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(The Occident, 1894.p.16)

A SUMMER OF ZOÖLOGICAL COLLECTING.

Owing to the absence of Prof. Ritter the seaside laboratory at Catalina Island was not opened this year, as was formerly intended. Instead it was decided to send out a small expedition to collect zoological specimens of which the biological laboratory stood in considerable need. As quite a little collecting

has been done along the coast south of San Francisco, it was deemed better to work on the coast north where very little zoological collecting has been done. A sum of money was granted by the Regents sufficient to defray the expenses of the expedition. The general plan of the trip was to start from Eureka and drive down along the coast road to San Francisco, stopping at the points likely

to furnish the material desired. Our party consisted of Mr. Bancroft, Mr. Horn and myself.

We obtained a horse and wagon and, besides our camping outfit, about one hundred jars of different sizes, 10 gallons of alcohol, a dredge, tow net, slip net, grappling hook, trays of various sizes, guns, ammunition, re-agents for killing, fixing, and preserving small animals, and various other articles too numerous to mention; the whole making a wagon load of astonishing proportions, which must have made the heart of our worthy steed sink when he saw it for the first time. We embarked on the steamer for Eureka, on May 23d, and had the good fortune to meet several people who became much interested in our undertaking and who were afterward the means of rendering us valuable assistance in many ways. Upon our arrival at Eureka we decided to travel northward about forty miles to Patrick's Point, which we were told was an excellent place for collecting.

The first day of our stay in Humboldt county was so fine that at night we decided not to pitch our tent but sleep out under the open sky. About midnight we were awakened by a downpour of rain. This was hardly pleasant, but it was a fitting introduction for what came after, for the rain continued with slight intermissions for about three weeks. Camping on wet ground, trying to build fires out of wet wood, and worst of all, being almost continually wet ourselves tended to cast a gloom, as Bill Nye would say, over the proceedings; however, it did not deter us greatly from our work.

A large share of our collecting was done among the rocks at low tide. The coast of Humboldt and Mendocino counties is bold and rocky, and at many places, when the tide was out one, could go out a long way on the rocks. Places like these are the best collecting grounds. Much material is to be obtained from the sides and upper surface of the rocks, such as tunicates, starfishes, chitons, sponges and polyps; while clinging to the underside are usually many animals quite different; while in the sand underneath are to be found still

others. The number of animals dwelling in a single small rock is often surprising and they are not all seen at a glance. The best plan in collecting is to confine your attention, for some time, to a very limited territory. Then change to a different locality until that is well hunted out, and so on.

At Patrick's Point we found the collecting good and spent several days there. Here we found several specimens of the large chiton, which grow to about a foot in length and are five or six inches broad—a veritable giant among chitons. The segments of the shell are sometimes washed up on the beach and are popularly known as "butterfly shells." From Patrick's Point we proceeded to Trinidad, where there is a quiet little harbor. We tried dredging in the harbor, but the bottom was so rocky that we were obliged to give it up. The surface of the water, especially when the tide was coming in, was swarming with beautiful salps, both sexual and asexual forms. We secured a large number of these interesting animals.

Humboldt Bay was our next collecting place. This bay much resembles the bay of San Francisco, having a narrow entrance, long arms running north and south, all surrounded by mud flats. We camped at the southern end of the bay on Mr. Knight's ranch, where we were treated with great hospitality. We were given a cabin to work in, which greatly facilitated our work. We dredged a good deal and got an abundance of material not met with before. The eel grass which covers a large part of the shallower portions of the bay is very full of life, and by hauling the dredge over it a great deal of material was gathered. Often three or four hours' work in the morning would bring material enough to keep us busy the rest of the day. Many forms simply required to be put in alcohol, but more required considerable preliminary treatment. This consists in first killing and then piping. Many forms, such as anemones, polyps, undibranch mollusks, if not killed in the proper way will contract, or withdraw their tentacles in such a way as to become comparatively useless specimens.

Some therefore have to be killed very slowly; others are best killed very rapidly, so that they have not time to distort their shape. In the latter case they are often treated with very strong acetic acid or plunged for a moment in a hot solution of corrosive sublimate. Some animals are so delicate that it is next to impossible to make good preparations by any method. The colors of many are almost impossible to preserve. Conspicuous among these are the undibranch mollusks. We collected quite a number of species of these, the colors of many being rich and beautiful in the extreme, but we were able to preserve none of them in their original beauty. Notwithstanding their beauty our California undibranchs have received little attention; for no amount of beauty can entice the modern zoologist to follow the scent of a significant anatomical detail.

From Humboldt Bay we had to travel several miles inland, as there is no road near the coast. The hills of Humboldt County are something prodigious—in fact there is nothing but hills there. The roads are for the most part cut out of the hillsides, and are narrow but tolerably good, with the exception of the inclination. There are numerous streams; all those of sufficient size abound in trout. Deer hunting is very good, and there is a fair amount of other game.

We trapped and shot a number of mammals, and made several skins and skeletons. Mr. Bancroft usually hunted birds along the way, and spent the evenings and other odd moments in preparing skins. We walked most of the time, so as to be better able to secure snakes, amphibians, land shells and other zoological specimens met with along the way.

The climate of Humboldt county is well adapted to amphibians and we secured quite a good collection. It was not entirely an ill wind. We touched the coast again at Cape Mendocino, an excellent place for collecting, and were fortunate enough to have particularly favorable tides, and hence found many new animals. There are large numbers of seal there; an unfortunate one that had been

washed ashore had to yield up his bones to the cause of science.

Cape Mendocino well rewarded our three days stay there. From the cape we had to go back into the hills and the giant redwoods once more. I cannot give an adequate description of the beauty and grandeur of much of the scenery we passed through in the redwood forests, nor shall I try. It was with great regret, however, that we left the forests for the more barren country further south.

We touched the coast again at Shelter Cove, a small port for shipping. The harbor was quiet and we dredged a little, but work among the rocks was more profitable. Many new things were found here, too, especially tunicates which we found in greater abundance as we traveled south. There we made the most valuable find of the whole expedition. An animal for which considerable search has been made on this coast in vain, and for which all of us were watching. This interesting creature is a species of *Balanoglossus*. People in America usually do not take much interest in tracing out their remote ancestry, and hence it may be that many of the readers of the OCCIDENT do not know what a *Balanoglossus* is. In general appearance it resembles a worm, but is much different from the worm in its essential structure. There are many striking points of resemblance both in its anatomy and its mode of development to the vertebrates, and it is due to this fact that this animal is of so much interest to the biologist. Last summer Prof. Ritter found a new larval form of *Balanoglossus*—a little free swimming ciliated animal—at Catalina. Whether the form we found is the adult of the same species is open to doubt. We secured but one specimen, although we were three or four days searching for others.

From Shelter Cove we had to go back for five miles up the hills to regain the road we left, thence we went southward until we reached the coast again, near which we travelled on the top of a terrace through a great part of Mendocino county. The roads were quite level and we were able to make

tolerably rapid progress. We stopped at Pt. Arena, a windy, bleak, disagreeable place, Fort Bragg and several other places on the coast.

At Bodega Bay we were able to do considerable dredging; the lagoon inside of the sand spit is a good collecting ground as also the bay outside. We obtained several fine jelly fish and stenophores outside the sand spit

and dredged a number of new forms in the lagoon. I obtained a fine lot of burrowing crustacea (*gebia* and *callianassa*) on the shore and many others from the eel grass. We touched at Tomales Bay, but did not remain there long, and as the places this side of there were within easy reach of Berkeley we left them for future excursions from home.

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