

Bancroft was a physician, who resided on the river Demerara, from which he wrote letters to his brother under dates July 8–November 15, 1766. In 1769, these letters were collected and published in a volume, under the above title, dedicated to William Pitcairn, M.D., fellow of the Royal College of Physicians in London and Physician of St. Bartholomew's Hospital. The copy from which this extract is taken may be found in the Library of Congress at Washington.

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#### SPECIAL ARTICLES

##### GLACIATION IN THE SAN BERNARDINO RANGE, CALIFORNIA

WHILE engaged in the study of the mountains of southern California the past summer the writers spent a week about the slopes of San Gorgonio Mountain, the highest point of the San Bernardino range. The important discovery was made of unmistakable signs of former glaciation upon its northern slope. This is a fact of considerable interest because it has hitherto been assumed that the southernmost point of glaciation in the United States was in the Sierra Nevadas, nearly two hundred miles to the north.

The San Bernardino range is topographically distinct from any other mountains of southern California. It appears to be much younger than the San Gabriel range, from which it is separated by the Cajon Pass, and also to have had a different history from the San Jacinto Mountains, which lie to the south on the opposite side of the San Gorgonio pass.

The topography of the range is marked by broad elevated valleys, and plateau-like ridges. There are several undrained basins quite similar to those in the desert immediately adjoining on the north, and it seems reasonable to assume that the range as a whole is an uplifted fault block of what was once topographically a portion of the Mohave desert.

The highest portion of the range forms a rather sharp ridge about six miles long and

extending a little north of west and south of east. San Bernardino Mountain forms the western end of this ridge with an elevation of 10,630 feet, while the eastern end is known as San Gorgonio Mountain with a height of 11,485 feet. The Santa Ana River, the main stream in the range, drains the northern slope of this ridge, receiving its large permanent flow of cold water from the glacial gravels and the snow banks which linger late in the season in the heads of the protected cañons.

The largest glacier existed on the northwest slope of San Gorgonio in a semicircular basin made by a northerly curve of the ridge running westerly to San Bernardino Mountain. Here is a true glacial cirque, and from its margins well-characterized morainal ridges extend downward for about a mile into the basin of the South Fork of the Santa Ana River, and block a small tributary from the east. Above the dam thus made is a body of water about a quarter of a mile across known as Dry Lake. The lower marginal moraine reached fully three quarters of a mile below the lake, the total width of the glacier at its lower end being indicated by this distance. The rock débris on its lower side forms a great wall across the valley 300 to 400 feet high. The glacier appears to have been overloaded with débris and after having first reached the lowest point where there is a great quantity of partly modified morainal material, to have been crowded progressively eastward back toward the present Dry Lake. In places two to three marginal moraines appear and several basin-like depressions resembling kettle holes. No bedrock is visible in the path of the glacier and scratched boulders were not recognized with certainty. The granitic rocks are coarse and crumble rapidly and it is not to be wondered at that no boulders thus marked were seen. Great springs issue from the lower margin of these glacial gravels, forming a typical mountain meadow with abundance of grass and a cool bracing air.

Another typical cirque basin lies close up under the northeast crest of San Gorgonio, and contains snow drifts nearly all summer.

A half mile below are one or more well-marked semicircular terminal moraines.

Two miles northwest of San Geronio, and in another northeastward facing cirque was a glacier which carried down a vast amount of débris to within a quarter of a mile of the termination of the large glacier already described. A small body of water known as Dollar Lake occupies the last resting place of the ice close up under the rocky cliffs.

Following the ridge westerly for two miles more we come to a cirque-like basin close up under the crest and forming the head of Hathaway Creek. Here was perhaps the most interesting glacier of all in the district. It was a long narrow tongue of ice which reached downward a mile and left the most perfect moraines seen. Five semicircular terminal moraines cross the cañon and upon its eastern side is an ideally perfect marginal moraine. The middle one of the terminal moraines is formed of immense blocks of rock and looked at from below its curving front forms a great wall nearly 100 feet high. The lowest moraine, 1,000 feet farther down the cañon, is formed of the finest material of any, as though when the first ice tongue came down it found the surface soft and deeply disintegrated. The phenomena here indicate that glaciation was of considerable duration, and that the history of the period was anything but simple.

The last glacier on the ridge was a small one nestling also in a northeast-facing alcove near the top of San Bernardino Mountain.

None of these glaciers appear to have descended much below 8,500 feet, and it will be seen from the descriptions given that the conditions had to be just right for their appearance at all. Such conditions were a northward or northeastward facing alcove which headed sufficiently close to the crest to receive the snows which drifted over its summit. The west fork of Hathaway Creek, which headed nearly as high as the glaciated one, was separated from the crest by a plateau-like shoulder and in its sharp V-character appears never to have contained anything of a glacial nature.

There seems to be no other possible interpretation of the phenomena observed but that of glacial action, and it is quite remarkable that this extensive lofty region known to have a heavy precipitation and to contain a boreal fauna and flora should not long before have been investigated in regard to the possibility of its having been glaciated.

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#### MALLOPHAGAN PARASITES FROM THE CALIFORNIA CONDOR

THE great vulture or condor of California, *Gymnogyps californianus*, although not as rare a bird as reported by most bird books is yet so uncommon and shy, and hence so rarely seen, and is such an extraordinary great feathered animal, that it is one of the most interesting of American birds. It ranges north and south through the mountains of the state, nesting in wild and inaccessible places. It is nearly, if not quite, as large as the condor of the South American Andes, averaging four and a half feet in length and ten feet in spread of wing. The female lays a single enormous egg ( $4\frac{1}{2} \times 2\frac{1}{2}$  inches), specimens of which are rarer in collections than those of the great auk.

Up to the present time no Mallophaga (biting bird lice) have been recorded from this bird giant. However one of my students of several years ago, C. S. Thompson, a student of birds as well as of insects, took a number of Mallophaga from a single condor and I have just taken time to go over this material. It includes only two species, a small *Menopon* and a *Lipeurus* of average size.

The *Lipeurus* belongs to the well-characterized group of sex-guttati (with six curious chitinized spots on the anterior half of the head), whose members are found only on raptorial birds, especially the larger kinds as vultures and eagles. The group affinities of the specimens (two females and a male) are certain, but whether they should be assigned to one of the few already described species of this group or be looked on as representatives of a new form is not so easily determined.