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## Journal of Entomology and Zoology

EDITED BY POMONA COLLEGE, DEPARTMENT OF ZOOLOGY

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THE JOURNAL OF ENTOMOLOGY AND ZOOLOGY

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Claremont, California, U. S. A.

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## Annelids from Laguna Beach

[Pg 27]

This list includes specimens recently determined by Dr. R. V. Chamberlin, but does not include new species reported on at that time.

*Glycera rugosa* Johnson. *Euphrosyne aurantiaca* John. *Eudistylia polymorpha* Johnson.

From holdfast. *Chrysopetalum occidentale* John.

*Diopatra californica* Moore. *Podarke pugettensis* Johnson.

*Syllis alterniata* Moore. *Pionosyllis elongata* Johnson.

*Halosydna pulchra* Johnson.

*H. californica* Johnson. Dredged. *Scoloplos* sp. San. Balboa.

*Naineris longa* Moore? Under stones. *Cirratulus luxuriosus* Moore, all bright red from eel grass. *Polycirrus californicus* Moore.

*Nereis agassizi* Ehlers. *Anaitides* sp. *Lumbrineris zonata* John.?

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## Structure of *Dolichoglossus Pusillus*

[Pg 28]

ALMA EVANS

The animals were studied from serial sections cut in several planes. The stains used were carmine, hematoxylin and eosin. The hematoxylin seemed to show the tissues more clearly. A graphic reconstruction was attempted, but did not prove satisfactory because of the individual artificial foldings and contractions. The drawings were obtained by the use of a camera lucida. The general drawings, Figs. 1-9 inclusive, are not filled in in great detail. The special drawings are shown at greater magnification with more of an attempt to show the actual condition.

*Dolichoglossus* is a soft worm-like animal with ciliated surface. It is divided into three distinct regions: the proboscis, a long club-shaped organ; the collar, a fold in the surface just behind the proboscis, and the trunk, a long cylindrical portion posterior to the collar.

*Dolichoglossus* is a marine form living in sandy bays or sheltered places. Mucous glands in the surface epithelium secrete a sticky fluid which covers the body and to which tiny sand grains stick. The sand clinging to the mucous coated surface forms a fragile temporary tube in which the animal is usually secluded. The animals in the living condition are bright orange or red but lose their color very soon after preservation in alcohol or formalin.

The proboscis cavity extending the entire length of the organ is surrounded by a network of connective tissue supported by longitudinal bands of plain muscle. This cavity is supposed to communicate with the exterior by a very small opening, the proboscis pore, but this did not show in the specimens examined. The heart, proboscis gland and notochord are located in the posterior part of the proboscis.

The collar contains the central nervous system, part of the notochord, the dorsal blood vessel, ventral and dorsal mesenteries, mouth opening and anterior part of the alimentary canal.

The trunk contains the alimentary canal, dorsal and ventral blood vessels, dorsal and ventral nerves, the gill-slits, the reproductive bodies, dorsal and ventral mesenteries and muscle bands.

The nervous system consists of three parts: the central, located in the collar region, Fig. 5; the sub-epidermic network extending over the entire body just under the surface epithelium, Figs. 1-7; and the dorsal and ventral strands which are thickenings of the sub-epidermic network extending throughout the trunk, Figs. 1 and 7. There is also quite a decided thickening of the sub-epidermic network at the base of the proboscis, Figs. 5, 6.

The vascular system consists of two parts, the central and the peripheral. The central is made up of the heart, a thin-walled vesicle at the base of the proboscis just dorsal to the notochord, and connected with it the proboscis gland, a plexus of capillaries just anterior to the notochord. Fig. 5. The peripheral system is composed of a ventral and a dorsal vessel. The dorsal starts at the heart and continues just ventral of the dorsal nerve throughout the length of the body. Figs. 1, 5, 7. The ventral vessel extends from the posterior border of the collar to the anal end. It is connected with the dorsal vessel by a circular vessel in the posterior edge of the collar.

The mouth is situated ventrally at the base of the proboscis, within the collar, and opens directly into the straight alimentary canal. The latter is a straight tube extending from the mouth opening to the anus. Figs. 5, 1, 7, 9.

[Pg 29]

The alimentary canal in the anterior part of the collar gives off a diverticulum, which grows forward and supports the proboscis. Because this diverticulum has the vacuolated appearance of the notochordal tissue of higher animals, it has been regarded as a notochord. It is largest at the base of the proboscis immediately anterior to the heart. Figs. 5, 6.

The paired gill-slits occupy the region just posterior to the collar. They are arranged in two longitudinal grooves in the dorsal wall. The number increases throughout life, new slits appearing just behind those already in place. I found about twenty-five to be the average number, while particular individuals had as low as eighteen and twenty and as high as thirty and thirty-one. The gills are formed in the shape of a U. A skeletal rod or gill bar separates the gills from each other. The gills are supplied with blood from the dorsal vessel. Figs. 3, 7, 8.

The sexes are distinct. The ovaries and testes are saccular organs arranged in a row along the gill and succeeding region. The sacs in other genera, for example *Balanoglossus* as described by Shipley, open directly on to the epidermis. I have been unable to see these openings in my preparations. Fig. 8 shows the position of the ovaries in the female; the testes in the male are in a

similar location.

The surface epithelium is modified ciliated columnar, varying slightly in thickness, size of nuclei and size and shape of cell according to location. Figs. [13](#), [14](#), [15](#).

The epithelium forming the gills and intestine is also modified ciliated columnar. That of the gills having short narrow cells and small nuclei, and that of the intestine having longer thicker cells and large nuclei. Figs. [11](#), [10](#).

The connective tissue surrounding the proboscis cavity is of a peculiar arrangement. The connective tissue itself consists of fine strands loosely interwoven, but arranged in a definite manner. The strands form a fine network which gives a beautiful lacy appearance. Small round nuclei are quite numerous in connection with the strands. Longitudinal bands of plain muscle are very conspicuous in the connective tissue. These muscle bands are probably used in altering the size and shape of the proboscis. Figs. [4](#), [20](#), [21](#).

The nervous tissue consists of many fibers thickly interwoven. There are a few small nuclei scattered about among the fibers. Figs. [12](#), [13](#).

The muscle is unstriated. The fibers are very long in some places, shorter in others and always quite distinct.

(Contribution from the Zoological Laboratory of Pomona College)

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## REFERENCES

- |   |      |
|---|------|
| <i>Assheton, Richard</i>  | 1918 |
| A new species of <i>Dolichoglossus</i> . Zool. Anz. Bd. 33, p. 517-520.   |      |
| <i>Delage and Herouard</i>  | 1898 |
| Traité De Zoologie concrète Vol. 8. Les Procordés. <i>Balanoglossus</i> . |      |
| Encyclopedia Britainica <i>Balanoglossus</i> .                            |      |
| <i>Shiple, Arthur E.</i>  | 1893 |
| Zoology of the Invertebrata. <i>Balanoglossus</i> .                       |      |

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## EXPLANATION OF FIGURES

[Pg 30]

Fig. 1. Cross section through the gill region showing gill opening. D. N., dorsal nerve. D. V., Dorsal vessel. G. O., gill openings. A, alimentary corps. G., gill. V. N., ventral nerve. V. V. ventral vessel. N., nervous tissue. ×40.

Fig. 2. Cross section through the base of the proboscis showing diverticulum wall and proboscis gland. D., diverticulum. N., nervous tissue. P. G., proboscis gland. ×40.

Fig. 3. Longitudinal section through a gill opening. N., nervous tissue. G., gill. G. O., gill opening. ×40.

Fig. 4. Cross section through the center of the proboscis. N., nervous tissue. M. C., muscle in the connective tissue. T., connective tissue. ×90.

Fig. 5. Longitudinal section through the base of the proboscis and collar. M., mouth. C. N., central nervous system. H., heart. No., notochord. P. G., proboscis gland. N., nervous network. A., alimentary canal. D. V., dorsal ventral. ×40.

Fig. 6. Cross section through the base of the proboscis showing thickened nerve network. N., nerve network. D., diverticulum wall. H., heart. ×40.

Fig. 7. Cross section through gill region. D. N., dorsal nerve. D. B. V., dorsal blood vessel. G. B., gill vessel. V. N., ventral nerve. V. V., ventral vessel. ×40.

Fig. 8. Longitudinal section through the gill region. G., gills. B., blood. O., ovary. N., nervous network. ×40.

Fig. 9. Cross section of alimentary canal. A., wall of alimentary canal. ×40.

Fig. 10. Intestinal epithelium, modified ciliated columnar. ×400.

Fig. 11. Epithelium of the gill, modified ciliated columnar. ×400.

Fig. 12. Nervous tissue.  $\times 400$ .

Fig. 13. Surface epithelium of proboscis, modified ciliated columnar.  $\times 400$ .

Fig. 14. Surface epithelium of collar, modified ciliated columnar.  $\times 400$ .

Fig. 15. Surface epithelium of trunk, modified ciliated columnar.  $\times 400$ .

Fig. 16. Cells of testis.  $\times 400$ .

Fig. 17. Ovary.  $\times 400$ .

Fig. 18. Plain muscle.  $\times 400$ .

Fig. 19. Epithelium of diverticulum.  $\times 400$ .

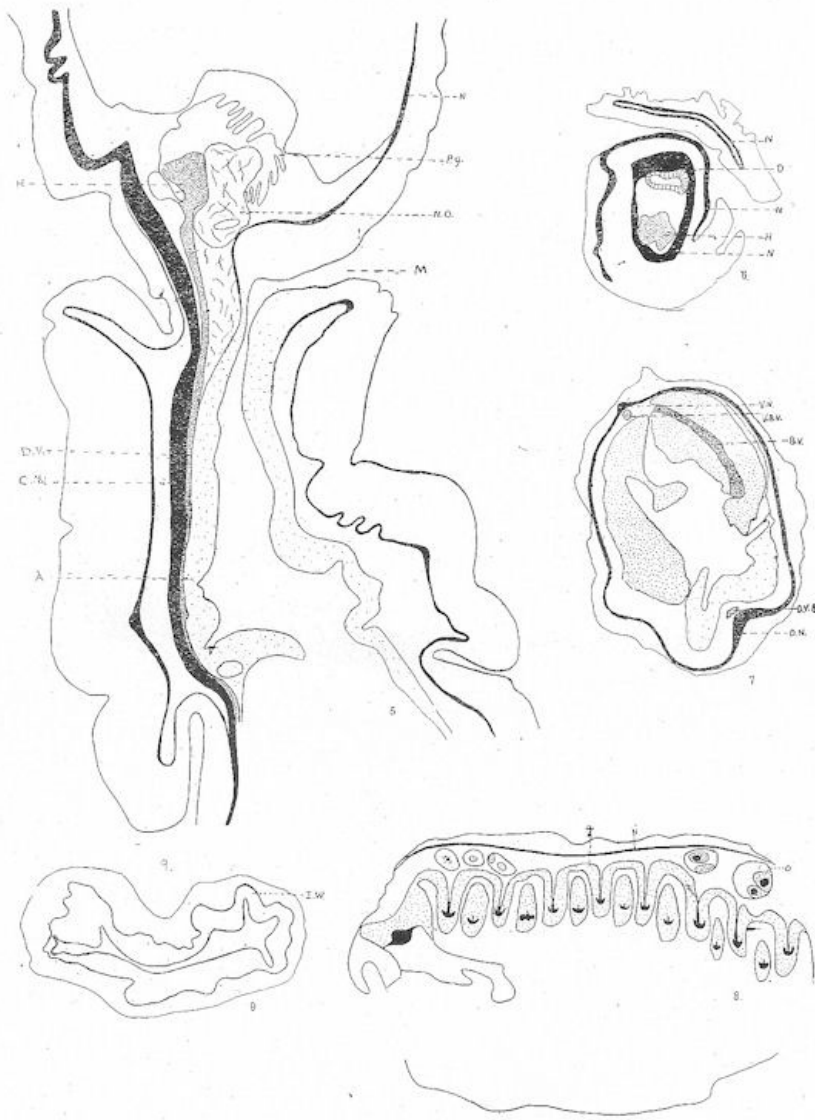
Fig. 20. Connective tissue of proboscis.  $\times 400$ .

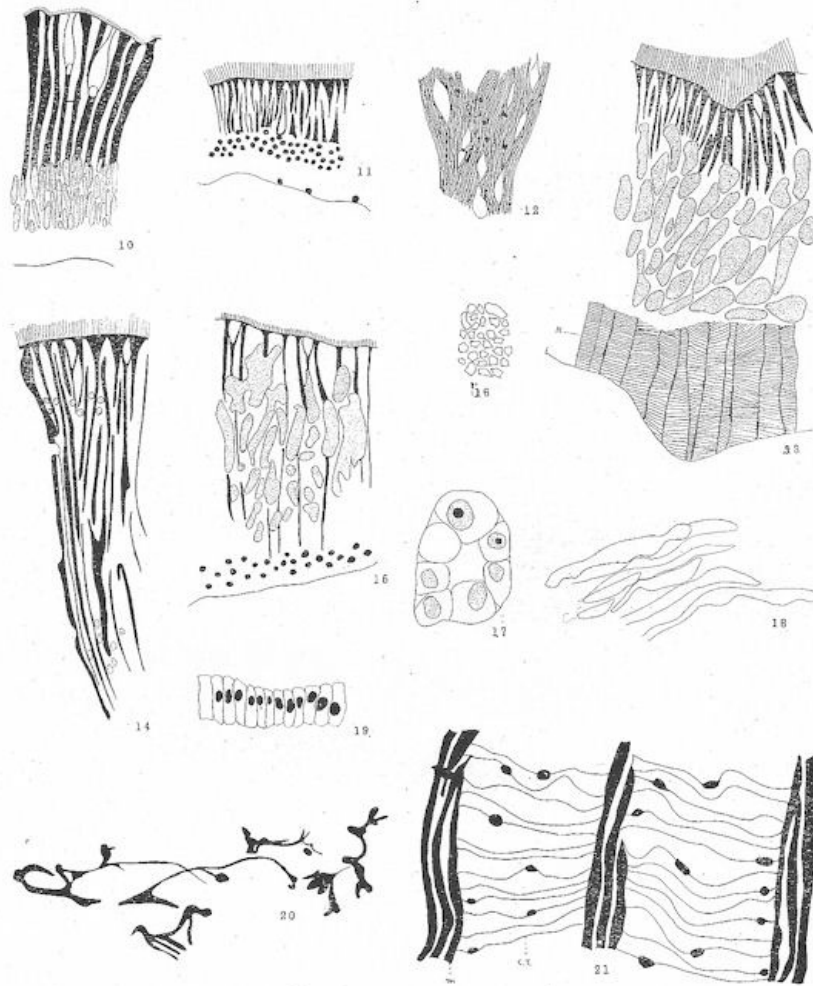
Fig. 21. Muscle bands in proboscis connective tissue.  $\times 400$ .

[Pg 31]



[Pg 32]





## Opisthobranchs from Laguna Beach

[Pg 34]

The determinations are by Dr. F. M. MacFarland

### TECTIBRANCHS

*Pleurobranchæa californica* MacF. Only one specimen has been obtained at Laguna Beach, from a depth of from 15 to 20 fathoms. The specimen was mottled dark above and about 5 inches long. Dr. MacFarland informs me that this species is quite common in Monterey Bay and ranges much larger, almost up to 10 inches in length.

*Navanax inermis* Cooper. Black, yellow lines, blue spots, yellow edges. About two inches in length. Another specimen possibly may be the same species, black with yellow spots. Apparently the same form occurs at Balboa.

*Aglaja (Doridium) purpureum* Berg.? Brown, dredged 10 to 15 f.

### NUDIBRANCHS

*Triopha* sp. Large, brown. Holdfast.

*Flabellina iodinea* Cooper. Narrow blue body, red appendages. Swims by lateral movements of the body. This beautiful nudibranch was first found near Laguna by Miss M. Cate, not far from Dana's point in 1916. In Jan. 15, '18, Mrs. May found a number near Laguna Beach.

*Dirona picta* MacF. Light brown, long thick appendages. Holdfasts and tidepools common in 1915.

*Aegires* sp. Knobs. Brick red, body clear.

*Chromodoris universitatis* Cock. Blue, yellow spots.

*Polycera atra* MacF. Red-brown, black stripes, brown spots. July 10, 1915.

*Facelina* sp. Body clear, appendages dark.

*Ancula pacifica* MacF.? Clear white, two yellow lines in front, one behind. Front appendages and two lateral tipped with yellow.

*Cadlina* Sp.? Dark brown, flattened.

*Aeolidia* sp. White to pink, appendages brown.

W. A. H.

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## Central Nervous System of the Sand Dollar *Dendraster Excentricus* Esh

[Pg 35]

WILLIAM A. HILTON

There seems to be little or no literature on the central nervous system of this form of echinoderm. As might be expected, the general arrangement of radial and circumoral bands are much as in sea-urchins, such as shown especially by Delage and Herouard 1903. There are however some interesting features which make the study of this type of special value.

In this paper only the chief mass of the central nervous system is considered. The more evident parts of the central nervous system are arranged in general as in other forms. The circumoral nerves issue from under the lantern and run along the oral, cross over at the edge of the shell and then run along the aboral side. The five radial nerves converge at the five ocular areas near the center of the aboral region. The circumoral nerve ring is looped over and under parts of the lantern. Fig. 1 shows a part of the lantern and parts of three loops of the circumoral nerve trunk. In the center of the figure one fifth of the lantern is drawn in and from under it a radial nerve is shown in the lower part of the figure. To the left and to the right of the central bony part of the lantern the union of a radial with a circumoral nerve is shown. At the junction of each radial nerve with the circumoral, is a little thickening which seems to be a special cellular mass such as I have not found in other forms. Fig. 7 is a section through a part of a circumoral strand, much enlarged. There are only a few nerve cells, from one to two layers.

As the radial nerves leave the lantern they are quite evident in dissected specimens as they are close to the bony skeleton with very little connective or other tissues to obscure them. The use of aqueous methylene blue aids in following the smaller branches. Near the lantern the branches are small as shown in fig. 2. When the region is reached where the upper and lower surfaces of the shell begin to fuse, the branches become larger and more irregularly arranged, as shown in the lower part of fig. 1 and fig. 2. After the nerve turns to run on the aboral side there is no change in arrangement until the region of the tube feet is reached. In the region of the tube feet the nerves become more numerous, smaller and more regular. The general distribution of the nerves and the arrangement of the tube feet nerves are shown in fig. 4 which is from part of the upper end of the aboral nerve. The holes in the skeleton for the tube feet are shown as circles on each side of the diagram.

The general structure of the chief central nerve trunks is quite similar as shown in sections. Figs. 6, 7 and 8. The nerve trunks have about one to two layers of cells, the main part of the nerves are composed of longitudinal fibers. There are not so many evident vertical fibers from cells as found in starfish and some other forms. This change in position of the fibers may be in part due to the general modification of structure. Whether this arrangement leads to other types of nerve association is a question.

When the nerve trunks are removed, stained in methylene blue and examined with the microscope something of the arrangement of the cells may be seen. In the circumoral and oral radial nerves the nerve cells are thickly massed from side to side, but in the upper part of the aboral nerve there is an evident arrangement of nerve cells in zones. There is usually a central more or less clear zone, next on each side a rather dense cell area and next on each side a very dense cell area, then a narrow nearly clear zone on each side again.

[Pg 36]

As a rule slightly larger cells are found near the nerve trunks and as some of these seem to send long branches out into the lateral trunks, they may be motor or sensory, the association neurones are probably the smaller cells in farther. The cells seem multipolar in most cases and in fact much more modified than the cells of starfish or sea-urchin. Figs. 9 and 10.

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## REFERENCES



<i>Delage and Herouard</i>	1903
Traité de zoologie concrète. T. iii. Les Echinoderms.	
<i>Hamann, O.</i>	1887
Beitrage zur Histologie der Echinodermen. Jenna Zeit. Nat. W. xxi.	
<i>Hilton, W. A.</i>	1917
Some remarks on the nervous system of two sea-urchins. Jour. ent. and zoo. vol. ix, no. 4.	

(Contribution from the Zoological Laboratory of Pomona College)

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### Explanation of Figures

Fig. 1. Diagram of one fifth of Aristotle's lantern of *Dendraster* showing three loops of the circumoral nerve ring, and parts of three radial nerves, the central one partly hidden at its origin by the lantern. The nerves are in black. ×9.

Fig. 2. Drawing of part of the first part of an oral radial nerve. ×9.

Fig. 3. Drawing of the lower end of an oral radial nerve. ×9.

Fig. 4. Drawing of the upper part of an aboral radial nerve. The eye spot region is up in the figure. ×9.

Fig. 5. Camera lucida drawing of a part of an aboral nerve showing position of cell areas. ×70.

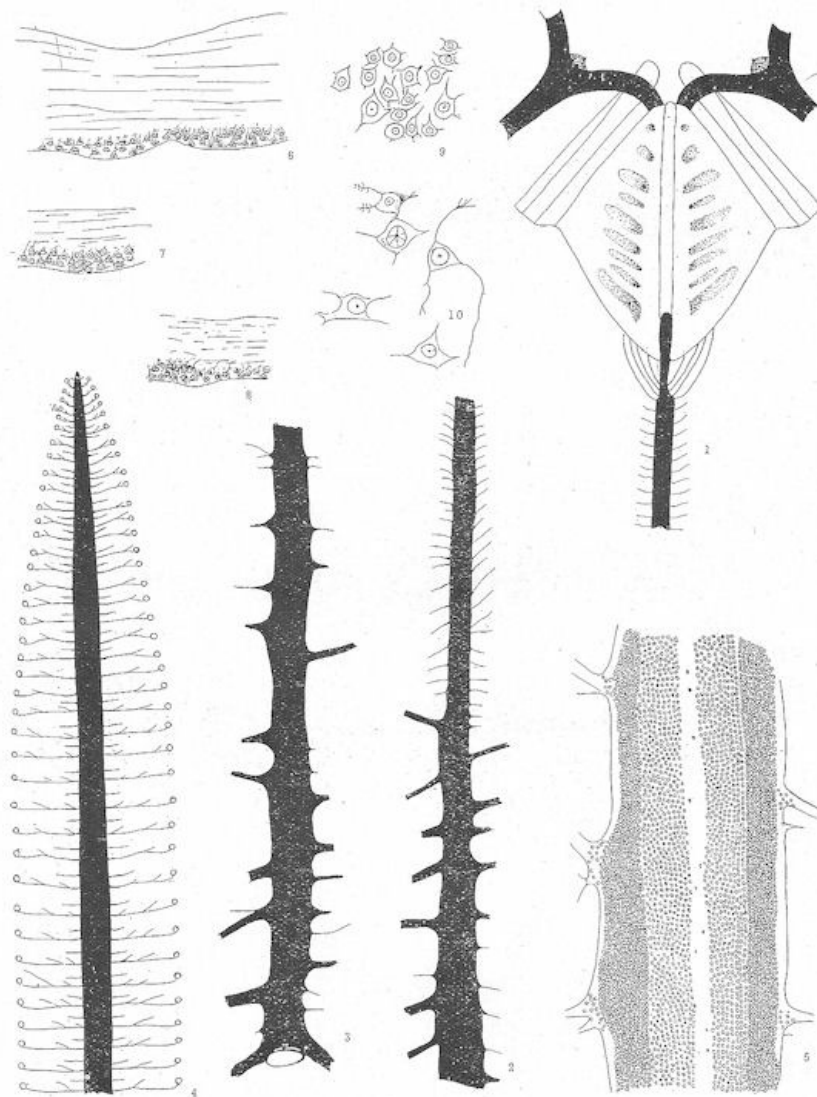
Fig. 6. Drawing of a section of an oral radial nerve. ×300.

Fig. 7. Drawing of a section of circumoral nerve. ×300.

Fig. 8. Drawing of a section of aboral nerve. ×300.

Fig. 9. Nerve cells from central regions of a radial nerve. The arrangement is as shown in the drawing, cells of various levels shown as one layer. Some of the processes possibly relate nearby cells, but most fibers run into the general fibrous mass. All fibers or fibrils are small. There is some indication of tigroid substance in some of the cells. ×450.

Fig. 10. Nerve cells from near a lateral branch from the radial band. ×450.



## Ants from the Claremont Laguna Region

[Pg 38]

This list includes ants collected chiefly in 1917. All determinations are by Dr. W. M. Wheeler.

*Novomessor andrei* Mayr. red var. Also some dark. Claremont.

*N. pergandei* Mayr. Medium, dark colored. Claremont.

*Pogonomyrmex californicus* Buckley Claremont.

*Pheidole longipes* Pergande Claremont.

*Pediole* sp. Claremont.

*Crematogaster lineolata* Say. Subsp. *californica* Emery. Claremont.

*C. l.* Say. subsp. *corctata* Emery. Claremont.

*Solenopsis molesta* Say. var. *validiuscula* Emery. Claremont.

*S. geminata* Fab. var. Claremont.

*Liometopum occidentale* Emery. Mts. and Claremont.

*Iridomyrex pruinosus* Roger var.  *analis* Ern. André.

*I. humilis* Mayr (Argentine ant) Claremont.

*Dorymyrmex pyramicus* Roger var. Claremont.

*Prenolepis imparis* Say. Below Aliso canon, Laguna Beach and Claremont.

*Tapinoma sessile* Say. Laguna Beach.

*Myrmecocystus melliger* Forel var. (Honey ant) Claremont.

*M. mexicanus* Wesm. sub sp. *mojave* Wheeler (Honey ant) Claremont.

*Formica rufibarbis* Fb. var *occidua* Wheeler. Claremont.

*F. cinerea* Mayr. subsp. *pilicornis* Emery. Claremont.

*Camponotus (Myrmoturba) maculatus* Fb. subsp. *vicinus* Mayr. var. *luteangulus* Wheeler. Claremont.

W. A. H.

(Contribution from the Zoological Laboratory of Pomona College)

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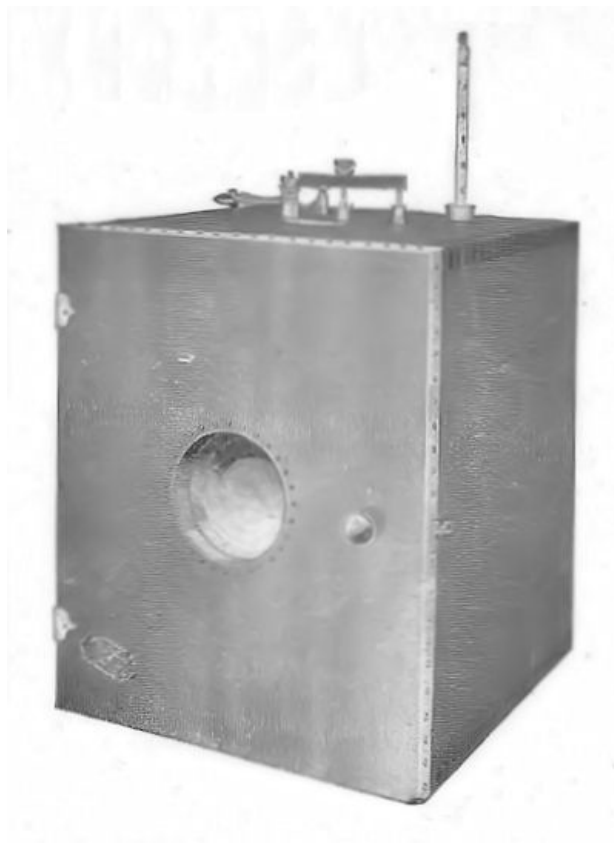
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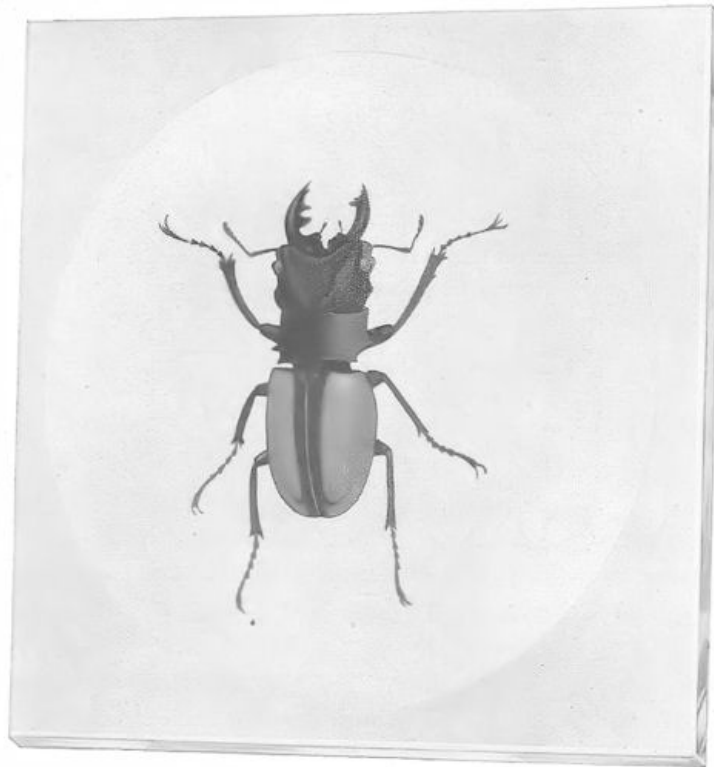
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Located in one of the most healthful and beautiful parts of the west coast. The mountains reach an elevation of ten thousand feet within a few miles of the college and these with the nearby ocean afford many special advantages for the study of things not in books. Special advantages are afforded by the fact that the college limits its attendance, the freshman class being restricted to two hundred applicants. The success of the college is particularly indicated by the large proportion of the graduates who proceed to advanced work in the large universities. In addition, well-manned departments of music and art afford exceptional advantages.

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### Transcriber's Note

- Punctuation errors have been corrected.
- Pg 29 Corrected spelling of "losely" to "loosely" in "... of fine strands losely ..."
- Pg 34 Corrected spelling of "lilnes" to "lines" in "... two yellow lilnes in front ..."
- Pg 36 Accent corrections on reference for "Traité de zoologie concrète"
- Pg 38 Corrected spelling of "say." to "Say." in "... say. subsp. ..."

\*\*\* END OF THE PROJECT GUTENBERG EBOOK JOURNAL OF ENTOMOLOGY AND ZOOLOGY,  
VOL. 11, NO. 2, JUNE 1919 \*\*\*

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