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## ANOMALIES IN THE DISTRIBUTION OF FOSSIL GULLS

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THE STUDENT who works with any of the larger natural groups of organisms will, sooner or later, become interested in the geographic distribution of its members. Quite as properly, though less certainly, he may become interested also in their geologic distribution. When he does begin to study this latter fruitful subject, he is soon brought to realize that he is plowing a field of three dimensions instead of two. The present is merely a cross-section of that great tide of organisms that has flowed out of the remote past and will, we hope, continue far into the future. In this great stream we may find that any particular group, such as species, genus, or family, may have shifted forth or back in its relation to the main stream bed, that is, the earth's surface. My own study of the fossil birds of the Pacific Coast has brought out some facts regarding the time and place distribution of certain bird groups, and these facts are, in some cases, very difficult of explanation. I refer especially to certain observations on the Laridae, the gulls and their allies, as they occur today and as they occurred in the geological period just preceding the present.

I have overhauled, during the past fifteen years, three extensive collections of Pleistocene birds from Oregon and California, all of which might properly be expected to produce the remains of gulls. At Fossil Lake, Oregon, there are abundant remains representing nine different species of gulls and terns, as determined by Shufeldt. This locality is east of the Cascade Mountains in a desert environment. There can be no doubt but that the accumulation was laid down in a broad, shallow, and possibly ephemeral lake that probably resembled the present Buena Vista Lake of the San Joaquin Valley, California, or the lately drained (and late lamented) Klamath Lake near the Oregon line. Such situations are ideal for the living birds and are likewise favorable for the entombment of their remains. Paleontologists are quite in accord as to the situation and the interpretation of observations made upon birds from this particular horizon. Two other collections of even larger numbers of individuals and of very rich faunas have been examined with quite the opposite result, so far as the gulls are concerned.

The excavations in Pleistocene asphalt at McKittrick, California, have yielded about a thousand determinable specimens of birds representing more than forty-three species. By far the greater number, both of individuals and of species, indicate an open country with expanses of shallow water quite comparable to the conditions now

prevailing at Buena Vista Lake or at Los Baños. Great numbers of ducks and shore birds, with a proper proportion of herons, storks, and cranes, constitute the bulk of the collection. Yet there have appeared no specimens of the Laridae in this great mass of material.

Two explanations of this fact might be proposed. One is the almost incredible suggestion that there were no representatives of the family present during Pleistocene times, although they were abundant at Fossil Lake at no greatly diverse period. The second view of the matter is that gulls were immune to the attractions that led to the entombment of other species. Was there some agency that prevented the entombment of these birds? Let us examine the comparable deposit at Rancho La Brea near Los Angeles. This was an asphalt trap similar to the McKittrick situation and from these beds there have been taken more than one hundred and fifty thousand specimens of birds; and yet I have searched vainly during nearly fifteen years for a single fossil representative of the Laridae. In the entire collection from Rancho La Brea—those at the University of California and those at Los Angeles representing twenty or thirty excavations from various lenses—there is but one small packet of bones that contains any gull remains. This packet, however, contains several gull bones of unchallengeable identity. The interesting fact regarding this particular packet is that the excavation data show the bones to have been taken from a chimney in the asphalt which contained the remains of *Homo*, and which was devoid of all those typical Pleistocene species so very abundant in these beds. Studies in this chimney accumulation by Dr. J. C. Merriam, working on the mammalian fauna and the stratigraphy, with a check on the bird remains by Miller, led to the conclusion that the chimney was a pathway of Recent intrusion by which *Homo*, *Larus*, and other present day forms reached a point in this particular asphalt lense some eight or ten feet below the surface. The interesting fact is that neither man nor gull was immune to the entombment processes, but neither occurred in truly ancient state.

While collecting Recent birds along the coast at Hueneme, California, I came upon a small accumulation of crude oil that had leaked from a shallow buried pipe. This oil spread over the ground in a pool about ten feet in diameter and displayed a surface grading from a fairly fresh seepage at the center to a dust and rubbish covered marginal area. Here was reproduced an actual three-dimension picture of what the imagination pictures Rancho La Brea to have been during Pleistocene. Visible in this trap were the remains of six or eight birds of several species among which at least one gull was recognizable. There was no immunity for gulls, it would seem.

Here, then, are the facts: Gulls were abundant during Pleistocene time in the interior of Oregon. They are now abundant over most of California in places suitable for them. The sites of the McKittrick and the Rancho La Brea deposits are within favorable areas. The Pleistocene faunas of both these deposits are such as to suggest conditions favorable to gulls. These birds are not immune to the asphalt trap. The entire family of Laridae is absent from the hundreds of thousands of fossil bird remains from the two asphalt horizons. Add to these points the absence of gull remains from the collections taken at the Upper San Pedro Pleistocene beds that yielded sixteen species of birds from littoral marine and sand dune deposits, and the easier conclusion is that the Pleistocene land of southern California harbored no gulls. Yet such conclusion seems most incongruous. Certainly it is hard to explain.

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