

THE ANTIQUITY OF THE MIGRATORY INSTINCT IN BIRDS

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EVER SINCE J. A. Allen, on purely speculative grounds, suggested that the migratory instinct in birds arose as an adaptation to weather conditions during Pleistocene time, there has been a more or less tacit agreement on the part of bird students with that very plausible hypothesis. Extremely rigorous winters, the supposed accompaniment of the ice sheet which thrust down over the land from the north, forced birds to move southward during the nonbreeding season and permitted their return to the northward only with seasonal relaxation of the rigorous cold. This periodicity became implanted in the nervous system of the birds and was ultimately transmitted by heredity to the race. It has persisted and becomes in some instances an orthogenetic phenomenon, even working a hardship upon the species where it has gone to the extreme. So much for current opinion.

Our studies of fossil birds during the last decade or two have brought Allen's hypothesis into question to some degree. First, in my own mind, there has been a growing appreciation of the geologic antiquity of most of the characters displayed by birds. Miocene shearwaters and gannets differ from modern species only in very unimportant details, while large numbers of Pleistocene species are still living in unmodified phase, so far as determinable. The instincts are as truly heritable characters as are those of bone or feather, although more easily disturbed, it is granted. Why should not the migratory instinct, so deeply rooted in a species, be likewise a character of great antiquity and far antedate the Pleistocene ice sheet?

With a known fossil avifauna from the Pacific Coast numbering well over a hundred species and a hundred and fifty thousand specimens, we may well begin to look for concrete evidence upon the subject. To be sure, an instinct is admittedly hard to preserve in the fossil state and some less charitable friends may hold that their patience is being imposed upon by any further discussion. Yet it seems to me there is some evidence to be brought forward.

The original home of a species was of necessity a region where it reproduced its kind. Again, with organisms which exercise parental care over their young, the breeding area is one in which the species is anchored for at least the period of juvenal dependency. Before the development of the migratory habit, if we credit Allen's hypothesis, individuals were crowded south from the breeding area by the cold weather of the nonbreeding season. Certainly the migration of most northern species is southward and away from the breeding area. Was it not therefore in the great majority of cases an extension of range southward and an extension occupied only in the winter?

In interglacial and in post glacial periods the breeding ranges may have been extended northward, but the winter ranges would still be to the southward.

The evidence from Rancho La Brea and from McKittrick all points to a climatic condition milder even than at the present time. Arnold's study of the marine life of the Upper San Pedro tells the same story. We have no reason therefore to think that, during these phases of the Pleistocene, our birds were breeding any farther south than they are at present. Hence there is foundation for my belief that the present breeding areas of species approximate fairly closely their Pleistocene breeding areas whether prior to the migratory instinct or not.

Admittedly the above discussion is mainly theoretical, but there are facts at our disposal which have an interesting bearing upon the subject. In brief, they are as

follows: We find in southern California the fossil remains of many species of migratory birds that now come to this region only in the non-breeding season. Were they not here likewise in Pleistocene time as winter migrants? The Pacific Fulmar left its remains in the strand accumulations of Upper San Pedro just as it now-a-days contributes a "migration note" to the beach combing ornithologist of southern California. Along with him was the Ancient Murrelet, the Black-vented Shearwater, and the White-winged Scoter, which help to approximate the parallel with a last winter's bird list.

Again we find the asphalt beds of McKittrick and of Rancho La Brea telling a comparable story of the fresh water migrants. Snow Geese, Gray Geese and White-fronted Geese, Sand-hill and Whooping cranes, a host of bare-footed mud-probers such as Red-backed Sandpipers, Long-billed Dowitchers, and Yellow-legs, pattered or stalked about the Pleistocene marsh or wedged across the sky in a landscape picture that is hard to dissociate from the tang in the air which often forces even the sluggish unfeathered biped to at least a local migration.

Not all members of a species feel the migration impulse with equal force. Quite possibly the hereditary impulse may have become in some species intensified or, in others, lost since Pleistocene time. Possibly additional species may have acquired the instinct in response to other influences; but to me the water-fowl particularly appeal as travelers that have been seasoned by more than one geological period of racial experience.

List of Pleistocene species that were probably migratory:

<i>Synthliboramphus antiquus</i>	<i>Oidemia perspicillata</i>	<i>Grus canadensis</i>
<i>Puffinus opisthomelas</i>	<i>Chen hyperboreus</i>	<i>Branta canadensis</i>
<i>Fulmarus glacialis</i>	<i>Anser albifrons</i>	<i>Grus americana</i>
<i>Macrorhamphus griseus</i>	<i>Pelidna alpina</i>	<i>Totanus melanoleucus</i>

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