

A PRELIMINARY STUDY ON DODECACERIA PACIFICA (FEWKES)

In various areas along the coast in the vicinity of Monterey there are many colonies of the Polychaete worm Dodecaceria pacifica. An attempt has been made to find out something of the distribution, size, structure and the flora and fauna associated with these colonies.

Introduction

Dodecaceria pacifica (Fewkes) is a Polychaete worm belonging to the family Cirratulidae. The worm range in size from 12 mm to 38 mm averaging around 23 mm. There are 60 to 100 well marked segments of the body. Immediately behind the rather narrow prostomium is a pair of grooved papillae. Situated behind the papillae are 4 to 5 pairs of tentacular cirri each pair slightly dorsal to the preceding pair. There are no eyes.

The color in life is a dark greenish or brownish black.

The worms form a colony of calcareous tubes, greyish white, in dense masses forming a matrix riddled by tortuous galleries.

The worms and colonies studied were found at Pescadero Point, Salinas, Point Pinos, China Point, Monterey Boat works beach and the Monterey Boat Harbor.

Colonies were collected, worms, tubes and colonies measured and dissected.

Distribution

Colonies are found in two different localities. The first of which I call the Open Coast areas used by Ricketts and Calvin to designate places such as Point Pinos, Pescadero Point, etc.

In this type of locality the colonies are fewer, smaller and less prominent than ones found in the second type, the Protected Open Coast area.

Colonies ^h were tend to be on the back sides of rocks facing away from the open sea or in crevices in tide pools.

The range of occurrence is from about the middle of zone 2 to a few colonies in zone 4. (Plate I Fig. 1.) The most abundant numbers being in zone 3. The Ricketts and Calvin zonation is here used.

Colonies do not seem to occur in the flat tide pools which are choked with sea-weed.

The Monterey Boat Harbor and the Monterey Boat Works beach near China Point are examples of the Protected Open Coast. It is in these areas where numerous prominent colonies are found.

The range of occurrence is from about lower zone 1 to lower zone 4. (Plate I Fig. 2) Colonies in lower zone 2 and upper zone 3 seem to attain the greatest size. In the lower zones the colony mass often covers or encircles a rock completely. In the higher zones the colonies tend to face the ocean and be located on one side of the rock only.

It seems probable that the Protected Open Coast

offers the correct conditions of exposure to wave shock which allow for strong development of the colonies. Apparently the wave shock prevalent on the Open Coast restricts the growth of large outstanding colonies.

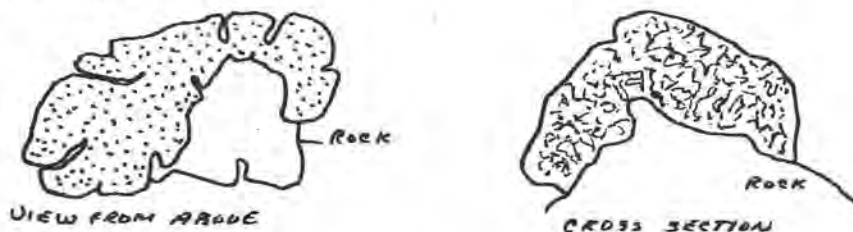
Colonies were much more numerous per unit of area in the Protected Open Coast localities than out on the Open Coast. In the Monterey Boat Works area approximately 165 colonies over 2¹/₂ feet square were counted along a 300 yard front of the intertidal. Location of colonies in the Open Coast was very spotty ranging from 15 to 20 colonies per 300 yards along the intertidal. (Plate I Fig. 3)

Form and Size

There are generally two types of colony formation. The first is a relatively thin encrusting type typically found in the more exposed areas such as the Open Coast. The colony is found more often in crevices and cracks and on the shore side of rocks.

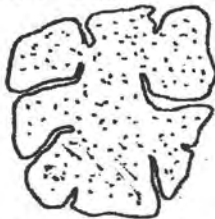
These colonies are smaller than ones in the more protected areas, ranging from about 6" X 6" X 1¹/₂" to 2¹/₂' X 2¹/₂' X 3".

The second type is larger, rounded and very prominent. Colonies often are rather kidney shaped circling or covering the rocks.



Some colonies may become very large. One near the old marine track in the Monterey Boat Works area

completely covers a large rock and measures $88\frac{1}{2}$ " X 57" X 47" looking like this from above:



There are about 10 colonies in this area measuring over 36" X 30" X 20".

The colonies measured in the Boat Harbor averaged somewhat smaller about 20" X 15" X 10", although one dead colony was 60" X 38" X 16".

One rock had a group of 7 colonies massed upon it which described an 18 foot arch 4 feet wide and 4 feet deep.

About 5 out of every 12 colonies had dead spots of from 3" to 6" in diameter on their surfaces. The seaweed Ulva was invariably found in these spots. From observation it seems reasonable to assume that wherever the Ulva gets a foothold sand and mud accumulates in the holdfast and kills the worms inhabiting the tubes underneath. These dead spots were observed to be mostly on the shore side of the rocks where the wave shock tends to be minimized.

Structure

The tubes constructed by Dodecaceria are for the most part calcareous as indicated by treating samples from all areas with hydrochloric and acetic acid.

The colony is attached to rock and except for one case appears to always use rock as a substrate. One small colony was found attached to the concrete piling

of the Monterey Muncipale Wharf about in Zone 3.

The colony seems to be constructed in tiers or galleries of tubes. The galleries below the outermost are about 5 to 8 centimeters deep and appear to be closed off from higher and lower galleries. When examined most tubes were found not to travel from the perimeter to the center. The lower galleries were also always dry and clean. The worm resides in the outermost gallery.

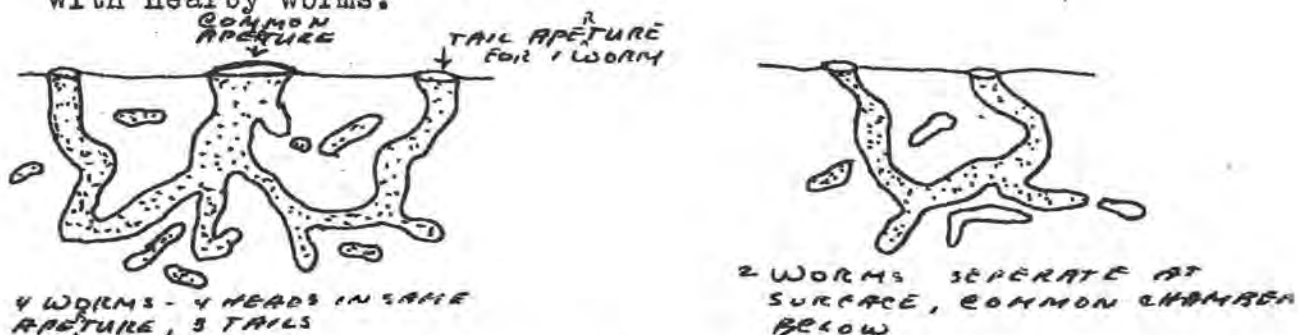
The tubes are very winding and tortuous. Length averaged 15 mm in depth and $1\frac{1}{2}$ to $3\frac{1}{2}$ mm wide.

Various cuts were made into many different colonies and measurements were taken. In $2\frac{1}{2}$ weeks no discernable evidence of rebuilding or repair has been noted.

It was found that the worms occupy a "U-shaped" position in the tube. Head and posterior position both sticking out of the tube when under water. Commonly head and tail of a worm utilized the same aperture but in many cases the posterior portion of the animal has its own opening to the outside. This position in the tube no doubt is necessitated by the fact that Dodecaceria has no means of clearing the tube of fecal material if it were to be deposited in the tube.

A varying number of worms were found inhabiting the same tube. The range was from 1 to 4 the average number being 2 per tube. (Plate I Fig. 4) In some cases all of the worms had separate openings for the tails, in other cases every worm was doubled back on itself and the posterior part was in the same opening as the head. There were also some cases where both conditions existed.

About 3 out of 10 tubes contained one individual, the middle of the body often sharing a common chamber with nearby worms.



In measuring 10 sets of 3 worms inhabiting the same tube it was found that the variation in size of the worms in one tube was relatively small. The average difference in length being 3.4 mm. These samples were taken from different colonies coming both from the Open Coast and the Protected Open Coast.

Lengths of Worms in Millimeters in Same Tube

Worm #	1.	14.0	1.	16.5	1.	23.0	1.	18.5	1.	34.5
	2.	13.5	2.	17.0	2.	19.5	2.	18.5	2.	29.5
	3.	15.0	3.	15.0	3.	21.0	3.	19.0	3.	31.0
Range of Difference		1.5		2.0		3.5		0.5		5.0
Worm #	1.	22.0	1.	27.5	1.	27.5	1.	19.5	1.	22.5
	2.	17.5	2.	26.0	2.	25.5	2.	20.0	2.	26.0
	3.	22.5	3.	27.0	3.	24.0	3.	24.5	3.	29.0
Range of Difference		5.0		1.5		3.5		5.0		6.5

Average of differences 3.4 mm.

These facts seem to indicate that perhaps the inhabitants of these tubes are not parents and offspring.

This of course doesn't answer the perplexing question of how new individuals are added to the colony but might indicate at this time of year new individuals aren't being budded off.

(1974)
Hartman states that Dodecaceria pacifica is

epitokous as is the European species D. concharum.
 No signs indicating worms in an epitokous state were
 found. However it would be necessary to observe worms
 the year round to obtain more information on this subject.
 Neither the Berkeleys^(1941, 1942) nor Moore⁽¹⁹⁰⁷⁾ give any information
 on this subject, restricting themselves to a description
 of the species.

It seems to me that with more time and more extensive
 methods this subject of reproduction in Dodecaceria
 would be very illuminating and profitable.

The manner of feeding also needs further and more
 intensive investigation. Worms obtained from the Boat
 Harbor were seen to defecate strings of cleaned sand
 bound with mucus. The castings of worms from the
 Open Coast were green and seemed to contain organic
 material. However it should be stated that I was never
 able to see any of the worms actually ingest either
 sand or plant and animal material.

Associated Plants and Animals

Many animals and a few plants were found living on
 the colonies. Only two animals the Spionid worm
Boccardia natrix and the Polynoid Phyllochaetopterus
prolifera both Polychaete Annelids were found in the
Dodecaceria tubes or in tubes of their own between the
 tubes of the colony.

- | | |
|-----------------------|-----------|
| Plants | *Abundant |
| * <u>Ulva lactuca</u> | |
| <u>Endoclista</u> sp. | |
| Coralline Algae | |

Animals

Coelenterates

Aglaophenia sp.

Bunodactis elegantissima

*Metridium dianthus

*Anthopleura sp.

Nematods

Various unidentified specimens

Nemertina

Amphiporus imparispinus

Gephyrea

*Physostoma aggazzi

Urochordata

Amarocidium californicum

Macroclinum pellucidum

Mollusca

Mopalia ciliata

Littorina planaxis

Acaea pelta

Thais emarginata

Mytilus californianus

Kellia sp.

Arthropoda

Insect larvae

Mites, 2 types unidentified

Crustacea

Ostracods

Copepods

Ampithoidae sp.

colonies at different places along the coast.

3. There are at least 2 different types of colony formation.

4. The structure of the colony is very complex.

5. More than one worm may inhabit a single tube.

6. There are many plant and animal associates.

It is evident that there are many questions which need study such as, the reproduction of these animals, feeding mechanisms, how new members are added to the colony, whether or not the worms inhabiting the 2 colony forms are of the same species.

Further investigation would doubtlessly be very profitable.

BIBLIOGRAPHY

- Berkeley, E. "Polychaetous Annelids from the Nanaimo District". Part 4. Chaetopteridae to Maldanidae." Studies from the Bio. Stations of Canada. Vol. IV No. 22 Univ. of Toronto Press
1929
- Berkeley, E. and C. "On a Collection of Polychaetes from Southern California." Bull. of Southern Calif. Academy of Sciences Vol. XL Part 1
1941
- Berkeley, E. and C. "North Pacific Polychaetes, Chiefly From the West Coast of Vancouver Island, Alaska and the Bering Sea." Canadian Jour. of Research Vol. 20
1942
- Hartman, Olga. "The Polychaete Annelids of the Littoral Zone of the Pacific Coast". Ph. D. Thesis
1936
- Light, S. F. "Laboratory and Field Manual in Invertebrate Zoology". Assoc. Students store Univ. of Calif.
1941
- M'Intosh. "Notes from the Gutter Marine Laboratory St. Andrews. On the British Cirratulidae". No. XXXII Annals and Magazine of Natural History Series 8 Vol. 7
1911
- Moore, J. P. "Polychaetous Annelids from Monterey Bay and San Diego California". Proceedings of the Academy of Natural Science of Calif.
1909

PLATE I

Distribution

