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THE NAUTILUS

A QUARTERLY JOURNAL
DEVOTED TO THE INTERESTS
OF CONCHOLOGISTS

VOL. XXXIII
JULY, 1919, to APRIL, 1920

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14/11/21



SHELLS OF LA JOLLA, CALIFORNIA.

BY C. R. ORCUTT.

My acquaintance with La Jolla dates back to 1879, when there was not a human habitation on the coast from San Dieguito on the north to the old lighthouse, 500 feet above the beach, at the extremity of Point Loma at the entrance to San Diego Bay. Now there are several flourishing towns along the way, the delight of summer and winter tourists, among whom not a few have been conchologists.

Taking charge of Hotel Strand at La Jolla in July, 1918, I have since busied myself quite as much with the molluscan fauna of La Jolla as with the hotel business, with some interesting results.

Mr. Maxwell Smith has contributed a list of La Jolla shells to THE NAUTILUS (volume 21, pages 55 and 65), and Mr. Joshua L. Bailey, Jr., has contributed a supplementary list (on page 92). A few additional notes may be of interest.

Haliotis fulgens.—In the spring of 1916 San Diego was visited with great floods, and a great amount of silt was washed into the ocean via San Diego and False Bay with the fresh water. This proved to be fatal to many mollusks, and I am told that many thousands of this shell were washed up along the shore from False Bay to La Jolla. One gentleman told me that a train of cars could have been filled with these shells which were piled a foot deep on the beach in many places. Another filled two sacks with the shells and nearly broke his back tugging them to the top of the cliff at what in early days we called Seal Rock, now named Bird Rock Beach. These he has finally placed at my disposal, and I found the two sacks full chiefly of this species. *Haliotis cracherodii* and *H. rufescens* were missing, as well as *H. assimilis*. Out of the lot I found six specimens of the following species and nine specimens of its variety.

Haliotis corrugata.—These were not very strongly corrugated, but properly referable to the species.

Haliotis corrugata diegoensis.—This form differs in the entire lack of the corrugations typical of the species, but otherwise

with nearly the same characters. All of the corrugated specimens possessed three holes, while of the nine specimens of this variety one had one hole, two had two holes, and the rest had three.

Haliotis californiensis.—The Japanese gardeners at La Jolla are good fishermen also, and frequently gather abalones for the meat. One of them gave me a specimen which for lack of a better name I have given the above name. It is $5\frac{1}{4}$ inches long, $4\frac{5}{8}$ across, 2 high, and has 11 small nearly circular holes outside, showing traces of two closed holes. The inside contains a large "pearl" or muscular impression, triangular in shape, and instead of the clear pearly white of *H. cracherodii*, there are large blotches of brown, green, blue and pink iridescence. I have had many similar specimens from the west coast of Baja California, which have never been determined to my satisfaction. Dr. Stearns I believe tentatively referred them to the above species of Swainson.

Caecum orcutti Dall.—This seems to be absent from the lists given in THE NAUTILUS. The type locality was at a point about two miles south of La Jolla's caves, where under a flat rock I must have found more than 100,000 examples of this minute species. I have sent the U. S. National Museum what I estimated as near 50,000 specimens, which I believe breaks the record for any single collection in this genus. It has been found at San Pedro, Cal., I believe, and at Todos Santos Bay, Baja California.

Helix pisana.—This snail has been recorded in THE NAUTILUS as from La Jolla (though not in the lists referred to above). The first of September, 1918, I found it for the first time, and reported its occurrence as a menace to California horticulture. A representative of the County Horticultural Commission counted nearly 800 living on one bush about a foot high with a spread of three feet. A dozen would frequently be found on one stem of the wild oak. It seemed to have no preference, but was abundant on native and cultivated plants alike, and thousands were observed on the sides of the cement curbing and on the sides of houses near by. But the tens of thousands observed were apparently confined to a district less than half a

mile in extent in any direction. The authorities attempted their destruction, but I have noticed hundreds yet remaining alive. It was first reported to our local society of natural history in 1914, when three specimens donated were "all that could be found."

Bifidaria hemphilli.

Bifidaria calamitosa.

Vertigo californica diegoensis.

Some years ago Mr. Henry Hemphill told me that there were no Pupae in this region, stating as his belief that they could not exist in our arid climate. Then I found a few under the stem of a decaying yucca on the mesas back of San Diego, and later more than 500 under some decaying cacti in the same vicinity. Still later individuals were found not at all rare on decaying plants on the seashore not far south of La Jolla, chiefly on the Hottentot Fig or Beach Strawberry (*Mesembryanthemum æquilaterale*). These were found at Pacific Beach and no doubt exist within the limits of La Jolla, if one will search with care.

Helix traskii Newc.

Helix tudiculata Binn.

These are apparently not rare in the environs of La Jolla. The first was not previously reported.

Helix aspersa Müll.—Mr. Smith reports that he turned a few dozen of these loose at La Jolla. They now exist by the tens of thousands and are very destructive to the vegetables in the gardens. Some way should be found to make Mr. Smith take them away. It seems to be a different form from the one now naturalized in San Diego gardens, where it is also a much hated pest.

Mytilus californianus.—*Modiolus californiensis* of Smith's list was doubtless an error for the above, which occurs plentifully on our coasts. Just south of the international boundary this species has yielded many pretty pearls. The larger shells measure about seven inches long.

Schizothaerus nuttallii.—This favorite clam was formerly abundant in a bed of rocks just inside the entrance to False Bay, which was formerly the home of many choice shells. This was the type locality of *Chlamydoconcha orcutti*, since reported from Monterey Bay by Dr. Berry.

Semele decisa, *Saxidomus nuttalli* and other bivalves were equally abundant, but now nearly exterminated. A list of the mollusca from this bed would be extremely interesting, but now hopeless of ever being written, as it is no longer the ideal home for mollusks that it once was. Over 100 *Cypraea spadicea* were found there in one day, and an equal number of *Ranella californica* were yielded by the adjacent sandy beaches. While the shells from this lagoon do not properly belong with the La Jolla list, yet fragments or dead specimens of all noted by Mr. Smith may occasionally be found at La Jolla.

Tagelus californianus.—This is extremely abundant in False Bay and is gathered in quantities for bait by fishermen, and thus the shells are scattered freely all along the La Jolla shores.

Pedipes unisulcata.—Smith reports many of the dead shells attached to sea anemones, but I found it years ago in company with *Truncatella stimpsoni* on round water-washed boulders in caves near La Jolla.

Pedipes liratus.—This was also found at La Jolla in early days and later by Prof. Kelsey.

Milnerea minima.—Abundant. Attached to the under side of stones. Usually reported as living on the shells of *Haliotis*.

Mytilus adamsianus.—This was long called *M. bifurcatus*, later known as *M. stearnsi*. Smith and Bailey, like many other collectors, seem to have overlooked it, probably mistaking it for the young of *Septifer bifurcatus* which it nearly resembles, except for the absence of the septum. It is equally abundant.

Mytilus denticulatus.—This is similar to the last but much smaller. It is *Modiolaria denticulata* of former lists, and might easily be overlooked, but is apparently not rare on our rocks.

Adula diegensis.—North of the Scripps Biological Station about a mile north of La Jolla is a rocky beach at the base of high cliffs. Much of the rock is a soft clay stone, and perforated by millions of pholads. In places this species has entire possession, and often they have made their cells so close together that no partitions of rock are left to separate the shells.

Pholas pacifica.—This is one of the pholads found at the above station with others already noted.

Petricola denticulata.—This is extremely abundant in the

above locality also, square yards of surface of some of the flat rocks being filled with its shells. This species seems to abound from San Pedro, Cal., to Magdalena Bay, Baja Cal., where I found millions of the young shells in the drift (determined by Dr. Dall).

Acmaea patina cumingii.—This is the commonest species at Bird Rock and all along our coast, but seems to have been overlooked by Smith and Bailey.

Tegula ligulatum.—One of the commoner shells on all our beaches.

Pecten hastatus.—In kelp holdfasts washed ashore at Pacific Beach.

Pecten hericeus.—Valves frequent in the drift.

Phacoides californicus.—Frequent in the drift on all our beaches.

Phacoides richthofeni.—Valves occasionally washed ashore. Mr. Emery found it living in False Bay.

Fissurella volcano.—This is probably one of the most abundant and widely distributed species on our coast. I have generally looked with contempt on the gathering of dead shells; but for lack of better material I have gathered several thousand of this from the drift, from very minute to specimens of maximum size. It occurs from Monterey, Cal., south at least as far as Salina Cruz, Oaxaca, where I have collected it in abundance. The beach-worn shells show a beautiful diversity of color not observable in the living shells. About fifteen per cent. of the shells picked up at La Jolla are of the var. *crucifera* Dall, sometimes the arms of the cross extending only halfway down the sides of the shell, sometimes wholly worn away at the apex, often one or more arms missing; in young specimens, say 2 mm. long, frequently only the lateral white arms appear halfway to the lower margin of the shell. The ground work is usually reddish, the gray or black forms being much rarer. From the four white arms of var. *crucifera* there occurs every variation in number up to 20 or 30 or more, the red rays on a white ground—like red-hot lava flowing down the sides of a mountain, having given it its name. This is probably the typical form.

Acmaea triangularis.—One specimen detected in the drift on the beach.

Calliostoma supragranosum Cpr.—Detected in kelp holdfasts.

Cyanoplax hartwegii.—Perhaps our commonest chiton, on rocks near high-water mark, strangely omitted from Smith's list.

Columbella fuscata.—One specimen was found living years ago, but no doubt stray from southern waters as well as a single well-developed living specimen.

<i>Thais biserialis</i> , not rare.	<i>Saxicava arctica</i> .
<i>Corbula luteola</i> , not rare.	<i>Saxidomus nuttallii</i> .
<i>Crepidula rugosa norrisianum</i> .	<i>Terebratella transversa</i> .
<i>Crepidula unguiformis</i> .	<i>Thracia curta</i> .
<i>Crepidula dorsata</i> .	<i>Thracia squamosa</i> .
<i>Hipponyx antiquatus</i> .	<i>Transennella tantilla</i> .
<i>Hipponyx cranioides</i> .	<i>Turbonilla castanella</i> .
<i>Hipponyx tumens</i> .	<i>Odostomia aequisculpta</i> .
<i>Kellia laperousii</i> .	<i>Venerupis lamellifera</i> .
<i>Kellia suborbicularis</i> .	<i>Mactra californica</i> .
<i>Modiola capax</i> .	<i>Mactra falcata</i> .
<i>Mytilimeria nuttallii</i> .	<i>Mactra nasuta</i> .
<i>Pecten latiauritus</i> .	<i>Mactra planulata</i> .
<i>Psammobia californica</i> .	<i>Phacoides nuttallii</i> .

The above are some of the shells omitted from the lists referred to that I have noted on the beach, quite a number of them in kelp holdfasts washed ashore.

A considerable number of minute shells yet undetermined will add considerably to the list, besides several chitons and larger shells that are being studied.

LA JOLLA, CAL., 21 Dec., 1918.

LAND SHELLS OF LAUREL SPRINGS, NEW JERSEY.

BY E. G. VANATTA.

The following species of land shells were picked from forest debris collected by Mr. Bayard Long on the north branch of Timber Creek, at Laurel Springs, Camden County, New Jersey, during 1918 and 1919.