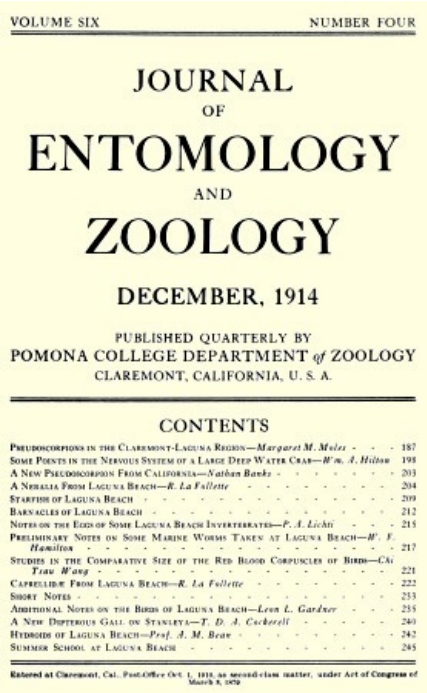
Title: Journal of Entomology and Zoology, Vol. 06, No. 4, December 1914

Author: Various

Release date: January 20, 2015 [EBook #48031]

Language: English

Credits: Produced by Larry B. Harrison, Tom Cosmas and the Online Distributed Proofreading Team at http://www.pgdp.net


VOLUME SIX NUMBER FOUR

JOURNAL OF ENTOMOLOGY AND ZOOLOGY

DECEMBER, 1914

PUBLISHED QUARTERLY BY
POMONA COLLEGE DEPARTMENT of ZOOLOGY
CLAREMONT, CALIFORNIA, U. S. A.

CONTENTS

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

cover

VOLUME SIX **NUMBER FOUR**

JOURNAL

OF

ENTOMOLOGY

AND

ZOOLOGY

DECEMBER, 1914

PUBLISHED QUARTERLY BY

POMONA COLLEGE DEPARTMENT *of* ZOOLOGY

CLAREMONT, CALIFORNIA, U. S. A.

CONTENTS

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

VOLUME VI, 1914

PUBLISHED QUARTERLY BY THE
DEPARTMENT OF ZOOLOGY OF POMONA COLLEGE
CLAREMONT, CALIFORNIA, U. S. A.

Contents of Volume VI

Index to Volume VI

Pseudoscorpions in the Claremont-Laguna Region

MARGARET M. MOLES

Many individuals may be found in a certain vicinity. In the valleys where oak and sycamore trees grow abundantly there can be found as many as seventy-five on the lower trunk of one tree. They are all of one or two species. In all the student collections that have been carried on here in college for the last ten years there have never been more than four or five species collected. It was only through special collection that the other species were found. Very few were found under stones, where they are so often spoken of as living, and few were found among fallen leaves. Some were collected in rotten poplar and pine logs. In the marshy ground at Chino they were found under leaves and stones and were very abundant on the poplar trees.

The distribution of the pseudoscorpions extends from an altitude of 5000 down to within ten feet of the ocean.

Concerning their habits of living little can be found. Many small spiders were found in their claws, also the small mites that live underneath the bark of trees. Several experiments were tried with some that were brought into the laboratory. The results were:

1. The pseudoscorpions would not go into Eucalyptus bark.

2. They could not live in a glass dish if water was not placed in it somewhere. If water was left out, they would dry up within twenty-four hours.

3. They avoided the sunlight and would go under cover.

4. They would remain in one spot without moving for a day at a time.

Chelifer cancroides Linn

Description: Length—including mandibles, 3 mm.; pedipalps, 4 mm.; claw, 1.5 mm. Color—Pedipalps, dark reddish brown; cephalothorax, dark reddish brown; abdomen, lighter than the

palps and cephalothorax; legs, light yellow brown.

Cephalothorax: Evenly rounded in front; one distinct median suture, two distinct eye spots. « 188 »

Abdomen: Twice as long as it is broad and divided into eleven distinct sutures. All of the scuta about the same size except the last one, which is a great deal shorter and broader than the rest. Each scutum is provided with two strong, spiny hairs on the outer edge.

The whole body is heavily granulated, the cephalothorax having knob-like protuberances all along the edges.

Pedipalps: Larger than the whole animal. Coxa, smooth; trochanter with large protuberance ending in a heavy spine on the outer edge. Femur longer than cephalothorax, pedicellate. Tibia, concave on inner edge, pedicellate, shorter than femur. Trochanter, femur and tibia strongly granulated and sparsely covered with almost clavate hairs. Claw of good size, finger a little shorter than the hand. Hand evenly convex on outer and inner edges. Finger slightly curved, smooth, with many long simple tactile hairs.

Mandibles: Small, fixed finger provided with many small teeth. Serrula attached throughout length of moveable finger. Spinnerets long and transparent. Mandibles are provided with five or more heavy long hairs.

Flagellum: Divided into four separate parts.

Legs: First two with trochantins, claws simple, legs covered with almost clavate hairs.

Habitat: Barns or buildings of this community; also found in some of the common trees, such as the oak and sycamore. This was collected in Whittier, Claremont, Lytle Creek and San Antonio canyons, and the smaller canyons near Claremont.

Chelifer fuscipes **Banks. Figs. 1 and 2**

Description: Length of animal, including mandibles, 4 mm.; pedipalps, 5.5 mm.; claw, 2 mm. Color—Pedipalps, reddish brown; cephalothorax, reddish brown; abdomen and legs, light brown.

« 189 »

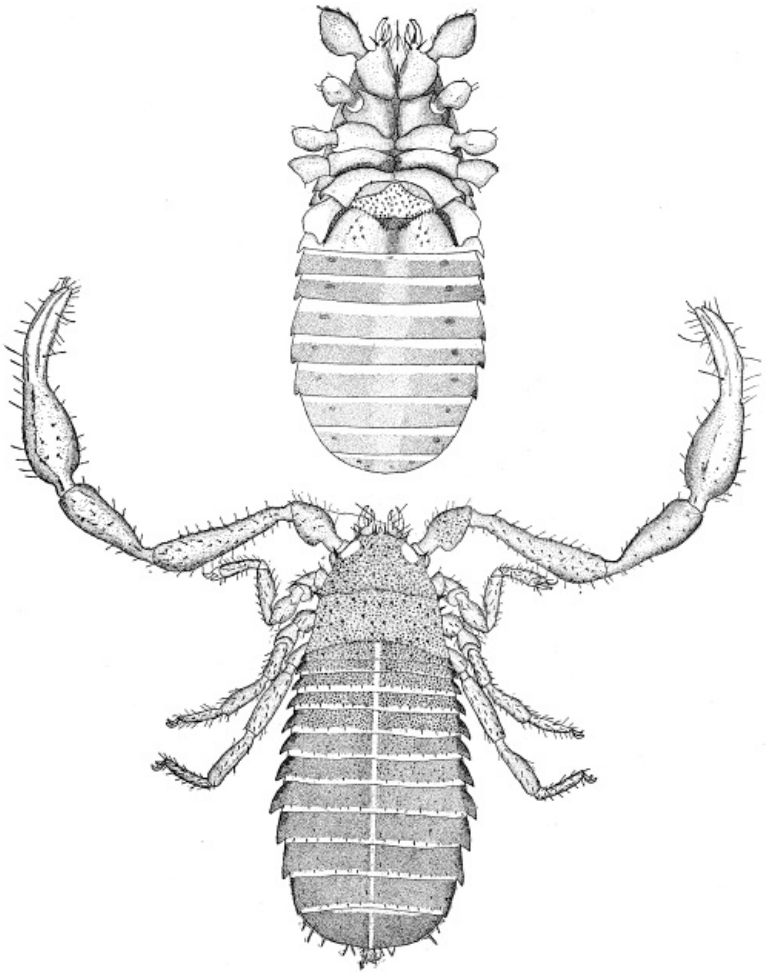


Figure 1. *Chelifer fuscipes* Banks. From below and above. ×25.

« 190 »

Figure 2. *Chelifer fuscipes*, third leg and mandible much enlarged.

Cephalothorax: As long as it is broad. Upper edge almost truncate, yet rounded; sides evenly convex, lower edge almost straight. Cephalothorax finely granulate and heavy, simple spine-like hairs placed in a definite order. One distinct median suture. Two eye spots. « 191 »

Abdomen: Half as broad as it is long and divided into twelve scuta. The outer edges of each scutum are prolonged into curved hooked spines. The first scutum is the shortest and broadest, and has the heavier spine or hook, while the last two segments often lack the hook. The abdomen is finely granulate and at the lower edge of each scutum there are eight heavy, short, simple hairs.

Pedipalps: Longer than body, coxa smooth, trochanter with large protuberance ending in a strong spine on outer side; femur longer than cephalothorax, slightly concave on inner edge, convex on outer edge. Tibia pedicellate, shorter than femur. The trochanter, femur and tibia are all granulate and sparsely covered with short, simple hairs. Claw large, hand broad, smoothly convex on both sides; finger as long as the hand and slightly curved. It is also provided with long, tactile hairs.

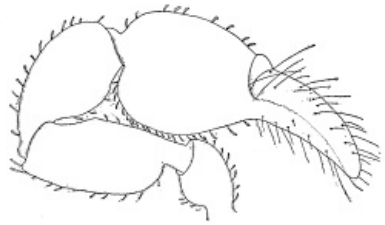


Figure 3. Pedipalp of *Chelanops serratus* n. sp. ×50.

Mandibles: Small for size of animal; fixed finger provided with small teeth. Serrula attached throughout the length of moveable finger. Flagellum divided into small parts. Spinnerets small and transparent.

Legs: First three legs with trochantins, claws simple, legs covered with simple hairs.

Habitat: Sycamore canyons, Laguna Beach, Whittier Hills, Cucamonga canyon, Arrowhead canyon, Lytle Creek canyon, Evey's canyon, San Antonio canyon, and from oak and sycamore trees around the college campus. « 192 »

***Chelifer scabrisulis* Simon**

I will not describe the details of this species, because it is so much like the last described, differing from *C. fuscipes* by not having the prolonged hooks like spines, on the outer edges of each abdominal scutum. The color differs from the other two. The abdomen and legs are light brown. The cephalothorax and palps are a little darker yellowish brown.

The habitat of this species was the same as that of *C. fuscipes*. When collecting, they were generally found together.

Chelanops oblongus Say

Description: Length of body, including mandibles, 5 mm; abdomen, 4 mm.; pedipalps, 4.5 mm.; claw, 2 mm. Color—Cephalothorax, light reddish brown, pedipalps darker, abdomen yellow with dark brown spots, legs pale yellow.

Cephalothorax: Very short for length of body. Front margin truncate, sides almost straight, lower margin slightly convex, smooth and shiny and provided with many short hairs.

Abdomen: Four times as long as it is wide; sub-parallel sides. Each scutum with a dark spot on each side and each dark spot surrounded by long, simple hairs arranged in a definite order.

Pedipalps: Nearly as long as the body, coxa smooth, trochanter stout and short; femur pedicellate, broadest part being near base, as long as the cephalothorax, inner edge slightly concave, outer edge strongly convex; tibia shorter than femur, pedicellate, strongly convex on inner edge, on outer edge slightly concave near base, but strongly convex beyond.

Claw: Large, finger very stout and curved, shorter than the hand. Hand very broad, very convex on outer edge, only slightly so on inner edge. The trochanter, femur and tibia are covered with stout simple hairs of varying length.

Mandibles: Small and short, serrula attached throughout length of finger, spinnerets small and transparent.

Legs: Short and stout, covered with short, stout, simple hairs.

Habitat: This has been reported from Palm Springs, but one specimen was found within our area at Brown's Flats, at about four thousand feet elevation, in an old pine log. « 193 »

Chelanops pallipes Banks

Similar to *C. dorsalis*, but fingers longer than hand and very slender; tibia also slender, less convex on the inner side, hard parts with clavate hairs. Three millimeters long. (From Banks.)

Habitat: Los Angeles and vicinity, but has not yet been found in our immediate region.

Chelanops acuminatus Simon

Cephalothorax and palpi reddish brown, with short but not clavate hairs; no eye spots; pedipalps rather short, hand evenly convex on inner side at base, fingers much shorter than the hand and quite stout. 3 mm. long. (From Banks.)

Habitat: Claremont and Los Angeles.

Chelanops lagunæ Moles

This species was described in the March number of this Journal, 1914.

It differs chiefly from *C. dorsalis* Banks by having two eye spots. It is a smaller species. This small species was found in Sycamore canyon, near Laguna Beach.

Chelanops paludis Moles

This species was described in the June, 1914, number of this Journal.

The very broad form of the abdomen is characteristic.

This was found on poplar trees and in poplar logs in the Chino swamp.

Chelanops serratus n. sp. Fig. 3

Description: Length—Pedipalps, 3 mm. Impossible to take measurements of other parts, for slide was so poorly made, but the body was small. Color—Cephalothorax and pedipalps, strong yellow brown; legs and abdomen, light yellow.

Cephalothorax: As long as it is broad, sides evenly convex, upper margin straight, one distinct median suture; no eye spots; surface of cephalothorax very granular.

« 194 »

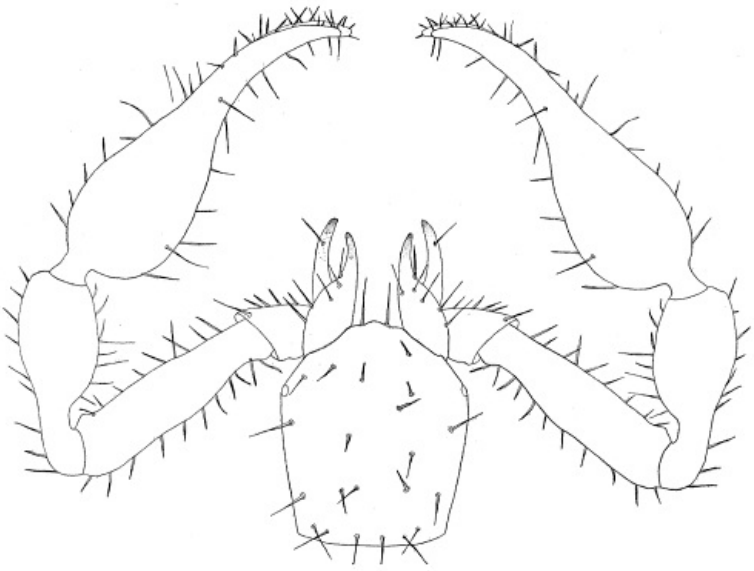


Figure 4. *Ideoroncus obscurus* Banks. Forward part of the animal from above. ×25.

Abdomen: Badly curled up; scuta entirely covered with short almost clavate hairs. « 195 »

The naming of this species is based on the short "saw-like" hairs that are all over the body. They are not globular on the end, as the clavate hairs, but have "saw-like" edge.

Palps: Short and stout, coxa smooth, trochanter as usual, femur shorter than cephalothorax; pedicellate, inner margin almost straight at base, then suddenly concave to tip, outer margin evenly but not strongly convex; tibia broad, pedicellate, suddenly enlarging on inner side near base, outer margin evenly convex. Trochanter, femur, tibia strongly granulate and sparsely covered with these "saw-like" hairs.

Hand: Broad as it is long, greatly swollen on inner margin near base; fingers slightly curved and as long as the hand.

Mandibles: Small; spinnerets small and transparent; serrula attached throughout the length of the moveable finger.

Legs: The two anterior legs with trochantins; legs covered with many hairs.

This specimen was found on the window pane of the Pomona College greenhouse. A fly (*Musca domestica*) lit on the pane and the pseudoscorpion caught its legs and clung while the fly crawled about. This is the only one of its kind that has been found.

Atemnus hirsutus **Banks**

Described by Banks in this number of the Journal. Only one specimen of this species was taken. This is the species found nearest the ocean. The broad hand is quite evident. Found ten feet from the ocean, among stones, at Laguna Beach.

Obisium macilentum **Simon**

Description: Pale yellowish brown, legs paler; hard part shining; cephalothorax one-fourth longer than broad. Sides parallel; mandibles about one-half the length of the cephalothorax; pedipalps very long and slender, with long, fine, scattered hairs. Femur as long as the cephalothorax. Fingers longer than hand.

Habitat: Claremont.

Ideobisium threveneti **Simon** « 196 »

Description: Length of animal, including mandibles, 4 mm.; length of palps, 3.5 mm.; length of abdomen, 3 mm.; length of claw, 1.5 mm. Color—Cephalothorax and palps, dark reddish brown; abdomen, lighter than cephalothorax; legs, pale yellow.

Cephalothorax: As long as it is broad, upper margin truncate, sides nearly straight, lower margin straight; no suture; four distinct eye spots; eyes on each side almost touch each other.

Abdomen: Elongate, three times as long as it is broad; scuta entire.

Palps: Coxa smooth; trochanter small; femur long, outer edge almost straight, inner edge slightly convex; tibia short and stout, pedicellate, convex on inner and outer surface.

Claw: Not large; finger as long as hand and not curved very much; hand, broad, evenly convex on inner and outer edges.

Legs: Lack trochantins, III and IV stouter than I and II; mandibles large; serrula not attached throughout length of moveable finger; spinnerets long and transparent.

Habitat: Claremont, Ice House Canyon, under leaves.

Ideoroncus obscurus Banks

Description: Length of animal, including mandibles, 3 mm.; length of pedipalps, 3 mm. Color—Cephalothorax and pedipalps dark yellow brown; abdomen and legs very light yellow.

Cephalothorax: A little longer than broad; front margin slightly truncate, rounded; sides so slightly convex as to be almost straight; lower margin slightly recurved; no transverse sutures; one pair of eyes.

Abdomen: Elongate and slender; scuta entire; both abdomen and cephalothorax with a few simple scattered hairs.

Palps: Long and slender; coxa smooth; trochanter lacks large protuberance of many of the Cheliferidæ; femur hardly as long as cephalothorax, very slender and not pedicellate; tibia shorter and broader than femur, pedicellate, convex on inner edge, only slightly so on outer edge; trochanter, femur, and tibia covered with short, stout simple hairs; claw long and slender; finger little longer than hand, and only slightly curved; hand twice as long as broad; hand and claw « 197 » covered with long, simple hairs; mandibles large, serrula attached only at base; spinnerets long and transparent.

Legs: The femur and tibia of the first two pairs of legs rather stout; no trochantins; covered with simple hairs.

Habitat: Found in oak trees in the wash around Claremont.

This differs slightly from that described by Banks in that:

1. The upper margin of the cephalothorax is not rounded, but truncate.

2. The fingers of the claw are not shorter than the hand.

3. The femur and tibia of the first two pairs of legs are not stout.

(*Contribution from the Zoological Laboratory of Pomona College*)

« 198 »

Some Points in the Nervous System of a Large Deep Water Crab

WILLIAM A. HILTON

During the summer of 1914 several living specimens of the large crab *Loxorhynchus grandis* Stimp. were obtained at Laguna Beach. One of these was kept for some time in a tank of sea water, and its general movements were observed as it walked about on the bottom or attacked the sharks or other fish in the aquarium. Its movements were slow and its senses seemed not very acute in this situation.

A gross and microscopical examination of the nervous system gave much the appearance of these organs in other decapods, but the remarkably small size of the brain or head ganglion was especially noticeable. The nerves connected with this ganglion were long and slender. The optic was large, the tegmental a little smaller and the first antennal about as large as this last. Closely associated with the optic was the small oculomotor, and near the connectives the small second antennal. Other small nerves were connected with the brain, whose courses were not traced, including a pair of small frontal nerves.

The connectives with the thoracic-abdominal ganglion were long and slender, with each its small ganglion a short distance from the brain. A cross connection between these connectives was not seen. It may have been broken in the dissection.

The thoracic-abdominal ganglion has many nerves connected with it, as shown in the figure; the largest of these were traced to the legs and upper thoracic appendages. The legs are large and heavy and the nerve trunks in them are large; their combined bulk would probably be many times that of the ventral ganglion.

So far as studied, the internal arrangement of tracts and cells does not differ materially from the classic descriptions of Bethe in another species. One thing especially noteworthy is the fact that the nerve cells do not seem especially large, nor are the large ones numerous.

« 199 »

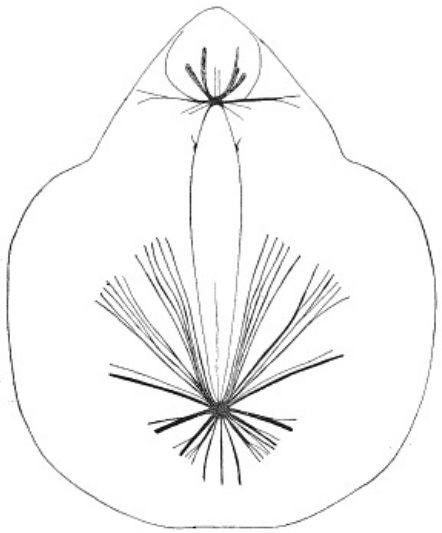
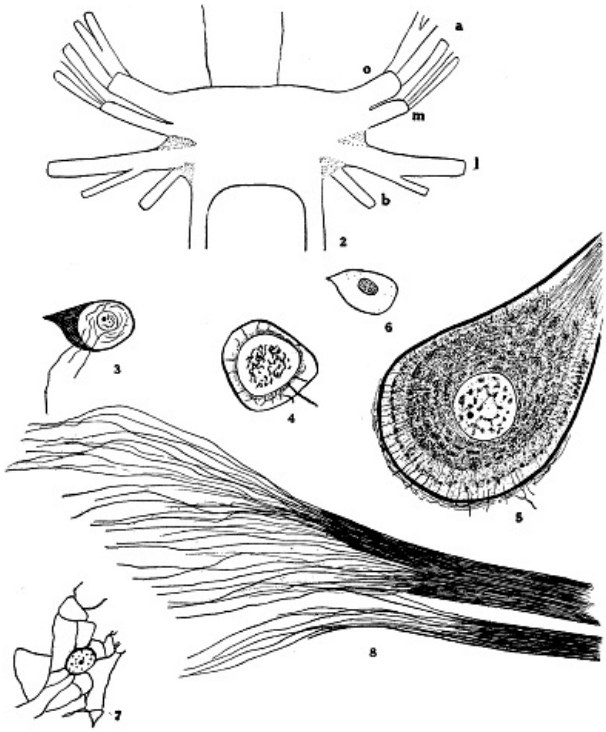


Figure 1

The nerve cells and fibers were studied in preparations fixed in Flemming's fluid and stained with iron hematoxylin. As in forms previously studied, the general structure of the ganglion in a way duplicates the structure of the nerve cells, in that a general reticulum forms a framework for the other structures in both. It is hard in individual cases to distinguish the supportive structures from the conductive, but the fibers and fibrils in or outside of the nerve cells run in longer straight lines—that is, they do not form so much of a meshwork, although they may branch and intertwine to some degree both within and outside the nerve cells. Large strands or fibers from nerve cells run as fibers, then divide into smaller masses of fibrils, and at last break up into numerous fibrils. The usual demonstration of nerve cells with their branches as shown by the Golgi or methylene blue methods, I believe, shows only the *larger* and *smaller* branches from nerve cells, and the smallest branches where the fibers break into fibrils are not shown at all.

« 200 »



« 201 »

In this and other arthropods which I have studied, it seems to me to be quite characteristic of the nervous system that many parts show fine fibrillæ more clearly than they are seen in vertebrates. This may in part be due to the nature of the insulating and supportive apparatus. As in *Carcinus*, described by Bethe, the optic tract enters the mesal side of the globulus and splits up into smaller and smaller parts, and is at last lost in the minute network of fibrils and supporting substance. Large bundles from the outside may be seen as dark masses here and there. These last are held in place in the section by many connecting strands which join the fibers from all sides. Some may be conducting fibrils, but it is hard to distinguish these from supportive. Probably most of the conducting fibrils leave at or near the termination of the thicker part of the fiber. The denser parts of the nervous system of this and other arthropods, such, for instance, as the material of the globulus, are composed for the most part of ultimate fibrillæ whose relationships at these points can only be conjectured at present because of their minuteness, their great abundance, and because of the intermingling of supportive or other materials of several little understood sorts. An extensive comparative study of these denser masses with various reagents should yield some interesting results.

Tigroid substance, mostly in the form of dots and flakes, was recognized, but not studied by

special stains. The cells are surrounded by a dense capsule of connective substance, and in some cases the peripheral zone of the cell next the capsule is light. In some, this light zone is speckled with dark dots or lines. Some of these may be the ends of fibrillæ—in fact, some fibrils were traced—others may be tigroid substance, or possibly the bodies recognized by Poluszynski in some Crustacea, although his are stained by other methods.

PAPERS MENTIONED

Bethe, A. 1898

Das Nervensystem von Carcinus maenas. Arch. f. Mic. Anat. Bd. 51.

Poluszynski, G. 1911

Untersuchungen über den Golgi-Kopsch'schen apparat und einige andere Strukturen in dem Ganglionzellen der Crustaceen. Bull. Acad. Sc. Cracovie.

Figure 1. Outline of the cephalothorax of *Loxorhynchus*, showing the position and size of the nervous system. One-half natural size.

Figure 2. Brain of *Loxorhynchus* from above. ×10. o, Ocular nerve; m, oculomotor; t, tegmental nerve; a, first antennal nerve; b, second antennal; c, connective.

Figure 3. Nerve cell with fibrils from the brain. ×900.

Figures 4 and 5. Nerve cells near each other in the brain fibrils are shown. ×900.

Figure 6. Neuroblast from a doso-median mass of the brain. ×900.

Figure 7. Neuroglia cell with branches from the brain. ×900.

Figure 8. Two fibres breaking into fibrils. From the brain. ×900.

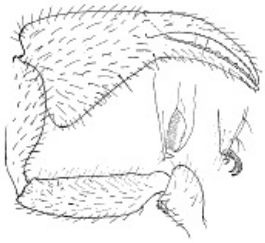
(*Contribution from the Zoological Laboratory of Pomona College.*)

A New Pseudoscorpion from California

NATHAN BANKS

Professor Hilton recently sent me a pseudoscorpion taken on the beach near water, which proves to belong to the genus *Atemnus*. Our common Florida *Atemnus* also occurs on the sea beach. The Californian species differs from the Florida form in having a larger hand and more hairy body.

Atemnus hirsutus n. sp.



Pale yellowish; cephalothorax a little longer than broad behind, narrowed in front, sides slightly sinuate, clothed with short, simple bristles; mandibles not one-third the length of the cephalothorax, with a short stylet; abdomen elongate, cylindrical, the segments with apical and preapical rows of simple bristles; legs rather large, with many simple bristles, all showing trochantins. Pedipalpi large, clothed with many fine simple hairs and bristles; the trochanters bituberculate behind near tip; the femur about as long as the width of the cephalothorax, of nearly equal width throughout; the tibia about as long as femur, a little broader beyond the middle, about equally convex on each side; hand extremely broad at base, barely shorter than the tibia; fingers as long as the hand, much curved, each with some tooth-like granules and a fine toothed ridge on the apposed sides.

From Laguna Beach, California, ten feet from the ocean. (Hilton.)

A Nebalia from Laguna Beach

Among the many marine forms collected and studied at Laguna Beach this summer were several Nebalia, which were taken by Mr. Lichti from a holdfast cast up on the beach. A specimen was sent to the National Museum at Washington, where it was classified as *Nebalia bipes* O. Fab. A brief description of the animal will be given in this paper.

Nebalia bipes O. Fab. (Plate I, Fig. 1) belongs to the order Phyllocarida, which is the linking order between the Branchiopoda and Copepoda on one hand and the Schizopoda and Decapoda on the other. There are only three genera, and the commonest of these is *Nebalia*. So far as I know this form has never before been reported from this region. The specimen here described was 9 mm. in length and a whitish flesh color. It was transparent in the living animal. The body is divided into a head, thorax and abdomen, having the normal malacostracan number of segments, except the abdomen, which is made up of eight, the last bearing caudal styles. There is a bivalved cephalic carapace extending back to the fourth abdominal segment and terminating in front in a movable rostrum. The eyes are large, round and raised on movable stalks.

There are two pairs of antennæ (Plate II, Fig. 2), the first pair being four-jointed, the last joint rather broad and armed with many hairs along the outer margin. The other joints have a few hairs on the articulating margin. The flagellum rises from the fourth joint, behind the fifth and has fourteen joints, each one armed with several hairs on the outer margin of the articulation. The second antennæ are slightly larger than the first and made up of three joints with a brush of plume hairs at the caudal end of the second joint. The flagellum is fourteen jointed. The mandible has a two-jointed palp (Fig. 3), with numerous hairs along the outer margin. The second maxilla also has a palp extending back under the carapace with the function of keeping the carapace free from foreign bodies.

The thoracic feet (Fig. 3) are about 1.5 mm. in length, eight in number and biramous. The « 205 » outer margins are heavily covered with hair, while the inner margins are comparatively smooth. The first four abdominal appendages (Figs. 5, 6) are much larger than the thoracic feet, being 2.5 mm. in length, and are used for swimming, like those of the copepods. They are also biramous, the back margin and tip having numerous hairs along the edge, while the inner margins are lined with many plumous hairs. The first appendage (Fig. 5) is somewhat heavier than the fourth (Fig 6), but the hairs and spines are arranged in the same relative position. The fifth appendage (Fig. 7) is two-jointed uniramous and small, .9 mm. long. The sixth is one jointed and smaller yet.

The eight abdominal segments taper off in size and the last bears a pair of caudal styles (Fig. 8) which are lined with sharp spines along their outer margins. The ends of the styles are armed with two long, sharp spines.

(*Contribution from the Zoological Laboratory of Pomona College.*)

EXPLANATION OF PLATE I

« 206 »

Magnification 25 Times

Figure 1. *Nebalia bipes*.

EXPLANATION OF PLATE II

Magnification 25 Times

Figure 2. Antennæ.
Figure 3. Mandibular palp.
Figure 4. Thoracic appendage.
Figure 5. First abdominal appendage.
Figure 6. Fourth abdominal appendage.
Figure 7. Fifth abdominal appendage.
Figure 8. Caudal styles.

« 207 »

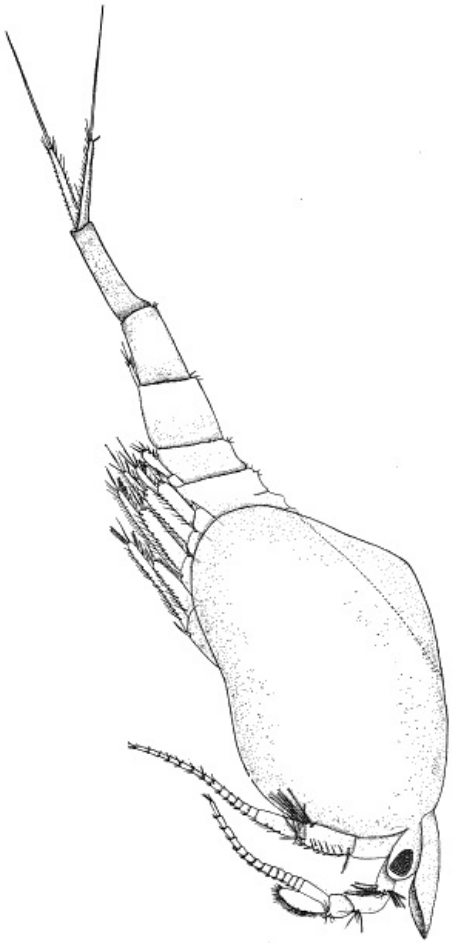


Plate I, Figure 1

« 208 »

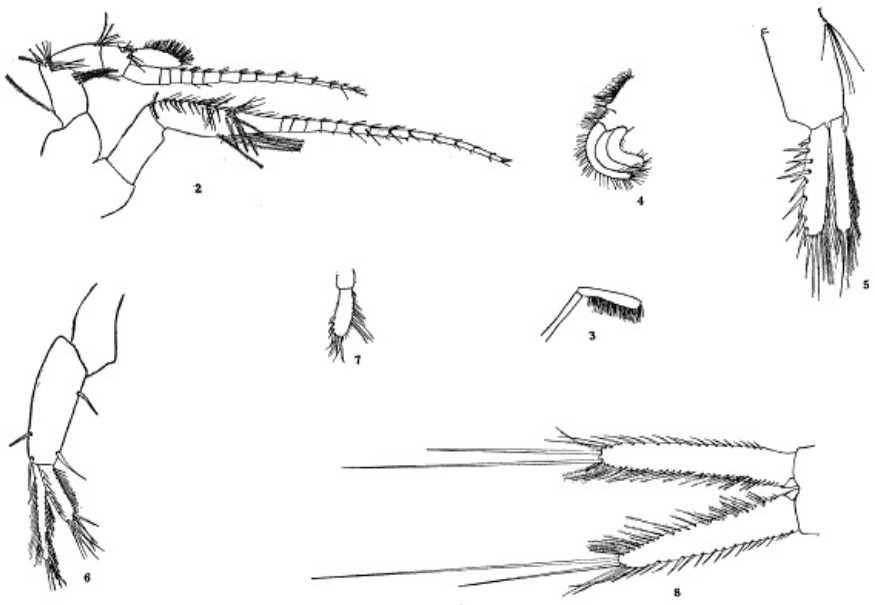


Plate II

« 209 »

Starfish of Laguna Beach

The following is a fairly complete list of shore forms of starfish at Laguna. All but the last one mentioned were photographed by Miss Clency at Laguna Beach.

Linckia columbiæ **Gray. Fig. 1**

A large number of these were collected under stones and in tide pools near shore. A number were found with six arms, and often the arms were very irregularly developed. The power of regeneration is very marked, as may be determined from the appearance of even a small number of individuals.

Orthasterias gonolena **Verrill. Fig. 2**

This is the "soft starfish." Clark has called it *Asterias forreri*. Fisher (in first Laguna report)

called it *A. sertulifera*. Verrill considers it different from either of these last two. We must thank Dr. Clark for this information, as well as for the identification of the remaining species of starfish.

This form is fairly common in the tide pools and under stones not far from shore.

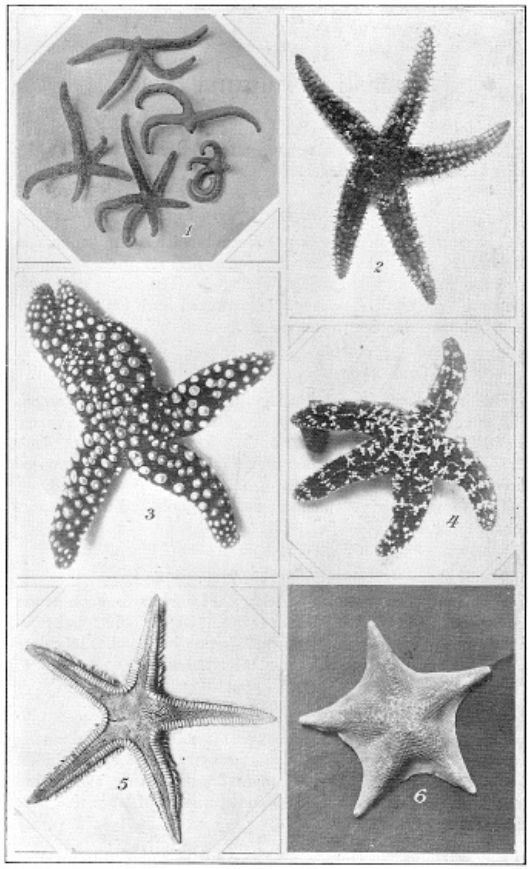
Pisaster capitatus **Stimpson. Fig. 3**

This is our most beautiful species, but is not as common as the next species with which it is often found. On the points and especially among the mussel beds this species may be found. Its colors during life are beautiful with their delicate shades.

Pisaster ochraceus **Brandt. Fig. 4**

This is our most common species on the rocky points and among the barnacles and mussels, where they may be found by the dozen. The color variations are quite marked, some being a light red brown, others a darker shade. Some specimens of large size were obtained.

« 210 »



Astropecten erinaceus **Gray. Fig. 5**

« 211 »

This beautiful starfish, with its pearl gray shades, is a deeper water form than the others. A few were found in the living condition cast up on the shore, and some were obtained from the fishermen, but they were not often found.

Asterina miniata **Brandt. Fig. 6**

These broad armed starfish were found quite often in the tide pools near shore; usually of a deep orange color, they were sometimes much lighter than this.

W. A. H.

(*Contribution from the Zoological Laboratory of Pomona College*)

Barnacles of Laguna Beach

« 212 »

MISS S. P. HUGHES

PACIFIC UNIVERSITY, FOREST GROVE, OREGON

Five species of barnacles were found last summer at Laguna Beach. For the identification of the first two of these, we must thank Dr. H. A. Pilsbry of the Academy of Natural Sciences, Philadelphia.

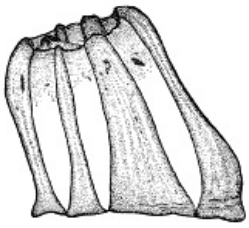


Figure 1

Balanus tintinnabulum californicus Pils. Fig. 1

The most common of the acorn barnacles; found abundantly on rocks, mussels, etc. There are six valves or plates; the rostrum, carina, and two latera on each side. These plates are delicately marked with pink stripes. The connecting pieces are often transversely lined. This is the largest of the common acorn barnacles; the average height is about an inch.

Figure 2

Balanus nubilus Darwin. Fig. 2

« 213 »

This is one of the small acorn barnacles, also very numerous on the rocks at tide level. Here the plates, usually six in number, although in some the lateral plates are divided, are closely joined to each other without connecting pieces.

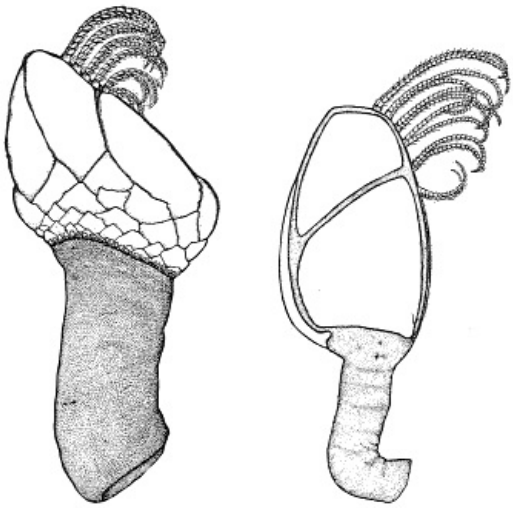


Figure 3 Figure 4]

Mitella polymerus Sowerby. Fig. 3

This is a very abundant species, and is found in great masses on the rocks near the tide level. It is readily known by the numerous irregularly arranged scales at the base of the capitulum. The valves are usually much worn, and many cases of regeneration have been noted. The peduncle is covered with fine scales.

Lepas anatifera Linnæus. Fig. 4

« 214 »

This is a fairly abundant goose barnacle, found in holdfasts of kelp and occasionally on driftwood and floating objects. The size varies from a few millimeters to almost an inch in length. The distinguishing characters are the very fine striations on the valves, the presence of an umbonal tooth on the right scutum, and the proximity of the base of the carina to the scutum. The valves are a delicate pale blue color and the peduncle a deep purplish brown.

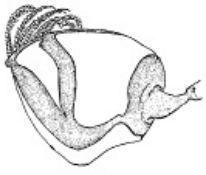


Figure 5

Lepas fasciculatus Elis and Solander. Fig. 5

Two specimens were found by Mr. Lichti upon the beach at Green Bay, Laguna Beach, in September of this year. Others have been collected from the Laguna region.

It is a light pelagic form, with paper-like plates and angularly bent carina, with a prominent umbo.

Notes on the Eggs of Some Laguna Beach Invertebrates

« 215 »

P. A. LICHTI

During the past summer a large number of species and individuals were examined for eggs. Some of these fragmentary notes may be of use to others who may carry the study further.

The serpent stars were not especially studied for the eggs, but during July several hundred were collected from various places. These were mostly of one species. About one-third of these contained well developed ova. On July 14th and 20th, six individuals of the genus *Ophiothrix* deposited eggs in the aquarium jars. During August three out of twenty specimens had ova well developed, many may have been young.

Comparatively few female sea urchins were found. Out of 50 individuals opened, 36 were males, six females, and the rest young. Miss Wang also found that the males were more numerous than the females as they were collected, four to one. Miss Wang was able to keep the sperm alive for 96 hours in the laboratory before we had running salt water.

In the common shore goose-neck barnacle *Mitella*, ova and segmentation stages were found during the summer.

The common rock crab, *Pachygrapsus*, was examined many times during July and very few adult females were without eggs. During the same day mature ova and advanced embryos were found. August 10th, about half the females were without eggs. On September 4th, about two-thirds were without eggs. The early summer seems the more active spawning season.

A live female deeper sea crab, *Loporhynchus*, was caught on June 25th. The enormous mass of eggs was unsegmented and failed to segment in the laboratory, although the animal was kept alive for some time. On July 20th, another female was caught, the embryos were well advanced and it was possible to see the heart beat under the microscope. They lived only a few hours.

The sand crabs of the genus *Eremita* were found laying their eggs all summer. Some hundreds « 216 »
were examined, and it was found that up to September egg masses were nearly always found with the females. In the whole season, out of 236 examined, only 11 in September were without eggs. It was found that while the eggs on the swimmeretts were developing into crabs another egg mass was being formed in the ovaries, this last reached maturity about the same time that the young crabs on the swimmeretts hatch.

A species of *Cypris* was found in a pool about 1½ miles up Laguna canyon. These had many eggs on July 1; by July 17 no eggs were found.

A number of species of isopods and amphipods were found to have eggs during the summer, and during September it was very easy to obtain *Ligyda* with eggs or young, although the proportion of young stages was becoming less.

Members of the genus *Caprella* were found with eggs at different times during the summer and up into the fall.

Of the pycnogonids, the following genera were found with eggs during the summer: *Lecythorhynchus*, *Ammothella* of two species; *Halosoma*, *Pycnogonium*, *Palene*, *Tanystylum* of two species.

A number of chitons were examined, but with negative results. Probably many were young.

Some of the bivalved forms were examined, but the character of the period of reproduction is not yet determined.

The sea hare, *Aplysia*, laid its eggs in the aquarium jars during the middle and late summer.

Many of the species of nudibranchs collected during the summer were found to deposit eggs in the laboratory. One species, a light brown form, was found abundantly in kelp holdfasts. They laid coiled ribbon-like masses of eggs.

Eight different individuals of the genus *Doris* deposited eggs in the laboratory.

On July 28, two of the genus *Hermissenda* and one *Spurilla* (?) deposited eggs.

Laila and several unknown forms deposited eggs in the laboratory during the first part of September.

(*Contribution from the Zoological Laboratory of Pomona College*)

Preliminary Notes on Some Marine Worms Taken at Laguna Beach

W. F. HAMILTON

During the summer of 1914 I made a collection of some 230 bottles of annelids. It was thought best that I should publish a list of the families and of such species as I have succeeded in identifying.

POLYCHAETA

SYLLIDÆ

Are quite abundant among the finer sea mosses.

Pionosyllis elongata Johnson.

Found among goose-neck barnacles west of the Laboratory and in seaweed tangles. White with bright red eggs coloring posterior end. Taken June 26, 1914.

Two other forms are common in the finer sea moss.

POLYNOIDÆ

Are of frequent occurrence on rocks and in seaweed tangles. I have identified four species.

Halosydna insignis Baird.

The most common and variable polynoid at Laguna. Color of elytra yellowish gray to bright red. Length from 18 to as much as 47 mm. (contracted).

Halosydna californica Johnson.

Less abundant. Similar in distribution. More slender and of a lighter pigmentation.

Lepidasthenia gigas Johnson.

This interesting form was taken from a large mass of the tubes of *Vermetus* (*squamigerus?*) (gasteropod). Heretofore, as far as I know, it has only been recorded as a tube commensal with a large *Amphitrite*. My specimen was not commensal, but was hidden among the mollusc tubes. The color was recorded as a "light, unsaturated yellow, elytra darker yellow, body irridescent below." The setæ project only their tips beyond the parapodia, differing only in this respect from Johnson's figures. I could not find any asymmetrical somites, judging from the elytrophores. The elytra were all gone and the specimen was poorly preserved.

Harmothoe hirsuta Johnson.

A single specimen 25 mm. long, badly mutilated and in a poor state of preservation was taken in seaweed between tide-marks. Two other species were taken from a similar location, but I have not identified them yet.

PHYLLODOCIDÆ

Three unidentified kinds inhabiting seaweed tangles and holdfasts are in the collection.

EUPHROSYNIDÆ

Euphrosyne aurantiaca Johnson.

NEREIDÆ

Are common in the atokous state, and one "heteronereid" was brought in from an unknown location.

Nereis agassizi Ehlers.

Specimens which agree closely with figures by Johnson are found very abundantly in seaweed tangles.

Nereis virens Sars.

A single specimen was taken in wave-washed sand three miles south of the Laboratory.

There is another species, resembling *Nereis procera* which I have not yet identified.

Two specimens of this beautifully brilliant orange annelid were taken on holdfasts.

Eunicidæ

I found few of these, but such as I did find were in burrows in a soft shale ledge or in sand under large stones.

Lumbriconereidæ

Lumbriconereis erecta (?) Moore.

I am not sure of this determination. The setæ are identical, but the parapodia are not quite the same as those figured by Moore. The worm is very abundant in the sand under large stones. One or two similar species are common in seaweed and under mussels.

Glyceridæ

Two species of this family were found in the sand under large stones.

Hemipodia borealis Johnson.

Found under a large rock, buried in the sand. One very large and active glycerid was found in the same locality. I have not identified it.

Cirratulidæ

Found in the roots of eel-grass, in holes in a soft shale ledge or in the sand under large stones.

Cirratulus robustus Johnson.

Cirratulus spirabranchus Moore.

Found in abundance in the above places.

Terrebellidæ

Found with the *Cirratulidæ*.

Schmardanella californica Moore.

Is very abundant in the matted roots of "eel-grass."

Two other forms are quite abundant wherever *Cirratulus* is found.

Maldanidæ

Found on holdfasts.

Clymenella rubrocincta Johnson.

Fairly common.

Chlorhæmidæ

I have a half dozen of these from holdfasts.

Sabellidæ

Small sabellids are common in holdfasts and seaweed masses.

Serpulidæ

The calcareous tubes of these animals are seen everywhere below half tide, on rocks, in holdfasts and on kelp (spirobis). I have six different serpulids.

Hermellidæ

There are probably two species of this family common at Laguna.

Sabellaria californica Fewkes.

This form was found in large colonies in the protected crevasses of cliffs west of the laboratory. The colonies are some twenty feet long, two feet wide and ten inches thick. The tubes are of loosely agglutinated sand and are crowded very closely together with their mouths evenly disposed over the surface of the colony.

Another species lives singly in very hard, thick sand tubes. Some specimens have algæ growing on their opercula.

Turbellaria

I have three kinds of these "flat worms" in my collection. They are found under partly submerged stones.

Nemertinea

There are seven different nemertines in the collection. They are recorded from holdfasts, seaweed tangles and from among vermetus tubes.

Nematoda

There are two or three different marine nematodes in the collection. They are most common in the finer moss.

Sipunculoidea

There are two kinds of sipunculids, which seem quite distinct. Taken from eel-grass roots, from under rocks and mussels.

The specimens were identified from the following papers:

Fewkes, J. W. 1899
New Invertebrata from the Coast of California. Bull. Essex inst. xxi, 99-146, pls. 1-7 (2) figs. in text.

Johnson, H. P. 1897
A Preliminary Account of the Marine Annelids of the Pacific Coast, with Descriptions of New Species. Proc. Cal. ac. sc. (3), i, 153-198, pls. 5-10.

——— 1901
The Polychætæ of the Puget Sound Region. Proc. Bost. soc. nat. hist., xxix, 381-437, pls. 1-19.

Moore, J. P. 1904
New Polychætæ from California. Proc. acad. nat. sci., Philadelphia, 56-484-503, pls. 37-38.

(*Contribution from the Zoological Laboratory of Pomona College.*)

Studies in the Comparative Size of the Red Blood Corpuscles of Birds

CHI TSAU WANG

The blood corpuscles of a large number of vertebrates were studied at Laguna Beach during the past summer. Some of the sizes of cell and nucleus are given below. The blood was obtained as fresh as possible; in no case was the blood obtained longer than twenty-four hours after death. The corpuscles were measured by the ocular micrometer and checked by the aid of a camera lucida.

Common Name	Scientific Name	Average Size of Corpuscle Microns		Average Size of Nucleus Microns	
		Length	Breadth	Length	Breadth
Western Gull	Larus occidentalis	14.70	8.82	6.53	3.27
Heermann Gull	Larus heermanni	14.05	7.84	6.21	2.77
Great Blue Heron	Ardea herodias	13.72	8.82	6.53	3.27
Red-breasted Merganser	Mergus serrator	13.07	7.51	6.86	2.77
Arkansas Kingbird	Tyrannus verticalis	12.77	9.47	5.55	3.10
California Road Runner	Geococcyx californianus	12.09	9.15	5.27	3.27
Long-billed Dowitcher	Macrorhamphus griseus scolopaceus	12.41	8.49	5.24	2.46
Least Tern	Sterna antillarum	11.76	8.46	6.21	2.94
Semipalmated Plover	Ægialitis semipalmata	11.43	6.21	5.24	2.77
Arizona Hooded Oriole	Icterus cucullatus nelsoni	11.27	8.49	4.41	2.94

San Diego Song Sparrow	Melospiza melodia cooperi	10.94	8.33	5.27	2.53
Least Vireo	Vireo pusillus pusillus	10.45	9.47	5.55	2.77
California Woodpecker	Melanerpes formicivorus bairdi	10.45	6.53	5.24	2.77
Belding Marsh Sparrow	Passerculus beldingi	10.08	6.86	4.90	2.77
Willow Gold Finch	Astragalinus tristis salicamans	9.80	6.79	6.04	2.94
California Horned Lark	Otocoris alpestris actia	9.47	6.21	4.25	2.12
Western Lark Sparrow	Chondestes grammacus strigatus	8.49	5.55	5.24	3.10

(Contribution from the Zoological Laboratory of Pomona College)

Caprellidæ from Laguna Beach

R. LA FOLLETTE

This paper is a preliminary article on the Caprellidæ of Laguna Beach, and deals with species that have so far been identified. Because of great variation, due to age, it is very difficult to place the different forms.

Caprella geometrica Say

Mayer places *C. geometrica* as one of eighteen or twenty varieties of the species *acutifrons*, but I have thought it best to follow some of the other writers and use *geometrica* as the species name, as my specimen closely resembles the species which seems to be *C. geometrica* in several accounts.

The specimen here described is an adult male. The peræon (Plate I, Fig. 1) is robust and covered with many blunt tubercles. In this respect it varies from the specimens described by others who say the peræon is smooth. The young are comparatively smooth and develop tubercles on the caudal segments first. Cephalon furnished with a sharp anteriorly directed dorsal tooth. First segment shorter than the second, which is triangular in shape; third and fourth broad and a little shorter than the second; fifth, sixth and seventh each growing smaller respectively and truncate at the tip. Antennæ, stout; superior pair not half as long as the body, first joint short and twice as thick as the second but only half as long, third joint shorter than first; flagellum as long as the peduncle and composed of 15 or 16 joints, inferior pair extending to about the middle of the flagellum of the superior, joints long and narrow.

First gnathopod (Fig. 2), attached far forward, convex in shape and tapering slightly toward the finger, which was long as the palm and narrow; palm armed with tooth-like spine at the base and many hairs. Second gnathopod (Fig. 3), attached just posterior to the middle of the second pereiod, basal joint short and thick, not half as long as the palm; inner margin of the hand concave, armed with a tooth on the dorsal lobe and a broad, truncate tooth near the base of the finger, as well as numerous hairs; finger sharply concave on the inner margin for about half its length. Branchia nearly round. Third, fourth and fifth peræopods (Fig. 4) similar in structure, short, stout, and armed with stiff hairs; hand nearly as long as rest of the extremity; palm broad and armed with numerous hairs, inner margin slightly concave, with two serrate teeth at the base.

Length of specimen, 13 mm.

Color varying from a bright red to white.

Several specimens taken at Laguna Beach the latter part of July, from the Rhodophyceæ on the rocks.

The young of this species were very abundant at Laguna Beach, and I will give a short description of one because of the great variation from the adult. Plate II shows a young male with the antennæ inverted showing the setæ on the ventral side. The first five segments are of nearly equal length; peræon smooth; superior antennæ nearly half as long as the body, with inferior nearly as long as superior; flagellum with six to nine joints. Maxillipeds (Plate III, Fig. 5) with inner plate reaching apex of first joint of palp, armed with two teeth and spines; outer plate reaching apex of second joint of palp and armed with three small teeth. Upper lip (Fig. 6) bilobed, finely ciliated. First maxillæ (Fig. 7) two-jointed, palp and second joint armed with spines. Second

maxillæ (Fig. 8) armed with a few hairs on the tip. Mandible (Fig. 9) has cutting plate made of five strong, unequal teeth; teeth of secondary plate nearly equal. First gnathopod attached far forward, triangular in shape and fringed with hairs. Second gnathopod (Fig. 11) attached the same as in adult, palm convex on inner margin, instead of concave as in adult, and armed with two small teeth near inner margin at the base; finger is concave and uniform in outline.

Caprella septentrionalis Kroyer

The specimen here described differs slightly from those described by Mayer, Holmes, Sars and others, yet I do not think the differences great enough to demand the naming of a new species.

The peræon (Plate IV, Fig. 12) is comparatively smooth, first two segments long, as long as the rest of the body; cephalon angularly produced in front into a very short, blunt spine. Figure 13 « 224 » shows a specimen with a body somewhat broader. The superior antennæ are about half as long as the body, first joint broader than second, but shorter; second joint longest of all; third longer than first, and narrower than second; flagellum shorter than the peduncle and made up of about twelve joints. Inferior antennæ slightly shorter than the peduncle of the superior. Mandible (Fig. 14) cutting edge denticulate, with five irregular teeth, spine row having three large, feathery spines; molar tubercle strong and prominent. First gnathopod attached far forward, against the maxillipeds; hand triangular, fringed with hairs on the inner margin and one spine tooth near the base. Second gnathopod (Figs. 15, 16) attached near the posterior extremity of the second pereiod, basal joint nearly as long as the hand, inner margin of hand lying in a straight line and armed with two teeth near the base of the palm, one on the lobe and the other to one side. Another long tooth is near the base of the finger and is separated from a large, broad tooth by a deep suture; inner margin of the finger irregular. Third, fourth and fifth peræopods are similar in structure and not as stout as those of *C. geometrica*; hands powerful and armed with three clumps of spines on small prominences; differing in this respect from those described by Mayer, Sars and others in that they lack the pair of serrated spines at the base of the palm. Finger stout and half as long as the palm.

Length of specimen, 12 mm.

Color white or flesh color.

The specimens were collected during the latter part of July at Laguna Beach, from the seaweed in the inner tide pools.

Caprella æquilibra Say

The peræon (Plate IV, Fig. 12) is comparatively smooth, with the cephalon devoid of a horizontal spine; the first three segments are long and narrow, of nearly equal length, the fourth a little longer than the third, the fifth twice as long as the sixth and seventh combined. The branchia are ovate in shape and moderate in size. Between the bases of the second gnathopods is a sharp projection (Fig. 13), and on each side another spiniform process pointing anteriorly. Superior antennæ slightly over half as long as the body, first joint about half as long as the « 225 » second, but broader; second twice as long as the first, and third a little longer than the first, but narrower; flagellum with sixteen or seventeen joints and about as long as the peduncle. Inferior antennæ reaching just beyond the peduncle of the superior. First gnathopod small, attached far forward, palm triangular in shape, tapering toward the finger, which reaches back entirely over the inner margin of the palm, armed with two sharp spine-like teeth at the base of the palm, and scattered hairs. Second gnathopod (Fig. 14), attached at the posterior end of the segment, basal joint quite short; other joints have their lobes ending in spine-like processes; palm slightly convex on the inner margin, with a spined lobe about a third of the way along, and a blunt tooth two-thirds of the way along separated from a broad tooth by a deep sinus; claw regularly concave; whole gnathopod with but few hairs. Third, fourth and fifth peræopods (Fig. 15) similar in size and structure; palm thick, with two serrate teeth a third of the distance from the base.

Length of specimen, 12 mm.

Color a dark brown to flesh color.

Two specimens taken on a holdfast that was thrown up on the beach at Laguna Beach during July, 1914.

BIBLIOGRAPHY

« 226 »

Bate, C. S. 1862
Catalogue of Amphipodous Crustacea, pp. 357, 362.
Catalogue of Amphipodous Crustacea, pp. 357, 362.

Holmes, S. J. 1903
Synopses of North American Invertebrates, xviii, The Amphipoda. The American Naturalist, vol xxxvii, No. 436, p. 291.
Bulletin of Bureau of Fisheries, vol. xxiv, Amphipoda of Southern New England, p. 526.

Mayer, P. 1882
Fauna und Flora des Golfes von Neaples, vi, Monographie, pp. 45-50.

Mayer, P. 1890
Fauna und Flora des Golfes von Neaples, xvii, Monographie, pp. 48-57.

Mayer, P. 1903
Siboga-Expeditie, xxxiv, Monographie, pp. 79-92.

Sars, G. O. 1895
An account of the Crustacea of Norway, vol. i, Amphipoda, p. 663.

Say 1817
Journal of the Academy of Natural Science, Philadelphia, pp. 390-391.

(*Contribution from the Zoological Laboratory of Pomona College*)

EXPLANATION OF PLATES

« 227 »

PLATE I

C. geometrica (adult). ×25

Figure 1. Body showing length of segments
Figure 2. First gnathopod.
Figure 3. Second gnathopod.
Figure 4. Fifth peræopod.

PLATE II

C. geometrica (young male). ×40

PLATE III

C. geometrica (young male)

Figure 5. Maxillipeds. ×300.
Figure 6. Lip. ×300.
Figure 7. First maxillæ. ×300.
Figure 8. Second maxillæ. ×300.
Figure 9. Mandible. ×300.
Figure 10. First gnathopod. ×175.
Figure 11. Second gnathopod. ×175.

PLATE IV

C. septentrionalis

Figures 12, 13. Bodies, showing length of segments. ×25.
Figure 14. Mandible. ×110.
Figures 15, 16. Second gnathopods. ×25.

PLATE V

C. æquilibra Say

Figure 12. Body showing length of segments. ×50.
Figure 13. Projection at base of second gnathopod. ×150.
Figure 14. Second gnathopod. ×150.
Figure 15. Fifth peræopod. ×150.

« 228 »

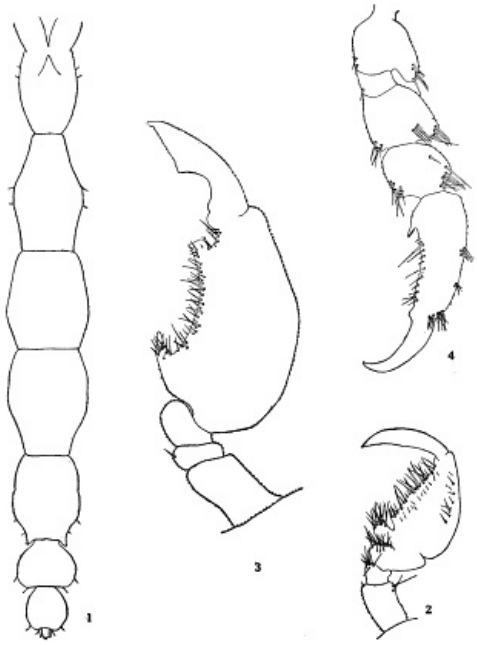


Plate I

« 229 »

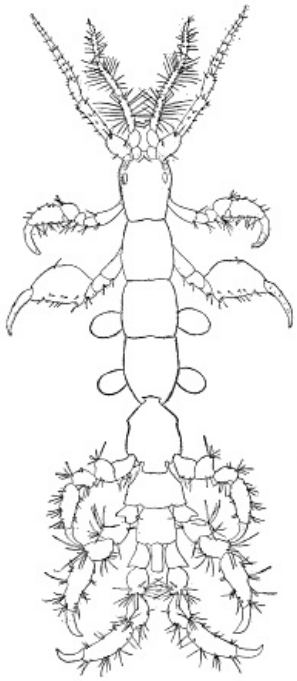


Plate II

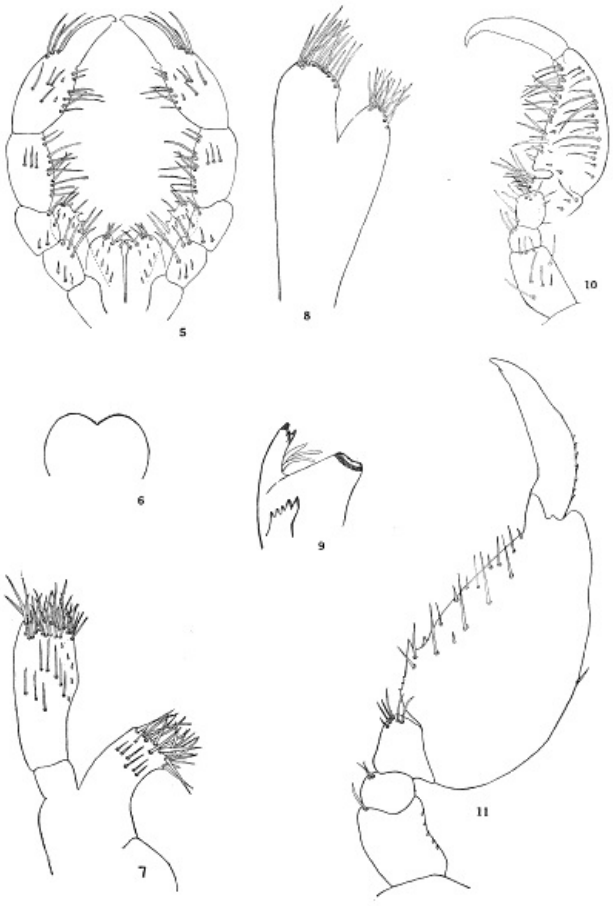


Plate III

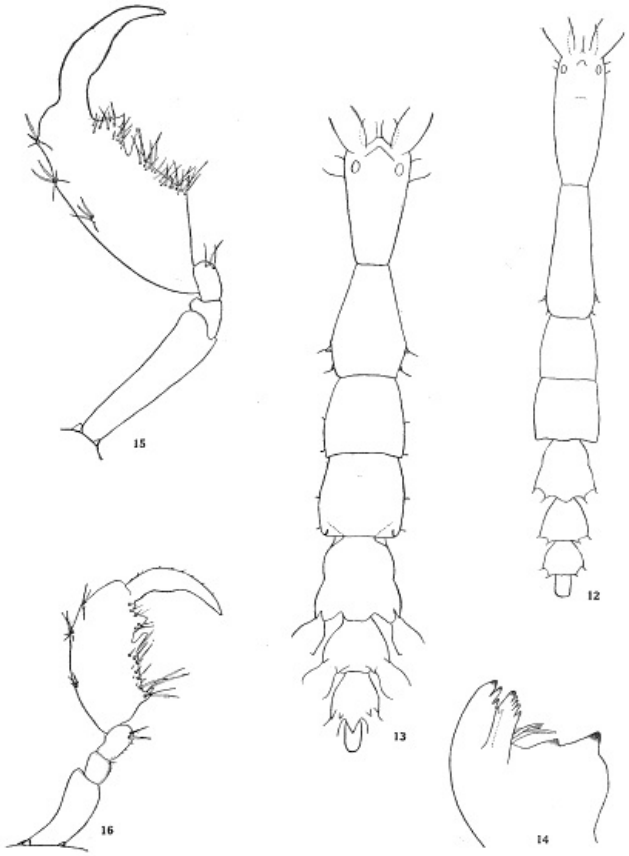


Plate IV

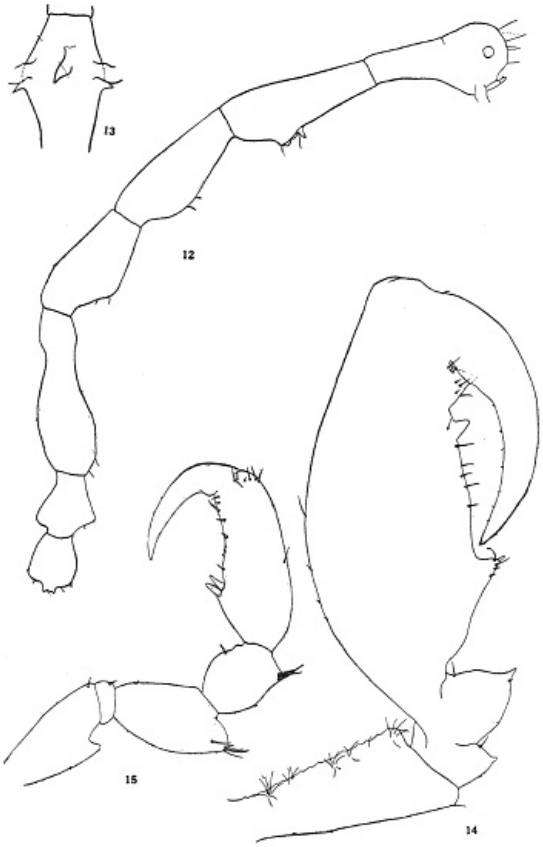


Plate V

Record of Two Fish, Not Before Mentioned, from Laguna

During the summer of 1914 no special effort was made to collect fish, but the two following species were taken:

Porichthys notatus **Girard**

A specimen of this interesting but rather common Californian fish was taken in a tide pool and kept for some time alive in the aquarium. This is sometimes called "Midshipman," because of the bright metallic spots over the head and body, like the buttons on a midshipman's uniform of years ago. These spots are provided with a lens, connective tissue capsule and a reflector, and are supposed to be luminous.

Mola mola Linnæus

A small specimen of this head-fish, or sunfish, was brought to us by the fisherman.

W. A. H.

Note on the Sea Urchins of Laguna Beach

Due to the kindness of Dr. H. L. Clark of Harvard, we are able now to have some clearer idea about the number of species of sea urchins found at Laguna.

Strongylocentrotus purpuratus Stimp

This is our most common species. It occurs by the hundreds in some of the larger tide pools, such as those near Seal Rocks. Judging from the specimens sent to Dr. Clark, the rather common greenish form, which we supposed to be distinct at first, is simply a younger form of the same species. This greenish form is more often found nearer shore under stones, where quite small individuals are abundant.

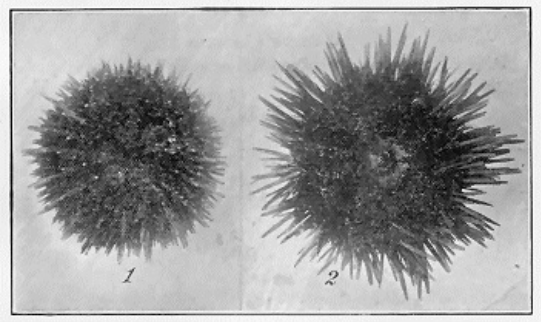


Figure 1. *Strongylocentrotus purpuratus* Stimp. Photo by Miss Clency.
Figure 2. *Strongylocentrotus franciscanus* A. Agassiz. Photo by Hamilton.

S. franciscanus A. Agassiz

These larger urchins are not so common as they may have been. Larger specimens may be obtained under rock ledges in deep water. Smaller forms of the same species, which seem to have long reddish spines, may be found in the tide pools, but are not common.

W. A. H.

Additional Notes on the Birds of Laguna Beach

LEON L. GARDNER

In accordance with the general plan of the Laguna Marine Laboratory, a part of the work was with the birds of the locality.

As mentioned in the First Annual Report of the Laboratory, Laguna Lakes, about four miles up Laguna Canyon; Balboa, eight miles up the coast, and the surrounding rocky wild hills of Laguna, afford rich and varied collecting. Perhaps the richest area of bird life lies between Laguna and Balboa, in the Irvine Ranch. This is a large tract of land comprising many thousands of acres, extending about seven miles up the coast from Laguna and eleven miles inland. The canyons here are steep and, in some localities, very wooded in contrast to the more open canyons farther down the coast. For years this land has been given over to cattle grazing, and the Irvine company, in order to safeguard the stock, have allowed no one, except their own range riders, to enter the property. In the years 1911 and 1912 this was a state game preserve, and there is considerable rumor among local residents that it was stocked with some kind of pheasants. However, I have neither seen nor heard of a specimen taken. In all events, the protection afforded the birds has been taken advantage of, and quail, road-runners, many species of hawks and all of the smaller

birds thrive in abundance and safety.

The fifteen days of collecting were spent largely in covering as large an area as possible, to obtain the widest range of representative species, with field notes, etc., to be placed in the Laboratory building, as a nucleus for greater collections and for the benefit of the local residents or summer visitors who are interested in the work of the College.

The additions to the first list, published in the First Annual Report, as mentioned before, are as follows:

Gavia immer (Brünnich) Common Loon

A specimen taken in Balboa Bay, July 6, 1914. This is rather an unusual record, as the Loon is only a winter visitant; however, some are known to remain throughout the summer. Mr. Swarth « 236 » tells me that this specimen had lost the power of flight during its molt. He thinks this seems to indicate that Loons lose the ability to fly during molting, as do the Anseres.

Gavia pacifica (Lawrence.) Pacific Loon

June 27, I found a dead Pacific Loon cast up on the beach. The specimen was in very worn and oddly colored plumage. On examination Mr. Swarth said it was a partial albino and had skipped a regular molt.

Larus heermanni Cassin. Heermann Gull

Abundant about the Bay at Balboa.

Mergus serrator Linn. Red-breasted Merganser

A female taken July 6, 1914. This is a very late record for this bird, since it leaves mostly in April. It was found resting on a sand spit in Balboa Bay.

Oidemia perspicillata (Linn.) Surf Scoter

Common along the coast from Laguna to Balboa.

Oidemia deglandi Bonaparte. White-winged Scoter

Occurring with the preceding species.

Erismatura jamaicensis (Gmelin). Ruddy Duck

Occurring at the tule lake in Laguna Canyon.

Himantopus mexicanus (Müller). Black-necked Stilt

One taken at Laguna Lakes, now mounted and in possession of J. N. Isch, Laguna Beach.

Macrorhamphus griseus scolopaceus (Say) Long-billed Dowitcher

A specimen taken on the sand spits in Balboa Bay, July 6, 1914. This appears to be an early fall migration record.

Catoptrophorus semipalmatus inornatus (Brewster) Western Willet.

Abundant in August, less common in July. Often in company with Hudsonian curlews (*Numenius hudsonicus*) along the coast. One taken as early as July 6.

Heteractitis incanus (Gmelin). Wandering Tattler « 237 »

Found in August along the rocky coast by Arch Beach (down the coast from Laguna).

Actitis macularius (Linn). Spotted Sandpiper

Common along the beach in August.

Ægialitis semipalmata (Bonaparte). Semipalmated Plover

A small flock found at Balboa July 13.

Ægialitis novisa Cassin. Snowy Plover

One taken between Laguna and Balboa.

Buteo borealis calurus Cassin. Western Red-tail

Fairly common in the hills. There seemed to be several different species of hawks at Laguna, but as they were very shy and most of them took refuge in the forbidden territory of the Irvine Ranch, none of the larger ones were obtained.

Haliætus leucocephalus leucocephalus (Linn.) Bald Eagle.

There are five Bald Eagles that are commonly seen along the beach near Laguna. When followed, they are always found to come to rest on the high, rocky west slope of Aliso Canyon (down the coast from Laguna). The owner of the canyon, Mr. Joe Thurston, tells me that for years a pair has bred there, and these other three are young that did not leave the vicinity. He is very jealous of their safety, and it is to be hoped they may always be kept there as a natural attraction. This is one of the few breeding points along the coast from which the Bald Eagle has not been driven. In March, 1895, Mr. E. Davis took two fresh eggs of the Bald Eagle near Laguna Beach. It would be very interesting to know whether or not he obtained them from the same canyon; if so, this must be a very old breeding place.

Pandion haliætus carolinensis (Gmelin). Osprey

One shot from a flagstaff in the center of town. The date is uncertain, but appears to be about 1905. The specimen is now mounted and in the possession of Mr. J. N. Isch of Laguna.

Otus asio bendirei (Brewster). California Screech Owl

Fairly common in the timbered canyons.

Speotyto cunicularia hypogaea (Bonaparte). Burrowing Owl

Common in upper Aliso Canyon, which is more open and very hot and arid.

Ceryle alcyon (Linn.) Belted Kingfisher

I noted two birds which were undoubtedly of this species along a rocky stretch of the coast, but was unable to collect one.

Melanerpes formicivorus bairdi Ridgway. California Woodpecker

I obtained two specimens of this species from a flock in Nigger Canyon. This seems to be a very low altitude at which to find these birds.

Myiochanes richardsoni richardsoni (Swainson). Western Wood Pewee

I collected two of this species in the willow bottoms July 25, 1912, which seems to be an indication that they are summer residents.

Corvus corax sinuatus Wagler. Raven

Irregular along the coast. One collected July 19.

Astraglinus tristis salicamans (Grinnell). Willow Goldfinch

Common in the willow bottoms.

Ammodramus savannarum bimaculatus Swainson. Western Grasshopper Sparrow

Very common in one particular grassy glade at the top of the ridge around Laguna, also at the tule lakes. I took a young bird June 27, which seems to indicate the birds were breeding there. This is one of the few breeding records for Southern California.

Hirundo erythrogastra Boddaert. Barn Swallow

Common along the rocky cliffs; some breeding in July.

This concludes the additional list. There is one other breeding record worthy of note. In Nigger Canyon (Irvine Ranch) there is a Great Blue Heron nesting colony. Although such colonies were at one time common along the coast, they are now becoming rare. The colony is situated in a large clump of sycamore trees, in the bottom of the canyon, some half mile or more inland. There are about thirty nests, quite white with bird lime; the trees and ground also are well covered, showing the permanency of the site. On June 26, 1914, I visited the colony and found very young birds, but no eggs. The whole place was filled with a peculiar stench, while the croakings of the old birds, coupled with the frightened squawks of the young, and the invisible, choking powder down, made the place quite undesirable. The old birds were very bold, but not pugnacious, and while the examination of the nests went on retired to nearby trees to watch the proceedings, while the young crowded out to the uttermost branches, keeping up a continual racket.

Owing to the protection afforded by the Irvine ranch, the colony has thrived and probably will for an indefinite period.

(*Contribution from the Zoological Laboratory of Pomona College.*)

A New Dipterous Gall on Stanleya

T. D. A. COCKERELL

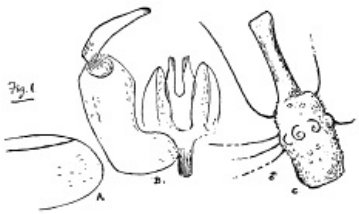


Figure 1. A, Apical part of wing. B, Male genitalia. C, Segment of male antenna.

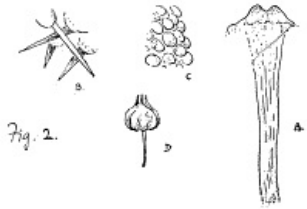


Figure 2. A, Breastbone of larva. B, Spines at caudal end of larva. C, Skin of larva. D, Gall.

On June 18, 1914, my wife and I found a hitherto undescribed gall on *Stanleya glauca* Rydberg, a remarkable cruciferous plant growing about four miles north of Boulder, Colorado. Thinking to rear the adults, the galls were placed in a bottle with some earth and watched for a long time, but nothing appeared. Supposing the effort to have been unsuccessful, I set the bottle aside; but long after discovered that adults had eventually emerged, but had died and were covered with mold. I was able to rescue sufficient fragments to make the drawings given herewith, which, together with the larval characters, serve very well to indicate the genus, with enough of the specific characters for ready recognition. The species may be called

***Perrisia Stanleyae* n. sp. (Cecidomyiidæ)**

Gall: A swollen flower of *Stanleya glauca*, containing many pallid larvæ. The sepals are thickened and enlarged.

Larva: With the skin strongly verrucose; breastbone of the same general type as that of *P. fructicola* Kieffer; caudal end with strong spines.

Male: The characteristic genitalia and antennal joint are figured.

Hydroids of Laguna Beach

PROF. A. M. BEAN

PACIFIC UNIVERSITY, FOREST GROVE, OREGON

The identification of the hydroids included in this list was undertaken while making a general collection of the marine forms of the Laguna Beach region. The specimens were taken mostly from the miscellaneous shore collections, and there is no claim to exhaustiveness. They were, however, examined as fresh material, and nearly always with the living polyp still present. There was abundant promise of opportunity for the study of ecological and developmental problems, of which I was unable at that time to take advantage.

The region covered included a strip of shore line of about two miles in extent. Part of this is sandy beach which after a heavy tide would often be covered by the laminæ and holdfasts of *Macrocystis* and other kelps, to which hydroids were generally attached. The remainder of the shore was rocky and of a remarkably varied conformation, including tide pools, deep channels, rock tables, mussel beds, and short stretches of sand and pebbly beach. Scarcely any attempt was made at dredging, and the shore itself was by no means completely searched.

GYMNOBLASTEA

Family PENNARIIDÆ

Tubularia sp.

This single representative of the Gymnoblastea more nearly corresponds to the *T. marina* described by Torrey, '02. It is, however, much smaller, the erect branches being scarcely ever as much as 15 mm. in length, instead of 30-50 mm. The proximal tentacles are 28 and 29 in number, instead of 22-26, described for *T. marina*. There is very little appearance of annulation of the stem, and no evidence of the "stem increasing in diameter distally." The habitat is also different. *T. marina* is given as growing "between tides on the lee side of rocks exposed to the breakers of the open sea." The tubularian in question, however, was found only clustered in among the « 243 » rootlike holdfasts of the *Macrocystis* at a depth of four to six fathoms. Moreover *T. marina* is not reported as occurring farther south than Pacific Grove. There seems to be some reason for considering this a new species, but further investigation, and perhaps a study of comparative material, will be necessary to determine its systematic position.

CALYPTOBLASTEA

Family SERTULARIIDÆ

Sertularella tricuspidata (Alder)

Sertularia furcata (Trask)

Both of the above forms were found on the washed-up holdfasts of *Macrocystis*.

Family PLUMULARIIDÆ

Aglaophenia inconspicua (Torrey '02)

Torrey's description gives "hydrocladia 3-4 mm. long." Out of a large number examined, however, I found none with hydrocladia more than 1.5 mm.

Aglaophenia struthionides (Murray)

Both *A. inconspicua* and *A. struthionides* were taken from the red algæ brought in by the tides.

Plumularia setacea (Ellis)

This form appears to have a wide variation in its bathymetric distribution. Specimens were collected from the mussels which are uncovered at mid-tide, and from the carapace of *Loxorhynchus grandis*, a deep-sea crab that is only rarely brought to shore by the highest tides.

Plumularia lagenifera (Allman)

Found on kelp holdfasts.

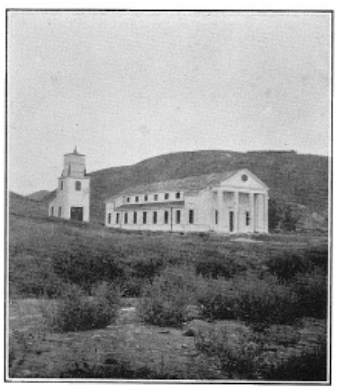
Antenella avalonia (Torrey)

Taken in tow-net from floating red algæ.

Family CAMPANULARIIDÆ « 244 »

Mention may be made here of one of the Campanulariidæ recently sent me by Professor Hilton of Pomona College, to whom thanks are due for many courtesies. It does not appear to be any species yet reported from this coast. Its identification, or at least an adequate description, must, however, be postponed for a future paper.

Summer School at Laguna Beach « 245 »

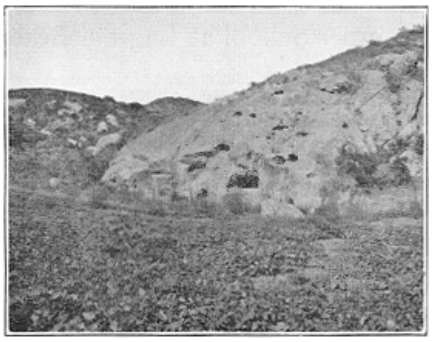


LAGUNA LABORATORY

During the six weeks of summer school of the past season (1914) there were in attendance

about thirty students and investigators, some of whom remained until the middle of September. In addition to these there were several hundred visitors to the aquarium and laboratory, in spite of the bad condition of the roads. After the middle of the summer running salt water was piped to the laboratories and aquaria, so that it was much easier to keep specimens alive. Yet even before this many interesting forms were on exhibition. At all times there were numerous marine animals for study, as well as many living land species, such as tarantulas, lizards, frogs, a large turtle and a number of snakes. Several rattlesnakes were kept in a box in the front of the building until the end of the summer. Several of the largest rattlesnakes were an unending source of interest. One day several people were able to observe a king snake swallow a slightly smaller rattler.

« 246 »

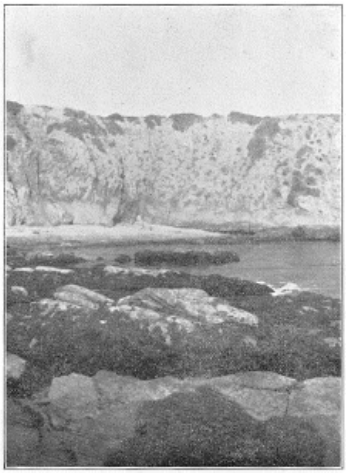


IN LAGUNA CANYON

SHORE NEAR SEAL ROCKS

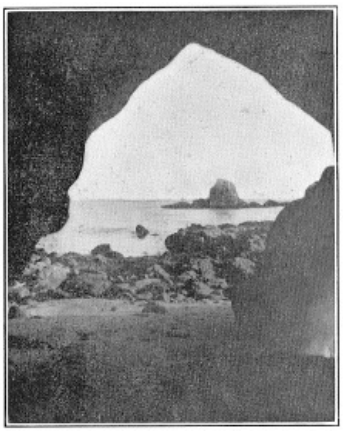
« 247 »

From day to day a varied display of marine forms was to be found in the aquarium; at different times rare and curious fish, starfish, sea urchins and devilfish, while now and then some of the larger specimens, such as sharks and rays, were brought in. Some of these were kept alive in the large cement floor tank or in the larger jars. Great quantities of smaller specimens were no less interesting, such as sea spiders, serpent stars of many beautiful colors and markings, brilliant nudibranchs, large abalones, curious small crabs and, in fact, all the interesting or beautiful specimens that could be found.

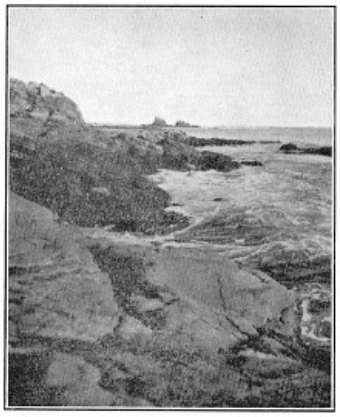


A COVE ABOVE LAGUNA

« 248 »

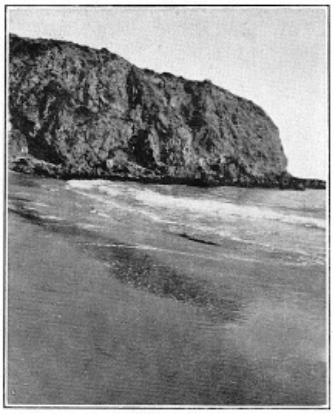


A VIEW FROM ONE OF THE SHORE CAVES



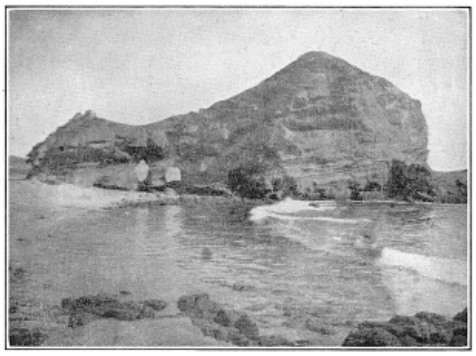
SEAL ROCKS IN THE DISTANCE

Each week, until September, the public was also invited to attend the evening lectures. These were usually of a general nature relating to the life of the sea, but some told of land forms as well, and one was on the Hopi Indian Snake Dance. « 249 »



SHORE NEAR EMERALD BAY

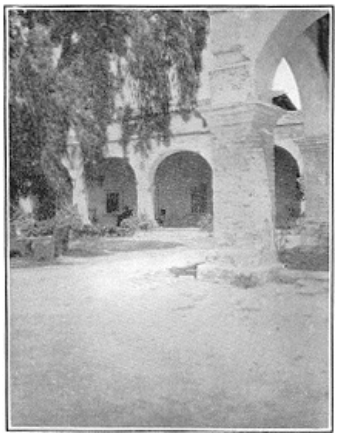
The chief work of the laboratory during the first six weeks was in connection with the Summer School. There was a class of nine in General Biology, twelve in General Zoology, and five in General Entomology. There were, in addition, from six to twelve doing special work for a longer or shorter period. Students from three Pacific coast colleges were in attendance, although most of the students and advanced workers were from Pomona College. Two or three studied special Histological or Embryological topics, but the majority were interested in faunal and distributional problems. As announced at an earlier time, the Laguna station is but an extension of the « 250 » Biological part of Pomona College, and the plan for special work includes a survey of the whole region from the mountains to the sea. With this in mind, many explorations have been begun, and the aid of specialists in various fields is sought, so that we may first of all know the living forms that inhabit this varied and interesting section of California. We hope that a better knowledge of the species in the different groups here may lead to more extensive observations both by advanced students from the College and by others.



THREE ARCHES BELOW LAGUNA

Together with the special and general work of the students, collections of marine and land animals were obtained all through the summer. Some of these were for the local collection, others to aid in the work of the survey. Among the collections made were many species of sponges, hydroids, polyzoans, pycnogonids, marine worms, Crustacea of several groups and, in fact, nearly all the shore forms that could be obtained between tides or a short distance from shore with a small boat. There were also extensive collections of insects and spiders from the hills and from up and down the coast.

« 251 »



SAN JUAN CAPISTRANO

For the study of marine and land animals Laguna has proved itself once more well adapted to our uses. The high hills come down near the ocean at several points, and there are miles of interesting and varied coast line in both directions from the laboratory. All summer, students in small or larger parties tramped over the hills and through the many interesting canyons to the lakes, to the Mission of San Juan Capistrano, or to Balboa and the mud flats. Saturday was the regular field day, and the longer tramping trips were then taken, but very often of an evening groups of students enjoyed beach suppers or picnics in some canyon or up in the hills.

That Laguna and its surroundings is a region of great interest and beauty is evinced by the fact that a number of artists make it their home, while it is visited by many others. The trail to Balboa, along the beach or the cliffs, is wonderfully varied and beautiful, while the drive from Laguna to San Juan Capistrano, except for the lack of villages and ruins, might well be considered a part of the famous Amalfi Sorrento drive in Italy.

« 252 »

During the summer of 1915 courses in general as well as special zoology will be given. General entomology may also be studied with advantage. For those who are just beginning biological work there may be special exercises arranged, as last summer.

There are eight private rooms in the laboratory for special workers. Some of these will be available for investigators who may wish to follow out problems of their own or those suggested by the work of the station. Write

W. A. Hilton, *Director*,
Pomona College, Claremont, California.

Wants and Exchanges

« 253 »

Subscribers and others are urged to use these columns to make their wants known. As the Journal goes to all parts of the world we hope to make this a very useful feature of the publication. Exchange notes are free to subscribers.

WANTED—Myriopods from all parts of the world. Will name, exchange or purchase. R. V. Chamberlin, Mu. Comp. Zoology, Harvard Univ., Cambridge, Mass.

Will exchange insects of any order from Southern California, for Microlepidoptera from any

part of North America, preferably pinned, with complete data concerning capture. Fordyce Grinnell, Jr., Pasadena, Cal.

Coccidæ—California Coccidæ exchanged for specimens from all parts of the world. E. O. Essig, Secretary State Commission of Horticulture, Sacramento, Cal.

Wanted—Cephalopods (in alcohol); Chitons (in alcohol or dry); shells of West American Mollusca; zoological literature. Offered: West American and other molluscan shells; zoological pamphlets, mainly on the Mollusca. S. S. Berry, 502 Cajon St., Redlands, California.

California Syrphidæ, Aphididæ to exchange for non-California Syrphidæ. W. M. Davidson, Walnut Creek, Cal.

Wanted—For exchange, papers on marine and fresh-water Protozoa. Albert L. Barrows, Department of Zoology, University of California, Berkeley, Cal.

Wanted—Information on any mite-papers for sale or exchange that have an economic bearing. H. V. M. Hall, Room 8, Court House, San Diego, Cal.

Wanted—Specimens and separates relating to the pseudoscorpions, in exchange for local species. M. Moles, Claremont, Cal.

Wanted—Literature and determined specimens of Collembola, in exchange for local forms and literature. G. Bacon, Claremont, Cal. « 254 »

Wanted—Determined specimens of Thysanura in exchange for local species. R. Gardner, Claremont, Cal.

Wanted—Separates relating to the nervous system and sense organs of the invertebrates in exchange for reprints by a number of authors on this and other topics relating to the anatomy of invertebrate animals. W. A. Hilton, Claremont, Cal.

Tabanidæ from all parts of North America to exchange for Tabanidæ from the Western United States and Mexico and Central America. Jas. G. Hine, Ohio State University, Columbus, Ohio.

Sarcophagidæ from all parts of the world bought or exchanged, according to arrangement. North American material determined. R. R. Parker, Ent. Lab., Mass. Agri. College, Amherst, Mass.

Journal of Entomology and Zoology—*Advertising Section* « i »

AUTOMATICALLY LUBRICATED FINE ADJUSTMENT BEARINGS.
NEW TYPE HANDLE ARM.
SYMMETRY OF OUTLINE.
BEAUTY OF FINISH.
SUPERIOR OPTICS.

16mm and 4mm objectives
Double nosepiece
One eyepiece
Cabinet
Discount to schools **$31.50**

IDEAL FOR LABORATORY WORK

Send for Revised Price List for 1914

Spencer Lens Co.
BUFFALO, N. Y.

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

« v »

Entomological News

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.

Reichert's Scopes are Good Scopes

IS YOUR'S A REICHERT?

HAVE YOU HEARD OF REICHERT'S FLUORESCENT MICROSCOPE?
CIRCULAR ON REQUEST. ADDRESS

McCALLA-REICHERT COMPANY

REICHERT'S AMERICAN AGENTS
623 S. WABASH AVE., CHICAGO
"*It is better to have BOUGHT Reichert's than to WISH you had.*"

THE KNY-SCHEERER CO.

SCIENTIFIC APPARATUS, INSTRUMENTS AND PREPARATIONS, CHEMICALS, ANATOMICAL AND BIOLOGICAL MODELS, NATURAL HISTORY SPECIMENS AND PREPARATIONS, MUSEUM AND NATURALISTS' SUPPLIES, GLASS JARS, WALL CHARTS, LABORATORY SUPPLIES.
Illustrated Catalogues on Application

Transcriber Note

The "Index to Volume VI" contains links to pages in all Numbers of this volume. Only those present in this volume have links. The Index also lists Entomobryidæ without a page reference. This Family may be in a different Number than the current text.

On page 222, the word "pereiod" may be a typo for "pereiopod".

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.