desired, the order should be given with the return of the proof

sheets. Extra copies and special covers or special paper will be furnished at cost. Authors of short contributions will receive a few extra copies of the number containing their articles.

Manuscripts should be sent by express or registered mail.

Address all communications to

THE JOURNAL OF ENTOMOLOGY AND ZOOLOGY

William A. Hilton, Editor

Claremont, California, U. S. A.

Another Record of a Small Whip Scorpion in California

< 1 >

M. L. MOLES

In April, 1916, Dr. W. A. Hilton collected some small whip-scorpions in the Pomona College Park at Claremont. These creatures were without eyes and yet they seemed to avoid forceps. They were able to run backwards or forwards with equal ease. On examination it was found that there were long hairs on the legs such as shown in the figure. Other specimens were afterwards found in one of the nearby canyons, and two specimens in the college collection were marked "C. Metz, in the mountains near Claremont."

Upon looking through the literature the species was determined to be *Trithyreus pentapeltis* Cook. In 1899 Dr. Hubbard collected some at Palm Springs under stones in the canyon near the stream. Those which we have found this year were under the dried oak leaves some distance from water. Cook gave the generic name *Hubbardia* which has not been sustained.

The following are the measurements of two types of the twenty or more specimens found.

Measurements—supposed Male:

Length of whole body, 7.5 mm.
Length of cephalothorax, 2 mm.
Length of abdomen, 3 mm.
Length of tail, 2.5 mm.
Length of first leg, 8 mm.
Length of maxillæ, 1.5 mm.
Width of abdomen, 1 mm.
Width of cephalothorax, 8 mm.

Measurements—Supposed Female and Juvenile, Fig. 1:

Length of whole body, 4.5 mm.
Length of cephalothorax, 1.5 mm.
Length of abdomen, 2 mm.
Length of tail, 1 mm.
Length of first leg, 5.5 mm.
Length of maxillæ, 2 mm.
Width of cephalothorax, 6 mm.
Width of abdomen, 1 mm.

Color of supposed Male—Cephalothorax and maxillæ, dark reddish brown. Abdomen and legs light yellow brown.

< 2 >

Color of supposed Female and Juvenile—All parts bright yellow brown.

Cephalothorax suboval, upper margin strongly concave at the sides and tapering to a point at the median line. Sides convex at upper edge; lower margin strongly convex. The cephalothorax is strongly chitinized, showing two small oval spots. The small suboval area between the chitinized cephalothorax and the abdomen is soft with five chitinized plates.

On the dorsal surface of each abdominal segment are two muscle depressions, while on the ventral surface the fourth, fifth and sixth segments have dark colored plates near the segmental divisions which are used for muscle attachments; besides the two muscle depressions.

The book-lungs openings are found on the ventral surface of the first abdominal segment, as is also the epigynum.

The caudal appendage of the juvenile and female is made up of three small joints tapering to a blunt end. It is held in an upright position above the abdomen. Cook in his description supposed

this form to be a female or juvenile; Krayselin considers it a different species, but upon close study of the rest of the organs of this form it was finally decided that it was a juvenile and probably a female, the supposition being held that the juvenile took the form of the female, as is often the case, until the last few molts. The epigynum of this form was extremely undeveloped, having only a small epigastric furrow with depressions at either end.

The caudal appendage of the supposed male is made up of two stout joints to which is attached a heart-shaped body tapering to a blunt apex. This body has deep pits both on the dorsal and ventral sides near the base.

On the tibia of the first pair of legs are two long special sensory hairs set in little pits. On the second, third and fourth legs one hair was found, also on the tibia. These hairs are three-fourths as long as the leg.

The mouth parts consist of a pair of strong mandibles and labium. The labium is placed between the two coxæ of the maxillæ. The long process of the coxa clothed with its long simple hairs seems to have some performance in the work of the mouth parts. The labium is suboval, clothed thickly with simple short hairs, the upper margin having a single row of long heavy straight hairs with many long single curved hairs covering them.

The mandibles are provided with three distinct kinds of hairs or spines. The large subquadrate proximal joint was clothed with long barbed spines, the movable finger having on its median surface a row of fifteen back curved barbed spines. In the space between the movable and stationary finger were long hairs, enlarged in the center and tapering off to a fine point, the tapered portion being barbed. The mandibles are set well down in the cephalothorax.

The sexual openings were found in the usual place; the ventral surface of the first abdominal segment, this being enlarged so as to do away with the second abdominal segment. The epigynum consists of a long epigastric furrow with a large lip-like opening near its median line. Just above this opening and on either side were small longitudinal creases.

Prof. Dr. Friedrich Dahl places the external sexual organs of this family on the legs and in the Thelyphonidæ which is closely related. They are found in the second joint of the tarsus of the first legs. Careful study failed to find any trace of secondary sexual organs in *Trithyreus pentapeltis*.

<i>Krayselin, Karl</i>	1899
Das Tierreich. Scorpiones und Pedipalpi.	
<i>Cook, O. F.</i>	1899
Hubbardia, a new genus of Pedipalpi, Entomological Society Proceedings, vol. 3.	
<i>Comstock, John Henry</i>	1911
The Spider Book, pp. 17-18.	
<i>Banks, Nathan</i>	1900
Synopsis of North American Invertebrates. Am. Nat. Vol. 34.	
<i>Dahl, Dr. Friedrich</i>	1913
Vergleichende Physiologie and Morphologie Der Spinnentiere. Jena, Verlag N. G. Fischer.	

(Contribution from the Zoological Laboratory of Pomona College.)

EXPLANATION OF FIGURES

Fig. 1. Drawing of the upper side of a young *Trithyreus pentapeltis* Cook $\times 10$.

Fig. 2. Lower or ventral view of *T. pentapeltis* $\times 10$.

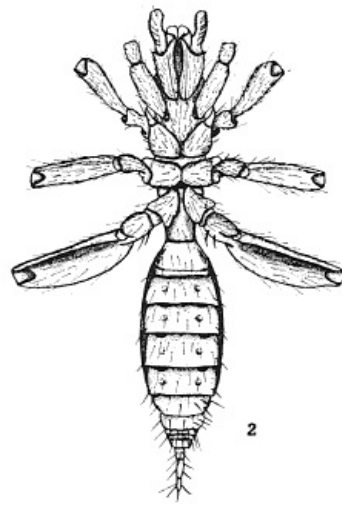
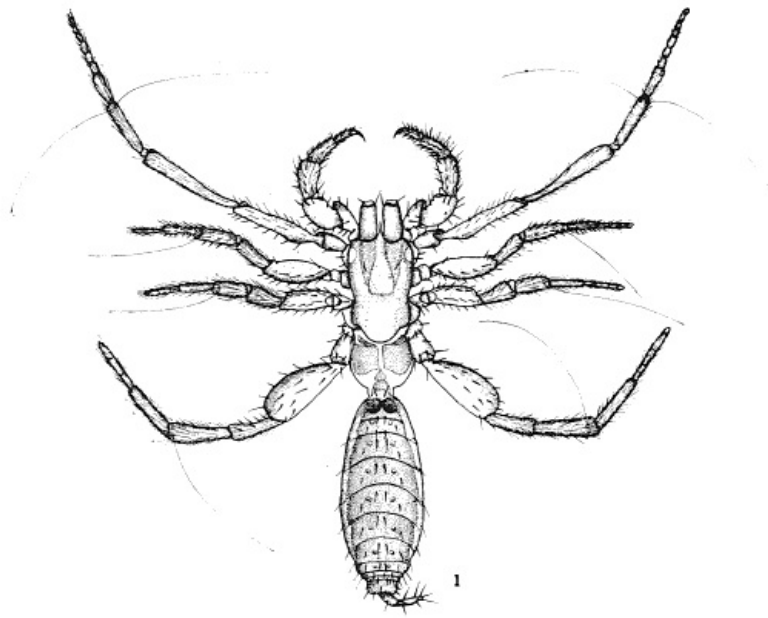
Figs. 3, 4, and 5. Various views of the caudal end of an adult *T. pentapeltis*. Much enlarged.

Fig. 6. Labium. Much enlarged.

Fig. 7. Maxilla. Much enlarged.

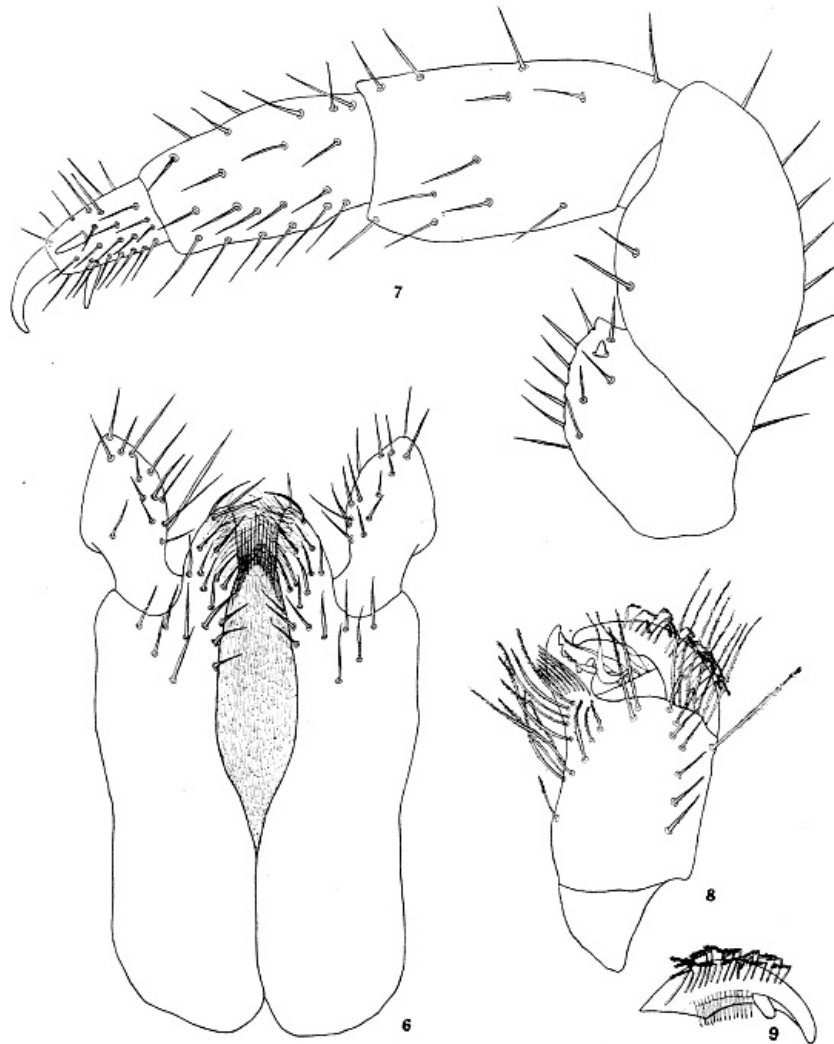
Fig. 8. Mandible of *Trithyreus*. Much enlarged.

Fig. 9. One jaw of mandible. Much enlarged.



« 6 »

« 7 »



Notes on Chalcid Flies, Chiefly From California

< 8 >

A. A. GIRAULT

The following descriptions are chiefly from specimens sent by the Department of Zoology of Pomona College.

Eusandalum californicum n. sp.

Female: Similar in every respect to *coquillettii* Ashmead except as follows: The hyaline cross-stripe between the fuscous cross-stripes of the forewing is distinctly narrower than either fuscous cross-stripe (broader than either in the other); the stylus of the abdomen is a little shorter than the ovipositor valves (their extruded portion), both equal in length in *coquillettii*. Otherwise the same. Antennæ 11-jointed, tapering, the club single and no longer than the pedicel, funicle 1 quadrate, 2 longest, elongate, somewhat compressed, over thrice the length of the pedicel. Types compared.

A female from Claremont (C. F. Baker).

Types: Catalogue No. 20357, U. S. National Museum, the female on a tag, a fore wing antenna and hind leg on a slide.

In the U. S. National Museum a female from the Santa Cruz Mountains, California, part of the type of *coquillettii* (now a single female from Los Angeles).

Eusandalum obscurum n. sp.

The type is one female from Easton, Washington (Kincaid). Catalogue No. 20358, U. S. National Museum, the female on a tag. [See table.](#)

Eusandalum alpinum n. sp.

The type is a part of the type of *coquillettii* from the Santa Cruz Mountains, California; Catalogue No. 20359, U. S. National Museum, the specimen on a tag. [See table.](#)

Eusandalum georgia n. sp.

One female, pinned, Georgia, Catalogue No. 20369, U. S. National Museum. A second female from Washington, D. C. [See table.](#)

Eusandalum arizona n. sp.

A female, Santa Rita Mountains, Arizona (Schwarz), May 27. Catalogue No. 20361, U. S. National Museum, tag. [See table.](#)

Synopsis of the North American Species of *Eusandalum*. Females. (From the types.)

1. Wings bifasciate, the distal fuscous band at apex. Legs red except the coxae, the antennae wholly concolorous. Ovipositor extruded for over half the length of the abdomen. Scutellum longitudinally lined.

Hyaline band of fore wing distinctly narrower than either fuscous band (one on each side of it); stylus a little shorter than the ovipositor.

[*californicum* Girault](#)

Hyaline band of fore wing somewhat broader than either fuscous stripe; stylus and ovipositor equal.

coquillettii Ashmead

2. Wings unifasciate or wholly embrowned or with a large unbroken, fuscous area. Wings wholly infuscated. Scutellum densely punctate like the scutum (in the first species). Propodeum with a lateral sulcus.

Ovipositor much extruded.

Legs reddish except the coxae and the first and third femora *ventrad*; more slender than usual, the ovipositor about as in *californicum* but the abdomen is longer, hence the ovipositor is so. Fore wing with a longitudinal white streak caudad of middle.

acmaeoderae Rohwer

Ovipositor extruded for less than a fourth the length of the abdomen, the stylus subobsolete.

Fore wings indefinitely slightly stained; legs reddish except the coxae; scutellum long-lineolated.

[*obscurum* Girault](#)

Wings infuscated from the bend of the submarginal vein to apex or nearly. Antennae concolorous (compare *obscurum*).

As in *californicum* but the scutellum finely punctate differs from *acmaeoderae* in being more robust, the first and third femora are not metallic *ventrad*, the costal cell is broader, the tip of the fore wing is hyaline for a short distance.

[*alpinum* Girault](#)

Legs wholly concolorous except the knees and tips of tibiae narrowly and the tarsi; as in the preceding but stylus and ovipositor subequal.

cyaneum Ashmead

3. Wings hyaline or subhyaline. Antennae concolorous except at extreme base.

Ovipositor extruded for about half the length of the abdomen, the stylus slightly short.

Middle legs except coxae, all knees narrowly, tips of tibiae and the tarsi reddish brown. Postmarginal vein subequal to the stigmal.

hubbardii Ashmead

Ovipositor extruded for less (or not more) than a third the length of the abdomen, the stylus subequal.

Postmarginal vein subequal to the stigmal.

Legs reddish except the coxae and cephalic femora and tibiae.

Scutellum somewhat more distinctly lineolated longitudinally, punctate. Ovipositor short.

hyalinipenne Ashmead

Postmarginal vein distinctly longer than the stigmal. Legs concolorous except knees, tips of tibiae and the tarsi. Stylus somewhat shorter than the ovipositor which is a third the length of the abdomen.

[*georgia* Girault](#)

4. Wings subhyaline. Antennæ with the basal fourth of the scape honey yellow.

Postmarginal vein distinctly much longer than the stigmal, twice longer. Ovipositor extruded for nearly half the length of the abdomen, the stylus a little shorter. Legs honey yellow except fore and hind coxae.

[*arizona* Girault](#)

All the species have the postmarginal vein shorter than the stigmal or no longer, save where noted; the parapsidal furrows are distinct, but very short, joining before the middle of the scutum from cephalad. The club is usually single, the antennae 11-jointed, tapering-filiform.

***Dialinus begini* Crawford**

One female, Santa Clara County (C. F. Baker).

***Elachistus coxalis* Howard**

One pair, San Mateo County, California, the male; and Laguna Beach, Southern California, the female (C. F. Baker).

The following species is an *Eudecatoma* (there being no distinct substigmal spot but only a very minute one) but for the present I include this segregate within the older one.

***Decatoma subimmaculata* n. sp.**

Female: Length, 2.00 mm. Of the usual habitus and sculpture, the punctation not coarse.

Honey yellow, the wings hyaline, the following black markings: Ocellar dots obscurely, upper margin of occiput (a crescent), median channel nearly to apex and cephalic margin of the propodeum (except laterad); abdominal petiole and the median line of abdomen dorsad narrowly, from just before apex of segment 2 nearly to the apex of segment 4. Abdomen compressed, segments 2, 4 and 5 subequal, longest, the abdomen glabrous, its petiole about twice longer than wide. Propodeum openly rugoso-punctate, the median channel single, distinct, no median basin. Pedicel black above, nearly twice longer than wide, a little longer than funicle 1, the other four funicle joints subequal, subquadrate. Club 2-jointed, the first joint shortest.

One female, Claremont, California (C. F. Baker); on oak.

Type: Catalogue No. 20400, U. S. National Museum, the female on a tag, the antennae and a caudal leg on a slide.

Differs from *catesbaei* Ashmead (types compared), in being larger, the median channel of the propodeum is distinct for its whole length and does not consist principally of two large foreae, the cross-carina passing *profinad* of it has an area on each side of the meson which runs at first nearly parallel to the channel (the forking) but in the Florida species, this carina continues more or less parallel with the cephalic margin of the propodeum.

***Scutellista cyanea* Mots**

One female, Claremont, California (C. F. Baker).

***Cleonymus californicus* n. sp.**

Female: Length, 4.00 mm.

Dark metallic green, the tegulae, antennae (except the club and pedicel) and the legs (except the concolorous coxae, the apex of caudal femur lateral and the last two pairs of tibiae dorsad more or less), reddish brown, the venation fuscous, the fore wings bifasciate, the first stripe from the base of the marginal vein and broken distad of the middle, the second from the postmarginal vein, obovate in shape, twice the width of the first. The (triangular) head, the thorax and abdomen, scaly punctate, the propodeum and abdomen 2 subglabrous, the distal margins of the abdominal segments glabrous. Propodeum foreolate along the cephalic and caudal margins, and along the median carina on each side, the lateral carina represented by a distinct, curved, foreate sulcus, the spiracle large, subreniform. Scutellum simple. Antennæ inserted near the clypeus, a little below the eyes, 11-jointed, the club pointed ovate, acuminate at apex, embraced by the long projection from one side of the apex of the distal funicle joint which reaches to distal three-

fourths of the club. Funicles 1 and 2 narrowest, grading into 3, all subquadrate, 4 longest, a little longer than wide and subequal to the pedicel; 8 wider than long. Postmarginal vein a little longer than the slender, curved stigmal, about a third the length of the marginal. Stigmal vein parallel, in general trend, with the costal margin.

Two females, mountains near Claremont (C. F. Baker).

Types: Catalogue No. 20348, U. S. National Museum, the females on tags, a fore wing and an antennae on a slide.

The abdomen is subpetiolate; it was distinctly, quadrately petiolate in a male specimen of *cleonymus depressus* in the U. S. National Museum.

***Entedon occidentalis* Girault**

Several specimens, Claremont, California (C. F. Baker).

***Isosoma grande* Riley**

One winged female, mountains near Claremont, California (C. F. Baker).

***Metapleura spectabilis* Westwood**

One female, Claremont, California (C. F. Baker).

The Rose Flea-Beetle **(*Haltica probata* Fall)**

« 13 »

G. F. MOZNETTE,
ASSISTANT ENTOMOLOGIST, OREGON AGRICULTURAL
COLLEGE,
CORVALLIS, OREGON

INTRODUCTION

From a careful perusal of the literature it is apparent that scarcely anything but the original description of *Haltica probata* Fall appears in print. As this species has at various times been reported on several of our cultivated plants, and as there is some possibility of its becoming destructive to our cultivated roses, observations have been made from time to time and this paper brings together, so far as possible, the recorded facts concerning the species.

HISTORY AND DISTRIBUTION OF THE SPECIES

The species was first described by Dr. H. C. Fall in 1910.^[A] Mr. Arthur Gibson^[B] mentions it as attacking leaves of strawberry plants at Nelson, British Columbia. The species is referred to as *Haltica evicta* Lec., but after a comparison with specimens in the writer's collection and later in Dr. Fall's collection at Pasadena, California, I am led to believe that the species reported by Mr. Gibson as *evicta* is not *evicta* but *probata*. It has been reported from Spokane, Washington, on strawberries, and at various times has been reported feeding on cultivated crops in Oregon.

The species is distributed along the Pacific Coast from British Columbia to California. It has been reported from Nelson in British Columbia; Everett and Spokane in Washington; from Corvallis, Pamela Lake, Mary's Peak, the Three Sisters, and Josephine County in Oregon; and from Santa Rosa, Belmont, Siskiyou, and Trinity Counties in California.

[A] Transactions of the American Entomological Society of America, Vol. 36, pp.

[B] Canadian Entomological Circular No. 2. 152-159.

SEASONAL LIFE-HISTORY AND HABITS OF THE SPECIES

With the approach of warm weather in the spring, when the buds of the wild rose are showing their green, the little bronze beetles ([Pl. I, Fig. 2](#)) come from their winter quarters, about the middle of April or earlier depending on the spring weather conditions, and commence feeding on the tender small leaves of the expanding buds. The beetles possess a very brilliant lustre and when approached manifest a saltatorial habit, and may leap for a considerable distance. The

« 14 »

insect passes the winter in the adult stage and during that time may be found concealed in convenient places. The writer has taken numerous individuals from beneath the moss of the scrub oak, which grows abundantly along the creeks in the Willamette Valley in Oregon. The first individuals were taken on April 11, 1913, feeding on a species of wild rose, *Rosa nукatana* Presl. near Corvallis, Oregon. The adults were at the time resting in the sun on the dried fruits of the rose and also on the moss which covered the oaks. In 1915, the first beetles were out on March 19 or somewhat earlier. Sometimes the March weather is too severe so that the beetles do not appear until later, and the inclement weather frequently puts a stop to the activity of the beetles and retards oviposition.

After emerging from their hibernating quarters, the beetles jump or fly to the nearest rose bush and soon begin to satisfy their appetite after the long winter's fast. At this time the tender bursting rose buds seem to be the favorite food, and the beetles engorge themselves with bites from the prospective crop of leaves, then locked up in the buds. The beetles seem to be most active during the warmer sunshiny portions of the day, when they may be seen jumping and flying about the rose bushes. When touched or jarred, they at once drop quickly to the ground, where they feign death for a short time, later returning to the foliage. Their shining bronze color renders it easy to discover and watch them at their destructive work. They begin gnawing an unsightly hole into either the side or top of the bursting leaf bud, often boring into the bud so far as to be almost hidden from view. It usually takes the beetles a few days to satisfy their vigorous spring appetites; then they turn their attention to the propagation of their kind. The later emerging adults feed voraciously on the foliage ([Pl. I, Fig. 5](#)) eating out irregular places in the leaves.

Many individuals were found in copulo on April 12, 1913, and on April 14, 1915. Eggs were laid in great numbers April 15, 1913, but not until the first of May in 1915, due to a long stretch of cold wet weather. By May 18 many eggs were to be found but usually no larvae. The eggs are laid in masses ([Pl. I, Fig. 3](#)) of from two to fifteen in a cluster with an average of between seven and nine. They are deposited usually on the lower surface of the leaf. No eggs are deposited until the foliage is well along usually, as this is the food of the larvae. The writer observed a female during oviposition. She thrusts out the egg and by a mucilaginous substance causes the egg to adhere fast to the leaf. She decorates the egg, as it were, with a fluid which later turns black and appears as a streak across the ova. The adults do not live long after egg deposition, usually about a week and a half. A number of females were observed to lay from forty to fifty eggs each.

« 15 »

The length of the egg stage was found to vary considerably even in the insectary, due no doubt largely to the weather conditions. In indoor observations it ranged from seven to fifteen days, with an average of twelve. In the open, eggs under screen cloth were deposited on May 24, 1913, and hatched June 10, 1913, a duration of seventeen days. By June, 1913, practically all of the egg masses had hatched and scarcely an adult could be found anywhere. The larvae are at first yellow, changing over to a black after a short period of time ([Pl. I, Fig. 7](#)). The eggs split at the side when the young emerge and the larvae remain quiet for some time apparently feeding first on the remaining egg juices. After a while they begin to move about for convenient feeding spots. The larvae moult three times, and after each moulting appear yellow, soon changing to a black. Several of the grubs usually work on the same leaf, continuing to eat small irregular holes, through, or nearly through, the leaf until it appears skeletonized ([Pl. I, Fig. 7](#)), when they seek new pastures.

When full grown the larvae drop to the soil and after burrowing to a depth of about an inch or less, they construct soil cells of earth ([Pl. I, Fig. 6](#)), not unlike the cell of the common cherry and pear slug, in which they pupate. By July 3, 1913, many larvae were falling to the soil. The length of the larval stage varies from fifteen to twenty-five days with an average of twenty days. By July 10 many pupae ([Pl. I, Fig. 4](#)) were found in the soil. The writer neglected to ascertain the exact length of the pupal stage, but from the meager observations made up to this time ventures the opinion that it is about eighteen days. By the first of August many adults could be found. They are a beautiful metallic color when just emerged. The writer bred from the adults a species of Diptera a *Tachinid* but has not been able to ascertain the species. Subsequent observation revealed no eggs, so undoubtedly the species is single brooded. The life-cycle is calculated to last about fifty-five days from eggs to adults, but this is greatly influenced by the weather conditions. The length of the adult stage is about ten months, depending, of course, upon the time the warm days approach in the spring and upon the cold stretches which intervene, conditions which influence emergence from their hibernating quarters.

« 16 »

DESCRIPTION OF THE VARIOUS STAGES

The Eggs ([Pl. I, Fig. 3](#)) are of an orange color, oblong oval or bean-shaped. The egg has a delicate covering by which it is attached to the leaf. Nearly every egg has a sort of spine-shape structure attached, although it is not exactly a spine but a part of the egg covering, which, when it has dried, gives it a black streaked appearance at that point. The egg measures 1 mm. in length by .25 mm. in width.

The Larvae ([Pl. I, Fig. 7](#)) when full grown have the body wider at the anterior end, tapering gradually to the anal segment and covered with many hairs. They are covered with an oily substance in which they often collect their excrement as they feed and travel. The entire larva is black and the segments of the body possess numerous tubercles bearing setae. Each segment of the abdomen has a group of tubercles on a side above the spiracles. When full grown the larvae

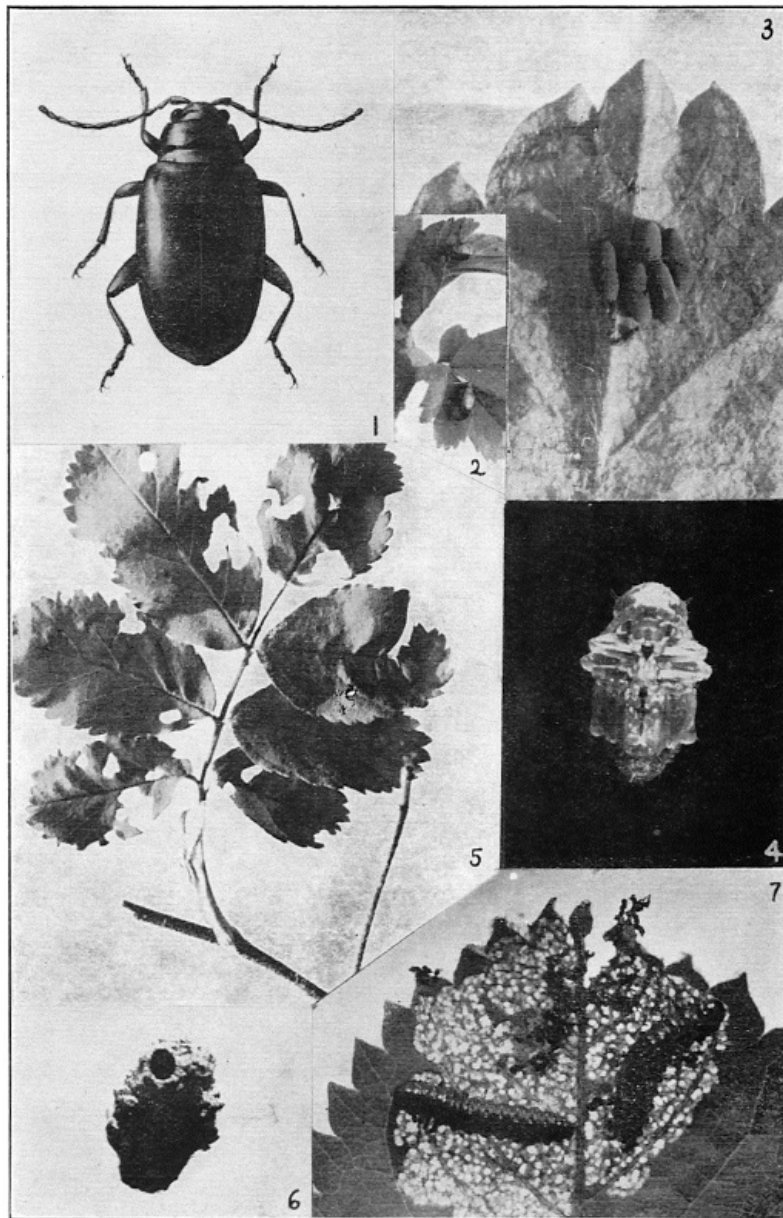
measure from 6 to 8 mm. in length.

The Pupa (Pl. I, Fig. 4) is yellow, 4 to 6 mm. in length, with the wing pads and legs of a paler yellow to nearly white. Two setae are located on the vertex and two on the occiput of head. The prothorax, mesothorax, and metathorax bear spines varying in number. The abdomen possesses three rows of setae on each side above the spiracles.

The Adult (Pl. I, Fig. 1) is green bronze, entire upper surface polished and strongly shining sculpture throughout, nearly as in *Haltica ignita*. Antennæ piceous, slightly more than half the length of the body, joints 2-3-4 gradually increasing in length, the fourth very nearly three times as long as wide. Eyes rather small and not very prominent, their width as seen from the front distinctly less than half the interocular distance. Prothorax two-thirds wider than long, sides parallel in basal half, convergent anteriorly. Elytra fully two-thirds as wide as long, and nearly three-fourths wider than the prothorax. Body beneath piceous; abdomen alutaceous, rather coarsely punctate and transversely rugulose. Length 3.7 mm. to 4 mm.

EXPLANATION OF PLATE

- Figure 1. The adult beetle (greatly enlarged).
- Figure 2. The adult beetle (natural size).
- Figure 3. Eggs in situ on leaf greatly enlarged.
- Figure 4. Pupa greatly enlarged.
- Figure 5. Rose leaves showing work of adult beetles.
- Figure 6. Pupal soil cell.
- Figure 7. Larvae at work skeletonizing leaf.



Notes on Birds of Laguna Beach and Vicinity for 1916

H. H. NININGER

In addition to the work done by Mr. Leon Gardener and others on the distribution of birds in the vicinity of Laguna Beach I noted the following species in the summer of 1916:

70. *Sterna hirundo* (Common Tern)

This species was found occasionally about the muddy flats at Balboa.

74. *Sterna antillarum* (Least Tern)

The Least Tern is much more common than the former. They were often seen in small flocks diving for fish along the coast from Laguna to Balboa. They probably nest along the sandy shores; but none of their nests were taken by the writer.

95. *Puffinis griseus* (Dark Bodied Shearwater)

These birds were found ten to twelve miles from shore, in flocks feeding over schools of fish. They are called by the fishermen "Barracuda Birds."

210. *Rollus obsoletus* (Calif. Clapper Rail)

Found in the swampy tracts about Balboa.

214. *Porzana carolina* (Sora Rail)

A specimen of this Rail was taken at one of the lakes in Laguna Canyon in the latter part of July.

421. *Chordeiles acutipennis* (Texas Night Hawk)

Either at dusk or at dawn these birds could be found abundantly, in certain localities, feeding over fields, pools and streams to which they came at dusk, from the hills where they spent the daylight hours. Mr. C. C. White found a pair of young almost ready for flight on one of the hills bordering on Laguna Canyon, July 7, 1916.

425. *Aeronautes melanoleucus* (White-throated Swift)

Mr. Charles A. Keeler in "Bird Notes Afield" (1889) records this species from Capistrano. To one accustomed to meeting with this bird only among the high and almost inaccessible cliffs of the mountains it is no little surprise to find it in a district so nearly level as the region about this old mission settlement. But surely it is there. A visit to the place in the latter part of July revealed the fact that they are, seventeen years since Mr. Keeler's writings, still using the same broken walls as a retreat. I think they are nesting at the time we visited the place, for upon the entrance of an adult into one of the crevices there came cries of young birds which seemed to be coming from birds that were being fed.

530a. *Astragalinus P. hesperophilus* (Green-backed Goldfinch)

Common around Laguna and the neighboring hills. Nests with eggs were found, probably the second brood for the season.

634. *Vireo vicinior* (Gray Vireo)

Found along the streams near Capistrano.

685a. *Wilsonia pusilla pileolata* (Pileolated Warbler)

Fairly common in trees along streams near Capistrano.

364. *Pandion haliaetus carolinensis* (American Osprey)

One of these magnificent birds was found on the rocky cliffs bordering the shore between Laguna and Balboa. It was seen several times and was reasonably tame.

BREEDING NOTES

In addition to the nests of the more common birds the following were noted:

Several Raven nests on the cliffs bordering the shore and are in Boat Canyon about a mile from the sea were found deserted, but feathers of their owners and the remains of their food betrayed their identity.

A brood of Ruddy Ducks was seen on one of the lakes in Laguna Canyon several times.

Coots were found breeding about the lakes in abundance.

(Contribution from the Zoological Laboratory of Pomona College)

Solpugids From the Claremont-Laguna Region

« 22 »

J. NISBET

The following list of solpugids represents a collection obtained by students and others during the past four or five years. Drawings are given of one large specimen and top and side views of the head region of several others. The determinations are by Dr. N. Banks.

Eremobates formicaria Koch

This species has been taken from our region although such large specimens have been reported only from dryer regions. This specimen, a male is from Brawley, Cal. (Figs. 1 and 2). Figs. 3 and 4 were taken from a young specimen collected at Claremont.

The movable finger of the chelicerae of the male has two large teeth. Anterior margin of rephalothorix straight. Hind tarsi one segment.

Eremobates californica Sim.

The drawings are from a specimen taken at Laguna Beach (Figs. 5 and 6). Specimens were also taken at Claremont. Movable finger of the chelicerae with a large tooth. This is not so marked in the female. Hind tarsi one segment.

Hemerotrecha californica Banks

Specimens were obtained at Claremont. Upper finger of chelicerae without teeth or many small teeth. Male has an elongated flayellow of two parts on the upper finger of chalicera. Hind tarsi with three joints. Specimens obtained were about evenly divided between this and the previous species (Figs. 7, 8, 9 and 10).

(Contribution from the Zoological Laboratory of Pomona College)

EXPLANATION OF FIGURES

« 23 »

Figure 1. *Eremobates formicaria* Koch. ×2.

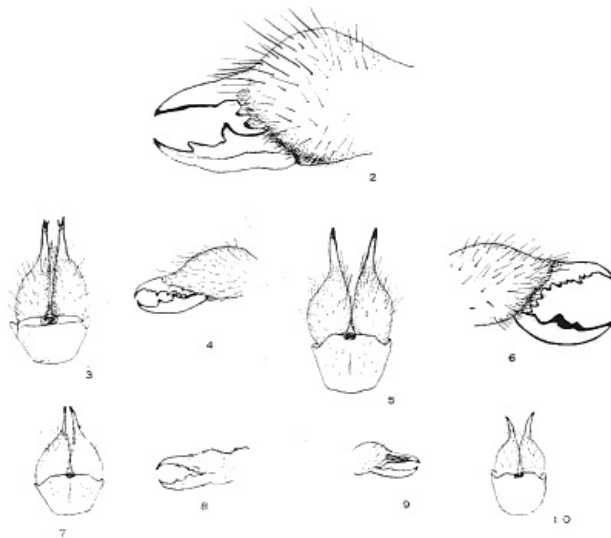
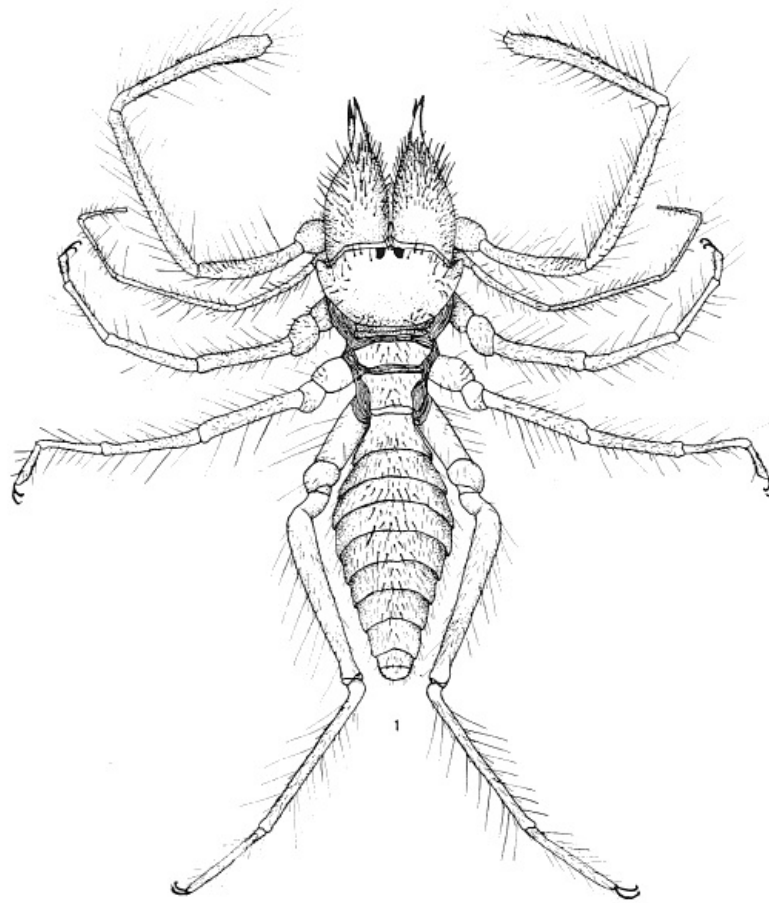
Figure 2. *Eremobates formicaria* Koch, side view of chelicerae. ×2.

Figures 3-4. Chelicerae from young *E. formicaria*. ×2.

Figures 5-6. Chelicerae from *E. californica* Sim. ×2.

Figures 7-8. Chelicerae from *Hemerotrecha californica* Banks, views of the chelicerae. ×2.

Figures 9-10. *H. californica* views of chelicerae, another specimen. ×2.



Record of Two Pseudoscorpions From Claremont-Laguna Region

WINIFRED T. MOORE

***Garypus Californicus* Banks**

Description: Fig. 1. Length 5 mm.

Color: Cephalothorax and pedipalps dark brown, abdomen and legs light yellow; each abdominal scutae with a dark central spot; anterior ventral scutae also with dark spots. Cephalothorax emarginate; four eyes; femur of pedipalps longer than cephalothorax, tibia hardly convex on inner side, hand about as long as tibia, fingers longer than hand; legs long and slender.

Habitat: Specimen found under rocks near ocean at Laguna Beach, collected by Walter Sturgis.

Chelanops pallipes Banks

Description: Fig. 2. Length 2 mm. including mandibles.

Color: Cephalothorax light reddish brown, pedipalps darker, abdomen and legs pale yellow.

Similar to *C. dorsalis*, but fingers a little longer than hand; no eye spots, clavate hairs found on all parts of two types, on legs and pedipalps more clavate on one side (Fig. 3) on body evening clavate (Fig. 4). Simple hairs found on under surface of tarsus. All parts covered with small chiton plates.

Habitat: Specimens taken from under stones in wash near Claremont.

(Contribution from the Zoological Laboratory of Pomona College)

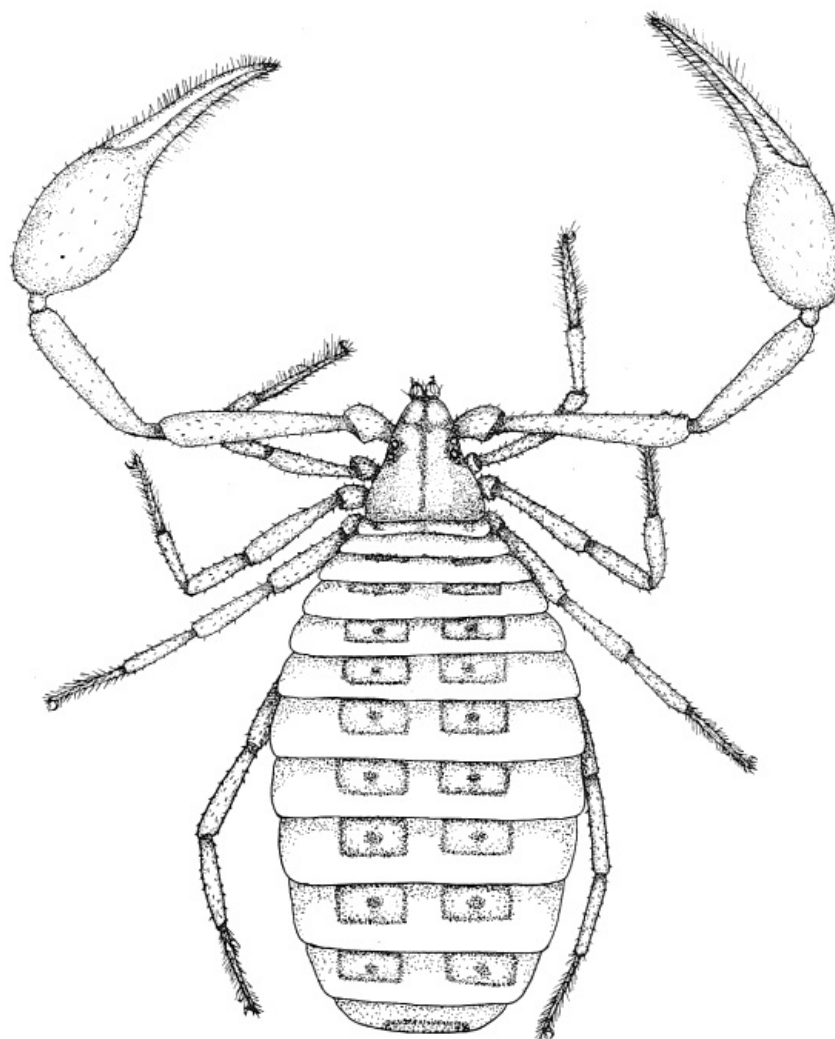
EXPLANATION OF FIGURES

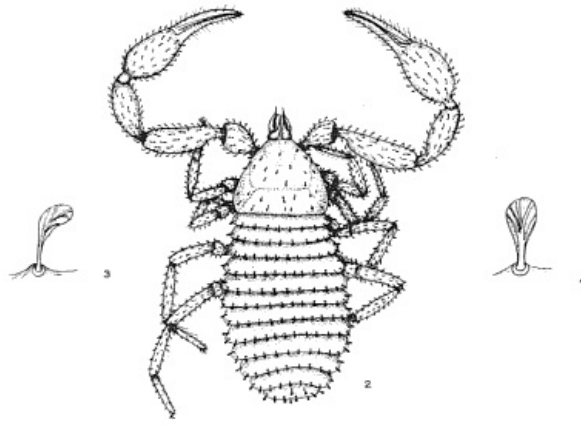
Figure 1. *Garypus Californicus*. ×20.

Figure 2. *Chelanops pallipes*. ×20.

Figure 3. Hair from legs and pedipalps of *C. pallipes* much enlarged.

Figure 4. Hair from body of *C. pallipes* much enlarged.





The Central Nervous System of a Sipunculid

« 30 »

WILLIAM A. HILTON

A number of specimens of the genus *Phascolosoma* were obtained at Laguna Beach. These were preserved in various fluids. Flemming's fluid and mercuric chloride, were especially valuable for study. The nerve cords were dissected out and mounted after staining. Some were imbedded, sectioned and stained. The stain which brought out the cells with greatest clearness was copper haematoxylin.

The general character of the nervous system of sipunculids is well known, and the specimens examined at this time were typical as to the form of the brain and cord. The brain is imbedded in the proboscis just below the tentacles. It has a similar appearance in section to the photographs of Spengel, 1912. The brain is small. Two main branches supply nearby tentacles and muscles. There is a pair of small branches from the connectives. Extending from the epithelium of the tentacular region is a pair of tubes leading into the brain, the cerebral organs. These epithelial tubes lead to a pigmented area on each side, and these pigmented areas in section look like simple eyes. A few irregular spots of pigment were found near the larger masses. The epithelium at the outer end of the tube was also deeply pigmented.

Throughout the body the ventral nerve cord kept about the same width, although the muscle bands at the sides increased somewhat. The strands connecting the muscles and nerves to the animal's body were more or less regularly arranged. In specimens with the proboscis drawn in, the nerve cord is of course doubled back on itself. In the specimen drawn at the junction of the two parts, that of the proboscis and that of the ventral body-wall, there is a lack of lateral branches, as shown in the upper portion of the second line of the drawing. Towards the caudal end the lateral branches come off more irregularly.

When the animal is contracted the nerve cord seems to be segmented, but sections show that this appearance is due to the slight folding of the nerve cord within the muscle bands; the nerve tissue does not seem to be elastic.

« 31 »

Very little has been written on the histological structure of sipunculids. Haller, 1889, discusses a number of points, especially in *sipunculus nudus*, relating to the ventral cord only. I find a number of differences in this form. I did not find any very clear evidence of special neuroglia cells, such as described and figured by Haller, such elements may be present, but at least they are not evident, not so evident as in many other invertebrates which I have examined. Nerve cells may anastomose with each other as shown in Haller's figure, but of this I can not be sure. If fibres do not unite they are in very intimate contact.

In the ventral cord no small fibrils were seen only rather small fibers which may have been fibrils. The lack of connective material in part at least, perhaps because the nervous system is often extended and folded, shows the cell processes with great distinctness. This may be why a clearer picture than usual is presented of the relationship of cells.

Cells are abundant on the ventral side of the cord, especially in the middle line. The more dorsal fibrous region is practically without cells of any kind. No very marked tracts of fibers are evident, the fibers are about equally distributed in all directions and may be subdivided as follows:

1. Fibers which enter the fibrous mass from cells and run short distances up and down.
2. Fibers which pass from cells to other cells near by in the cellular area.
3. Fibers which leave the ganglion laterally from ventral cells.
4. Fibers which enter from the lateral nerves to end in the fiber area or in among the cells.

There are no indications of long fibers, either ascending or descending. After the examination of the cord of this animal one is impressed with the suggestion that many cells of similar sort act alike, that is groups of cells, not individuals are involved in the simplest transmissions of impulses. This general suggestion which, of course, is not new, comes to mind with great clearness after the study of thin sections of the cord of this animal. Whether the cells actually anastomose or not is a question hard to decide, but in the numerous contacts of naked fibers there is, I believe, ample opportunity for the transmission of complex changes from cell to cell, to all parts of the nervous system. In this form there is no particular localization of definite centers.

The brain differs in structure from the cord, the central fibrous mass is more dense, the cells are very much smaller and more numerous. Some cells of the brain send their fibers out directly without the common pathway of a distinct nerve trunk. No special features of the brain were determined except the cerebral organs already described.

<i>Andreae</i>		1882
	Beitrag zur Anatomie und Histologie des Sipunculus nudus. Zeit. f. Wiss. Zool. t. xxxvi.	
<i>Andrews, E. A.</i>		1887
	Notes on the anatomy of Sipunculus gouldii Pourt. Studies Biol. Lab. J. H. univ. vol. iv.	
<i>Delage et Herouard</i>		1897
	Traite de zoologie concrete. Les vermiens. vol. v. Paris.	
<i>Haller, B.</i>		1889
	Beitrag zur Kenntniss der Textur des Centralnervensystem Hoherer Wurmer. Arb. des Zoolog. Inst. Wien Tom. viii. Heft 2.	
<i>Marcel, A. Herubel</i>		1907
	Recherches sur Sipunculides. Chap. iv. Le system nerveux. Mem. soc. d. France. t. xx.	
<i>Melalnikoff, S.</i>		1900
	Zeit. Wiss. Zool. Bd. lxxviii.	
<i>Herubel, A.</i>		1902
	Sur le cerveau du Phascolosome. Ac. d. Paris, cxxiv.	
<i>Spengel, J. W.</i>		1912
	Beitrag zur Kenntnis der Gephyren. Zeit. Wiss. Zool. Bd. xxxiv.	
<i>Ward, H. B.</i>		1891
	Some points on the anatomy and history of Sipunculus nudus. Bull. Mus. Comp. Zool. Harvard College.	

(Contribution from the Zoological Laboratory of Pomona College)

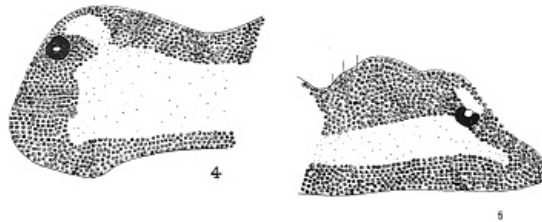
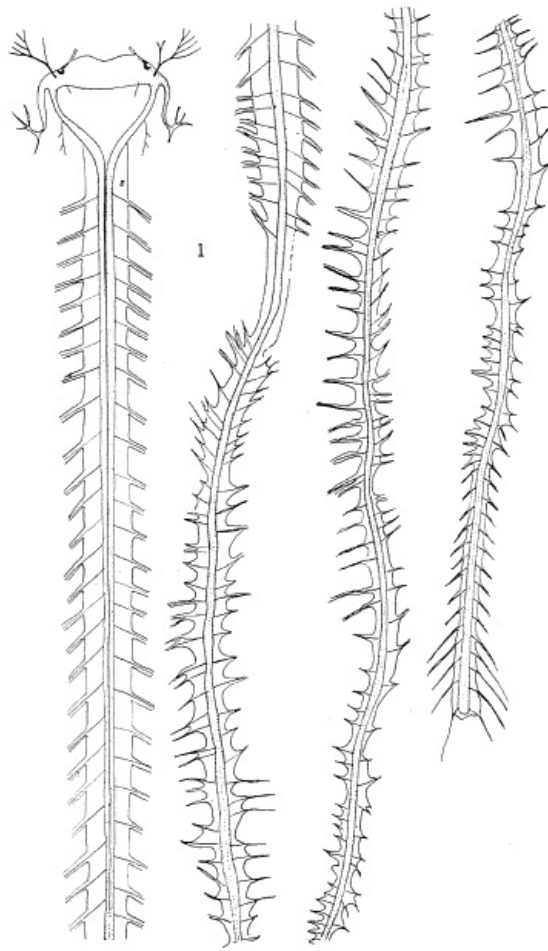
EXPLANATION OF FIGURES

Figure 1. Central nervous system of Phascolosoma $\times 15$. The cord is shown in three separate pieces. The lower end of the first or left-hand drawing should join with the second and so on. The central nerve band is shown with the lateral branches of muscle and nerve. The brain is shown attached to the first segment at the left. The pigment spots, cerebral tubes and chief nerves are shown. The brain is drawn from reconstructions made from serial sections.

Figure 2. Cross section of the nerve cord. $\times 75$.

Figure 3. Longitudinal section of the nerve cord. $\times 75$.

Figures 4 to 6. Drawings of sections taken through the brain at various levels, only one-half is shown in each case. $\times 75$.



« 35 »

Littoral Ascidiens Collected at Laguna Beach

« 36 »

The specimens reported upon are from a collection made by P. A. Lichti during the summer of 1915, and from a small collection brought in during the summer of 1916. The determinations of all but the fifth were kindly made by Prof. W. E. Ritter.

***Ascidia californica* Ritter and Forsythe**

These simple forms were found quite abundantly under stones and in kelp holdfasts. The form of the body was determined largely by the position the animal took on the stone or seaweed.

***Styela barnharti* Ritter and Forsythe**

The specimens obtained were young, simple, of a redish-brown color and about 4 mm. high. They were found under stones at low tide but not as commonly as some others.

***Styela montereyensis* Dall**

A single specimen of this large, simple species was taken just off shore. It was slender at the base, expanded near the openings and of a redish-brown color.

***Euherdmania claviformis* Ritter**

This slender species was often found in clusters under stones. They were about 2 mm. in diameter and 10-20 mm. long, sometimes free from sand, at other times covered with sand grains.

***Goodsiria dura* Ritter**

Bright red or orange masses of these were often found in bits of seaweed from deeper water. The individuals were 2 to 3 mm. across and often closely massed on the seaweed or other support.

***Eudistoma diaphones* Ritter and Forsythe**

This was the common compound species found closely attached to the lower sides of stones. It was often quite extensive but not thick or colored.

***Eudistoma psamion* Ritter and Forsythe**

Great masses of this tough, pinkish or slightly colored form were found under rock ledges. It resembles one of the sponges in general appearance and is found in among sponges and polyzoans. This was one of the most bulky forms which we found.

« 37 »

***Glossophorum planum* Ritter and Forsythe**

Irregular masses of this species were found under rock ledges and under stones. Our specimens are largely covered with sand grains.

***Distaplia occidentalis* Ritter and Forsythe**

This compound stalked form was found on a rock ledge at low tide near Salt Creek.

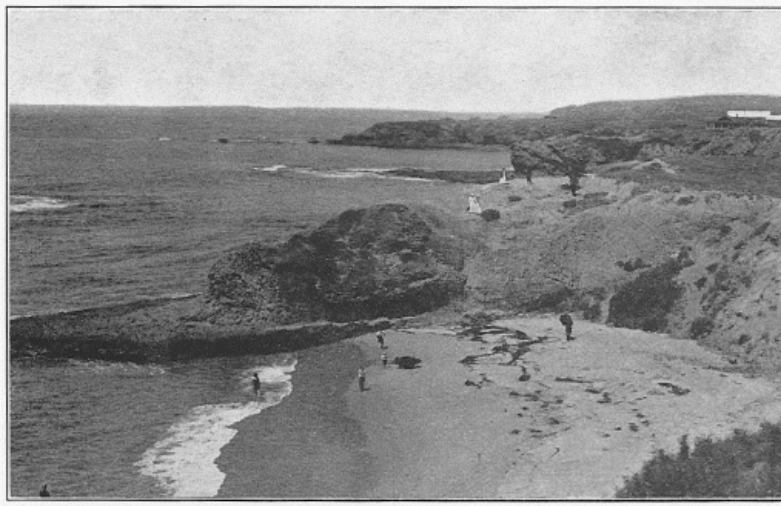
W. A. H.

(Contribution from the Zoological Laboratory of Pomona College)

Summer School at Laguna Beach

« 38 »

The summer school at Laguna Beach during the past season was in many respects the most valuable of the past five or six years. There were more students, more teachers and fully as many visitors. The harvest of specimens was very satisfactory. Many creatures not before gathered here were brought from the nearby waters. Amphioxus was obtained here for the first time, as well as many other interesting and valuable specimens.



Several new courses were offered. A course in Ecology was given by Professor Bean. In this the local distribution of animals was especially studied. A similar course is to be offered this summer to those who have had some zoology. It is believed that this work will bring greater and greater advantages to us here as we come to know the local conditions better. In the nature of the material this will always be to a large extent a field study.

The course in birds given by Professor Nininger was interesting and valuable. A number of new records for this region were obtained during the summer.



« 39 »

For the first time Miss Hills gave a course in drawing in connection with zoological subjects. This much-needed and valuable work will be continued during the coming summer, not only in a special course, but also in an optional way in connection with several of the other courses.



In connection with the ecology especially, more off-shore collecting was done than ever before. A number of longer trips were found interesting and valuable. Laguna at all times offers attractive walks and many short trips were taken by all classes. Some of these were for a few miles along the coast, back in the hills or by water or land for a considerable distance.

« 40 »

The rocks and coves were again explored, yet much remains unknown. Many new specimens to the locality were found, some of these were from deeper water, rare fish, large sea cucumbers, a large number of strange crabs and many other smaller but no less interesting creatures.

As in the past, a number of workers from other institutions used the private laboratories. The eight research rooms were in use most of the time by those doing more advanced work. It is expected that there will be a number of advanced workers from the northern and eastern universities during the coming season. For the first time the laboratory is provided with a satisfactory lighting system. Electricity is now established at Laguna Beach and the laboratory and tent city are well provided with an ample lighting system.

The tent city and dining hall will again offer accommodations at reasonable prices. The cost of tuition is \$7.50 general charge and \$3.00 an hour per hour taken. By an hour is meant the equivalent of an hour's work in a regular college semester. There are eight private rooms for special investigators.

For further information write to the Director, William A. Hilton, Pomona College, Claremont, Cal. (Laguna Beach, Cal., from June 26 to September 20.)

Courses Offered at the Summer School of the Laguna Beach Biological Laboratory 1917

« 41 »

To reach Laguna Beach from Los Angeles take the electric or Santa Fe to Santa Ana. From Santa Ana a morning stage leaves at ten, an afternoon stage at four.

Work begins June 27 and regular courses last six weeks, but the laboratory is open all summer.

No one may register for more than six hours. By an hour is included the equivalent of an hour's work during a regular college semester.

The staff of the Laguna Marine Laboratory for the summer will be as follows, several others from eastern institutions may be added later.

William A. Hilton, Pomona College, Director	<i>Zoology</i>
Dr. R. V. Chamberlin, Harvard University Museum of Comparative Zoology	<i>Zoology</i>
E. O. Essig, Department of Entomology University of California	<i>Entomology</i>
Anna A. Hills	<i>Scientific Drawing</i>

1. S. B. 11. Zoology (2 hours). A synopsis of marine invertebrates. Lectures and class exercises with early morning field trips. Prerequisite Biology A1, or open to those who are taking some other biological work. M. to F. at 8.
- 1a..S. B. 11. Zoology. Marine invertebrates (1 hour if taken with 1, or 2 hours). Laboratory on typical local forms. Mornings 9 to 12, except Saturday.
- 2.. S. B. 18. General Entomology (2 to 3 hours). Class laboratory and field work in the general study of local insects. Prerequisite Biology A1, or Zoology B11, or may be accompanied by one of these. Class period M. to F. at 11. Laboratory and field work at hours to be arranged.
- 3.. S. A1. General Biology (3 hours). A beginning course dealing with general principles. Open to those who have had no biological work and who have either entered college or are about to enter. Class periods M. to F. at 11. Laboratory and field work afternoons.
- 4.. S. C. 4. Ecology (2 or 3 hours). Class, field and laboratory work at hours to be arranged. A study of local land and aquatic societies and the factors governing the distribution of marine, fresh water and land forms. Prerequisite, a year of biological work. Class periods M. W. F. at 1.
- 5.. S. C. 5. Nature Study (2 or 3 hours). Methods and materials for nature study. This will be given in the evening when a lantern may be used. A general view of the whole field will be given either for those who are teaching, those who intend to teach, or those who desire the general not technical information. This is not a course for college credit. M. to F. evening at 7:30. Laboratory and field work to be arranged. This will be given by a number of teachers.
- 7.. S. D. 7. Mammalian Embryology (2 hours). Laboratory work with serial sections of embryos. Prerequisite two years of zoological work. A review course for those in the practice of medicine or preparing for medical work. Hours to be arranged.
- 8.. S. D. 8. Neurology (2 or 3 hours). Laboratory work with sections of the human brain and cord. A review course open only to those who have some knowledge of the central nervous system of vertebrates. Especially designed for those who have interest in Neurology, Psychology or Medicine.

« 42 »

In addition to these courses special C. or D. work for 2 or 3 hours may be taken as follows:

- a.. Special field and laboratory work with some group of marine animals, such as amphipods, isopods, decapods, gastropods, etc.
- b.. Special field and laboratory work in Entomology, either with some single order or family, or life history work.
- c.. Special field and laboratory work in the embryology of invertebrates.
- d.. Special field and laboratory work in Ecology. Hours to be arranged.
- e.. Special field and laboratory work in marine algæ. Hours to be arranged.

« 43 »

The following work in art will be offered by Miss Anna A. Hills:

- 1..S. A1. Art (2 hours) zoological drawing. A beginning course for students of Biology with marine and land specimens as material. This course will be an aid to any who may wish to prepare illustrations for scientific papers or books. Pen and ink, pencil and colored methods will be given. Tuition the same as in other courses. Students furnish their own drawing materials.
- 2.. Outdoor sketch class with either water colors or oils—oils preferred.
- 3.. Outdoor figure work. Especially arranged for if desired by those who have done out-of-door work.

Rates for two and three, 75 cents per hour. Each should be taken in three periods of three hours each.

Miss Hills has had the following preparation: Student in Olivet College, Art Institute, Chicago; Graduate of Cooper Union, New York City; special work under Rhoda Holmes Nicholls and Arthur W. Dow, New York. During four years study in Europe worked under Wilhelmina H. de Koning in Holland, Jean Paul Laurens and William Lappara in Julian's Academy, Paris, and in England two years out of doors under J. Noble Barlow.

« 44 »

Supply Department

Laguna Marine Laboratory

LAGUNA BEACH, ORANGE COUNTY, CALIFORNIA

« 45 »

ZOOLOGICAL SPECIMENS FOR CLASS AND MUSEUM
MARINE AND FRESH WATER FORMS
DETERMINED INSECTS FOR SCHOOL COLLECTIONS
MICROSCOPIC PREPARATIONS OF ALL SORTS, BOTH
WHOLE MOUNTS AND SECTIONS
ZOOLOGICAL CHARTS IN COLORS
ANATOMICAL MODELS AND DISSECTIONS
All orders for material should be sent in not later than August 1st

ATTENTION GIVEN TO SPECIAL MATERIAL
From September 15th to June 20th, address Department
Zoology, Pomona College, Claremont, California.
From June 20th until September 15th, address

SUPPLY DEPARTMENT
LAGUNA MARINE LABORATORY
LAGUNA BEACH, CALIFORNIA

Living protozoa, hydroids, planarians, rotifers, frogs, lizards and salamanders may be furnished if time is given. Enough for a class of twelve of any one of the first four, \$1.00. Frogs, lizards and salamanders may be furnished at from \$1.00 to \$3.00 a dozen.

Towings from the ocean, per bottle	\$.25
Simple sponges, per dozen	.50
Other sponges, per dozen	.75

Small hydroids, per vial	.75
Large tubularian hydroids, per dozen	.75 to 1.00
Fresh water planarians, per dozen	.25
Salt water planarians, per dozen	.50
Small round worms, per dozen	.25
Sipunculid worms, per dozen	.75
Marine annelids, per dozen	.75 to 1.00
Leeches, per dozen	.75
Polyzoa, per bottle	.25
Starfish, small to large, per dozen	.50 to 1.50
Sea urchins, per dozen	.75 to 1.00
Sea cucumbers, large, per dozen	3.00
Synapta, per dozen	1.00
Serpent stars, small to large, per dozen	.75 to 2.00
Mussels, medium to large, per dozen	.75 to 1.50
Pectens or cockles, per dozen	.75 to 1.50
Snails, small, per dozen	.50
Sea hares, per dozen	2.00
Salt Water Snails, large, per dozen	1.00
Limpets, large, per dozen	.75
Land slugs, per dozen	.75
Chitons, medium sized, per dozen	.75
Chitons, large, per dozen	1.50
Barnacles, large, per dozen	1.00
Shore crabs, per dozen	.75
Rock crabs, large, per dozen	.50
Small lobster-like forms, per dozen	.75 to 1.50
Ascidians, simple or compound	.75
Amphioxus, medium to large, each	.25 to .50
Small fish, per dozen	.50 to 1.50
Devilfish or octopus, each	.75 to 3.00

Eggs or young crabs, lobsters, starfish, etc., can be furnished either mounted and stained for microscopic examination or in bottles.

[Pg i]

Amphipods, isopods, etc., can be furnished at any time.

The following land animals can be furnished at from 25c to \$1.00 a dozen preserved in alcohol or formalin.

Spiders, phalangids, scorpions, centipedes, millipedes, dragon and damsel fly larvæ, aquatic beetle larvæ, grasshoppers, crickets, termites, bugs, beetles, etc.

DETERMINED COLLECTIONS OF MARINE SHELLS

A set of fifty species \$5.00

DETERMINED MARINE CRUSTACEA

A set of forty species \$8.00

DETERMINED MARINE INVERTEBRATES

A set of local starfish, sea urchins, etc. \$5.00

DETERMINED AND MOUNTED INSECTS

A set of all the important orders, labeled and in a box or case \$6.00

A mounted collection of fifty common beetles, determined and labeled 6.00

A set of 25 butterflies, mounted and labeled 6.00

Other sets of determined insects may be obtained to order.

ZOOLOGICAL CHARTS

These are made on cloth and may be made to order. The charts may be in colors and cost from \$1.00 to \$3.00 each, according to the details. Special prices given on Anatomical, Physiological, Zoological or Entomological diagrams in one or several colors.

ZOOLOGICAL OR ANATOMICAL MODELS IN CLAY OR WAX AND IN COLORS

These also may be made to order, their cost depends upon the complexity. The following are some of the series:

Brains of the chief vertebrate groups, set of six	\$5.00 to \$10.00
Anatomy of clam, earthworm, starfish	10.00
Models of the development of the frog	5.00
Models of the development of the chick, etc.	

(OVER)

ZOOLOGICAL OR HISTOLOGICAL MICROSCOPIC SLIDES

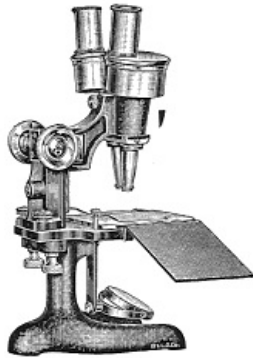
[Pg ii]

Sections of starfish, whole small starfish, young crustacea, etc., sections of organs for classes in Physiology. These slides will be made to order from any animal or any tissue for from 25 cents to 75 cents a slide with reduction in price for sets of twelve or more.

Serial sections of embryos of mammals, reptiles, birds, fish or invertebrate embryos or adults will be made to order at from 25 cents to 75 cents a slide, depending upon the stain and character of the object.

Prices include preservatives and containers in most cases.

The KA Binocular Microscope



Is of great value in all biological work where low and medium powers are employed. In embryology the true stereoscopic image shows the relative position of important details. This feature is of great assistance to the student and makes the instructor's work easy.

Write for booklet

Bausch & Lomb Optical Co. of California

154 Sutter St., San Francisco, Cal.

The Journal of **Zoological Research**

Edited by
WALTER E. COLLINGE, M. Sc., F. L. S., F. E. S.
The Gatty Marine Laboratory
The University, St. Andrews, Scotland

The subject matter is strictly confined to original zoological research—systematic and anatomical. Fully illustrated by lithographic plates and text figures.

Each volume will consist of 4 parts, price \$5.

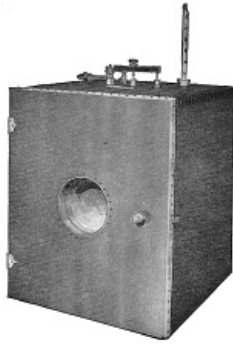
All subscriptions should be forwarded to

Messrs. Dulau & Co., Ltd.
37 Soho Square, London, W., England

[Pg iii]

GRIFFITH

Incubators



A simple, well constructed bacteriological incubator

The Journal of Parasitology

A Quarterly devoted to Medical Zoology

This journal will be a medium for the prompt publication of briefer papers and research notes on animal parasites. Emphasis laid on the morphology, life history and biology of zooparasites and the relations of animals to disease.

Subscription, \$2.00 a volume

Managing Editor,
HENRY B. WARD,
Univ. Illinois, Urbana, Ill.

Gage—The Microscope

[Pg iv]

An Introduction to Microscopic Methods and to Histology

By SIMON HENRY GAGE

Twelfth edition in press. Entirely rewritten, with many new illustrations.

Price \$2.00.

This work aims to give help to everyone who uses the microscope, whether he is a beginner or an advanced worker.

Comstock—A Manual for the Study of Insects

By JOHN HENRY COMSTOCK, Professor of Entomology in Cornell University, and ANNA BOTSFORD COMSTOCK, member of the Society of American Wood-Engravers. 8vo. cloth, IX.+701 pages, 797 figures in the text, and six full page plates. Nearly all of the figures were engraved especially for this work. Postpaid \$4.07; net \$3.75.

This handbook is designed to meet the needs of teachers in the public schools and of students in high schools and colleges.

Needham—General Biology

A book of outlines and practical studies for the general student

By JAMES G. NEEDHAM, Professor of Limnology and General Biology in Cornell University. Cloth 8vo. XIV.+542 pages; 288 figures, mostly original. Postpaid \$2.00.

This book is expressly designed to help the general student obtain a comprehensive grasp of the principles of biology.

Comstock—Handbook of Nature-Study

By ANNA BOTSFORD COMSTOCK, Lecturer in Nature-Study in Cornell University. Cloth 8vo. XVIII.+938 pages, more than 1,000 illustrations. Prices, postpaid: Bound in one volume, \$3.65; bound in two volumes, \$4.50; Volume I., including Animal Life, \$2.25; Volume II., including Plant Life, \$2.25. Sample pages sent on application.

A handbook of Nature-Study for teachers and parents, based on the Cornell Nature-Study Leaflets, with much additional material and many new illustrations.

GAGE—Optic Projection

By SIMON HENRY GAGE, Professor Emeritus of Histology and Embryology in Cornell University, and Henry Phelps Gage, Ph. D.

This work of over 700 pages and with over 400 figures is of especial interest to workers in all fields of Biology in that it deals especially with the use of the Projection Microscope for demonstrations and for drawing. It also gives the fundamental principles of all the forms of projection. A 16-page circular will be sent on request. Postpaid, \$3.00.

RILEY—Handbook of Medical Entomology

By WM. A. RILEY, Ph. D., Professor of Insect Morphology and Parasitology in Cornell University and O. A. JOHANNSEN, Ph. D., Professor of Biology in Cornell University.

A concise account of poisonous, and disease-carrying insects and their allies, including descriptions and illustrations of the principal species, with keys for their determination, and method of control. Bound Library Buckram, medium 8vo. Nearly 375 pages. Price \$2.00 net.

The Comstock Publishing Company
Cornell Heights, Ithaca, N. Y.

Choice Mineral Specimens

[Pg v]

It affords this establishment pleasure to state that though we are over fifty years old we are still seeking with youthful energy new finds of choice mineral specimens.

A few of our recent additions will show from what widely distributed areas we draw:

- Japan:** **Chalcopyrite** in groups of sharp crystals, some of them beautifully iridescent.
Stibnite, brilliant crystals, 5 to 8 inches long.
Hokutolite, a new radio-active barium-lead silicate.
Reinite, in large, sharp crystals.
Quartz Twins, fine, large crystals.
- Rhodesia:** **Malachite**, beautiful polished specimens showing concentric banding.
Hopeite, in small groups of excellent crystals.
- Madagascar:** **Betafite**, a new uranium niobate, in good crystals.
Euxenite, good crystals.
Beryl, in large brown crystals with pyramidal faces.
- California:** **Tourmaline**, polished transverse sections of large crystals of rich red and green colors.
Kunzite, superb gem crystals.
Benitoite and **Neptunite** in fine crystals and groups.
Greenockite on **Magnetite**, uncommonly good.
- Utah:** **Willemite**, drusy masses of colorless and red crystals.
Aurichalcite, singularly beautiful robin's-egg blue, crystallized coatings.
- Nova Scotia:** **Magnesite** in groups of small distinct hexagonal crystals.

New lots of fine specimens are constantly arriving. Ask for price-list No. 160.

Cheap minerals are described in No. 158.

Circular No. 170 enumerates all of our many catalogues and price-lists.

Ward's Natural Science Establishment
84-102 College Avenue
Rochester, N. Y.

A forty-eight page illustrated magazine, published monthly except August and September, devoted to the study of INSECT LIFE. It contains a list of the titles of the current Entomological Literature, and also articles by the leading Entomologists in the United States and Canada. Valuable information for the beginner, the economic entomologist and the systematist.

To new subscribers, \$1.90; Renewals, \$2.00; payable in advance. Single copies 25 cents. Address

ENTOMOLOGICAL NEWS
1900 RACE STREET, PHILADELPHIA, PA.

CLASS WORK MATERIAL

CAN BE PROCURED AT ANY TIME OF
THE YEAR FROM

C. S. BRIMLEY, Zoologist

1135 Newberne Avenue

RALEIGH, N. C., U. S. A.

Twenty-one years' experience

Price List on Application

To Entomologists

I can supply Entomologists with all orders of insects from all parts of the world, as I am continually receiving fresh consignments from my own collectors.

General lists of Lepidoptera and Coleoptera on application; also special lists of Sphingidæ, over 300 species, of Pieridæ in papers, over 100 species. Collections just received from Natal, Madagascar, Peru, Ivory Coast, French Guiana, Java and Argentine; selections of these at low rates. Particulars on application.

E. LE MOULT

4 Rue Duméril, Paris XIII, France

Do Business by Mail
It's profitable, with accurate lists of prospects. Our catalogue contains vital information on Mail Advertising. Also prices and quantity on 6,000 national mailing lists, 99% guaranteed. Such as:

War Material Mfrs.	Wealthy Men	Fly Paper Mfrs.
Cheese Box Mfrs.	Ice Mfrs.	Foundries
Shoe Retailers	Doctors	Farmers
Tin Can Mfrs.	Axle Grease Mfrs.	Fish Hook Mfrs.
Druggists	Railroad Employees	Feather Duster Mfrs.
Auto Owners	Contractors	Hotels

Write for this valuable reference book.
Ross-Gould, 1027H Olive Street, St. Louis.

Ross-Gould
Mailing
Lists St. Louis

Pomona College

Located in one of the most healthful and beautiful parts of the west coast. The mountains reach an elevation of ten thousand feet within a few miles of the college and these with the nearby ocean afford many special advantages for the study of things not in books. Special

advantages are afforded by the fact that the college limits its attendance, the freshman class being restricted to two hundred applicants. The success of the college is particularly indicated by the large proportion of the graduates who proceed to advanced work in the large universities. In addition, well-manned departments of music and art afford exceptional advantages.

For further information, address

SECRETARY OF POMONA COLLEGE
Claremont, California

Transcriber Note

The use of ligatures was standardized within each article. In the first article about Whip-Scorpions, the genus and species names were standardized to *Trithyreus pentapeltis* Cook.

*** END OF THE PROJECT GUTENBERG EBOOK JOURNAL OF ENTOMOLOGY AND ZOOLOGY,
VOL. 09, NO. 1, MARCH 1917 ***

Updated editions will replace the previous one—the old editions will be renamed.

Creating the works from print editions not protected by U.S. copyright law means that no one owns a United States copyright in these works, so the Foundation (and you!) can copy and distribute it in the United States without permission and without paying copyright royalties. Special rules, set forth in the General Terms of Use part of this license, apply to copying and distributing Project Gutenberg™ electronic works to protect the PROJECT GUTENBERG™ concept and trademark. Project Gutenberg is a registered trademark, and may not be used if you charge for an eBook, except by following the terms of the trademark license, including paying royalties for use of the Project Gutenberg trademark. If you do not charge anything for copies of this eBook, complying with the trademark license is very easy. You may use this eBook for nearly any purpose such as creation of derivative works, reports, performances and research. Project Gutenberg eBooks may be modified and printed and given away—you may do practically ANYTHING in the United States with eBooks not protected by U.S. copyright law. Redistribution is subject to the trademark license, especially commercial redistribution.

START: FULL LICENSE
THE FULL PROJECT GUTENBERG LICENSE
PLEASE READ THIS BEFORE YOU DISTRIBUTE OR USE THIS WORK

To protect the Project Gutenberg™ mission of promoting the free distribution of electronic works, by using or distributing this work (or any other work associated in any way with the phrase “Project Gutenberg”), you agree to comply with all the terms of the Full Project Gutenberg™ License available with this file or online at www.gutenberg.org/license.

Section 1. General Terms of Use and Redistributing Project Gutenberg™ electronic works

1.A. By reading or using any part of this Project Gutenberg™ electronic work, you indicate that you have read, understand, agree to and accept all the terms of this license and intellectual property (trademark/copyright) agreement. If you do not agree to abide by all the terms of this agreement, you must cease using and return or destroy all copies of Project Gutenberg™ electronic works in your possession. If you paid a fee for obtaining a copy of or access to a Project Gutenberg™ electronic work and you do not agree to be bound by the terms of this agreement, you may obtain a refund from the person or entity to whom you paid the fee as set forth in paragraph 1.E.8.

1.B. “Project Gutenberg” is a registered trademark. It may only be used on or associated in any way with an electronic work by people who agree to be bound by the terms of this agreement. There are a few things that you can do with most Project Gutenberg™ electronic works even without complying with the full terms of this agreement. See paragraph 1.C below. There are a lot of things you can do with Project Gutenberg™ electronic works if you follow the terms of this agreement and help preserve free future access to Project Gutenberg™ electronic works. See paragraph 1.E below.

1.C. The Project Gutenberg Literary Archive Foundation (“the Foundation” or PGLAF), owns a compilation copyright in the collection of Project Gutenberg™ electronic works. Nearly all the individual works in the collection are in the public domain in the United States. If an individual work is unprotected by copyright law in the United States and you are located in the United States, we do not claim a right to prevent you from copying, distributing, performing, displaying or creating derivative works based on the work as long as all references to Project Gutenberg are removed. Of course, we hope that you will support the Project Gutenberg™ mission of promoting free access to electronic works by freely sharing Project Gutenberg™ works in compliance with the terms of this agreement for keeping the Project Gutenberg™ name associated with the work. You can easily comply with the terms of this agreement by keeping this work in the same format with its attached full Project Gutenberg™ License when you share it without charge with others.

1.D. The copyright laws of the place where you are located also govern what you can do with this work. Copyright laws in most countries are in a constant state of change. If you are outside the United States, check the laws of your country in addition to the terms of this agreement before downloading, copying, displaying, performing, distributing or creating derivative works based on this work or any other Project Gutenberg™ work. The Foundation makes no representations concerning the copyright status of any work in any country other than the United States.

1.E. Unless you have removed all references to Project Gutenberg:

1.E.1. The following sentence, with active links to, or other immediate access to, the full Project Gutenberg™ License must appear prominently whenever any copy of a Project Gutenberg™ work (any work on which the phrase “Project Gutenberg” appears, or with which the phrase “Project Gutenberg” is associated) is accessed, displayed, performed, viewed, copied or distributed:

This eBook is for the use of anyone anywhere in the United States and most other parts of the world at no cost and with almost no restrictions whatsoever. You may copy it, give it away or re-use it under the terms of the Project Gutenberg License included with this eBook or online at www.gutenberg.org. If you are not located in the United States, you will have to check the laws of the country where you are located before using this eBook.

1.E.2. If an individual Project Gutenberg™ electronic work is derived from texts not protected by U.S. copyright law (does not contain a notice indicating that it is posted with permission of the copyright holder), the work can be copied and distributed to anyone in the United States without paying any fees or charges. If you are redistributing or providing access to a work with the phrase “Project Gutenberg” associated with or appearing on the work, you must comply either with the requirements of paragraphs 1.E.1 through 1.E.7 or obtain permission for the use of the work and the Project Gutenberg™ trademark as set forth in paragraphs 1.E.8 or 1.E.9.

1.E.3. If an individual Project Gutenberg™ electronic work is posted with the permission of the copyright holder, your use and distribution must comply with both paragraphs 1.E.1 through 1.E.7 and any additional terms imposed by the copyright holder. Additional terms will be linked to the Project Gutenberg™ License for all works posted with the permission of the copyright holder found at the beginning of this work.

1.E.4. Do not unlink or detach or remove the full Project Gutenberg™ License terms from this work, or any files containing a part of this work or any other work associated with Project Gutenberg™.

1.E.5. Do not copy, display, perform, distribute or redistribute this electronic work, or any part of this electronic work, without prominently displaying the sentence set forth in paragraph 1.E.1 with active links or immediate access to the full terms of the Project Gutenberg™ License.

1.E.6. You may convert to and distribute this work in any binary, compressed, marked up, nonproprietary or proprietary form, including any word processing or hypertext form. However, if you provide access to or distribute copies of a Project Gutenberg™ work in a format other than “Plain Vanilla ASCII” or other format used in the official version posted on the official Project Gutenberg™ website (www.gutenberg.org), you must, at no additional cost, fee or expense to the user, provide a copy, a means of exporting a copy, or a means of obtaining a copy upon request, of the work in its original “Plain Vanilla ASCII” or other form. Any alternate format must include the full Project Gutenberg™ License as specified in paragraph 1.E.1.

1.E.7. Do not charge a fee for access to, viewing, displaying, performing, copying or distributing any Project Gutenberg™ works unless you comply with paragraph 1.E.8 or 1.E.9.

1.E.8. You may charge a reasonable fee for copies of or providing access to or distributing Project Gutenberg™ electronic works provided that:

- You pay a royalty fee of 20% of the gross profits you derive from the use of Project Gutenberg™ works calculated using the method you already use to calculate your applicable taxes. The fee is owed to the owner of the Project Gutenberg™ trademark, but he has agreed to donate royalties under this paragraph to the Project Gutenberg Literary Archive Foundation. Royalty payments must be paid within 60 days following each date on which you prepare (or are legally required to prepare) your periodic tax returns. Royalty payments should be clearly marked as such and sent to the Project Gutenberg Literary Archive Foundation at the address specified in Section 4, "Information about donations to the Project Gutenberg Literary Archive Foundation."
- You provide a full refund of any money paid by a user who notifies you in writing (or by e-mail) within 30 days of receipt that s/he does not agree to the terms of the full Project Gutenberg™ License. You must require such a user to return or destroy all copies of the works possessed in a physical medium and discontinue all use of and all access to other copies of Project Gutenberg™ works.
- You provide, in accordance with paragraph 1.F.3, a full refund of any money paid for a work or a replacement copy, if a defect in the electronic work is discovered and reported to you within 90 days of receipt of the work.
- You comply with all other terms of this agreement for free distribution of Project Gutenberg™ works.

1.E.9. If you wish to charge a fee or distribute a Project Gutenberg™ electronic work or group of works on different terms than are set forth in this agreement, you must obtain permission in writing from the Project Gutenberg Literary Archive Foundation, the manager of the Project Gutenberg™ trademark. Contact the Foundation as set forth in Section 3 below.

1.F.

1.F.1. Project Gutenberg volunteers and employees expend considerable effort to identify, do copyright research on, transcribe and proofread works not protected by U.S. copyright law in creating the Project Gutenberg™ collection. Despite these efforts, Project Gutenberg™ electronic works, and the medium on which they may be stored, may contain "Defects," such as, but not limited to, incomplete, inaccurate or corrupt data, transcription errors, a copyright or other intellectual property infringement, a defective or damaged disk or other medium, a computer virus, or computer codes that damage or cannot be read by your equipment.

1.F.2. LIMITED WARRANTY, DISCLAIMER OF DAMAGES - Except for the "Right of Replacement or Refund" described in paragraph 1.F.3, the Project Gutenberg Literary Archive Foundation, the owner of the Project Gutenberg™ trademark, and any other party distributing a Project Gutenberg™ electronic work under this agreement, disclaim all liability to you for damages, costs and expenses, including legal fees. YOU AGREE THAT YOU HAVE NO REMEDIES FOR NEGLIGENCE, STRICT LIABILITY, BREACH OF WARRANTY OR BREACH OF CONTRACT EXCEPT THOSE PROVIDED IN PARAGRAPH 1.F.3. YOU AGREE THAT THE FOUNDATION, THE TRADEMARK OWNER, AND ANY DISTRIBUTOR UNDER THIS AGREEMENT WILL NOT BE LIABLE TO YOU FOR ACTUAL, DIRECT, INDIRECT, CONSEQUENTIAL, PUNITIVE OR INCIDENTAL DAMAGES EVEN IF YOU GIVE NOTICE OF THE POSSIBILITY OF SUCH DAMAGE.

1.F.3. LIMITED RIGHT OF REPLACEMENT OR REFUND - If you discover a defect in this electronic work within 90 days of receiving it, you can receive a refund of the money (if any) you paid for it by sending a written explanation to the person you received the work from. If you received the work on a physical medium, you must return the medium with your written explanation. The person or entity that provided you with the defective work may elect to provide a replacement copy in lieu of a refund. If you received the work electronically, the person or entity providing it to you may choose to give you a second opportunity to receive the work electronically in lieu of a refund. If the second copy is also defective, you may demand a refund in writing without further opportunities to fix the problem.

1.F.4. Except for the limited right of replacement or refund set forth in paragraph 1.F.3, this work is provided to you 'AS-IS', WITH NO OTHER WARRANTIES OF ANY KIND, EXPRESS OR IMPLIED, INCLUDING BUT NOT LIMITED TO WARRANTIES OF MERCHANTABILITY OR FITNESS FOR ANY PURPOSE.

1.F.5. Some states do not allow disclaimers of certain implied warranties or the exclusion or limitation of certain types of damages. If any disclaimer or limitation set forth in this agreement violates the law of the state applicable to this agreement, the agreement shall be interpreted to make the maximum disclaimer or limitation permitted by the applicable state law. The invalidity or unenforceability of any provision of this agreement shall not void the remaining provisions.

1.F.6. INDEMNITY - You agree to indemnify and hold the Foundation, the trademark owner, any agent or employee of the Foundation, anyone providing copies of Project Gutenberg™

electronic works in accordance with this agreement, and any volunteers associated with the production, promotion and distribution of Project Gutenberg™ electronic works, harmless from all liability, costs and expenses, including legal fees, that arise directly or indirectly from any of the following which you do or cause to occur: (a) distribution of this or any Project Gutenberg™ work, (b) alteration, modification, or additions or deletions to any Project Gutenberg™ work, and (c) any Defect you cause.

Section 2. Information about the Mission of Project Gutenberg™

Project Gutenberg™ is synonymous with the free distribution of electronic works in formats readable by the widest variety of computers including obsolete, old, middle-aged and new computers. It exists because of the efforts of hundreds of volunteers and donations from people in all walks of life.

Volunteers and financial support to provide volunteers with the assistance they need are critical to reaching Project Gutenberg™'s goals and ensuring that the Project Gutenberg™ collection will remain freely available for generations to come. In 2001, the Project Gutenberg Literary Archive Foundation was created to provide a secure and permanent future for Project Gutenberg™ and future generations. To learn more about the Project Gutenberg Literary Archive Foundation and how your efforts and donations can help, see Sections 3 and 4 and the Foundation information page at www.gutenberg.org.

Section 3. Information about the Project Gutenberg Literary Archive Foundation

The Project Gutenberg Literary Archive Foundation is a non-profit 501(c)(3) educational corporation organized under the laws of the state of Mississippi and granted tax exempt status by the Internal Revenue Service. The Foundation's EIN or federal tax identification number is 64-6221541. Contributions to the Project Gutenberg Literary Archive Foundation are tax deductible to the full extent permitted by U.S. federal laws and your state's laws.

The Foundation's business office is located at 809 North 1500 West, Salt Lake City, UT 84116, (801) 596-1887. Email contact links and up to date contact information can be found at the Foundation's website and official page at www.gutenberg.org/contact

Section 4. Information about Donations to the Project Gutenberg Literary Archive Foundation

Project Gutenberg™ depends upon and cannot survive without widespread public support and donations to carry out its mission of increasing the number of public domain and licensed works that can be freely distributed in machine-readable form accessible by the widest array of equipment including outdated equipment. Many small donations (\$1 to \$5,000) are particularly important to maintaining tax exempt status with the IRS.

The Foundation is committed to complying with the laws regulating charities and charitable donations in all 50 states of the United States. Compliance requirements are not uniform and it takes a considerable effort, much paperwork and many fees to meet and keep up with these requirements. We do not solicit donations in locations where we have not received written confirmation of compliance. To SEND DONATIONS or determine the status of compliance for any particular state visit www.gutenberg.org/donate.

While we cannot and do not solicit contributions from states where we have not met the solicitation requirements, we know of no prohibition against accepting unsolicited donations from donors in such states who approach us with offers to donate.

International donations are gratefully accepted, but we cannot make any statements concerning tax treatment of donations received from outside the United States. U.S. laws alone swamp our small staff.

Please check the Project Gutenberg web pages for current donation methods and addresses. Donations are accepted in a number of other ways including checks, online payments and credit card donations. To donate, please visit: www.gutenberg.org/donate

Section 5. General Information About Project Gutenberg™ electronic works

Professor Michael S. Hart was the originator of the Project Gutenberg™ concept of a library of electronic works that could be freely shared with anyone. For forty years, he produced and distributed Project Gutenberg™ eBooks with only a loose network of volunteer support.

Project Gutenberg™ eBooks are often created from several printed editions, all of which are confirmed as not protected by copyright in the U.S. unless a copyright notice is included. Thus, we do not necessarily keep eBooks in compliance with any particular paper edition.

Most people start at our website which has the main PG search facility: www.gutenberg.org.

This website includes information about Project Gutenberg™, including how to make donations to the Project Gutenberg Literary Archive Foundation, how to help produce our new eBooks, and how to subscribe to our email newsletter to hear about new eBooks.