Better to demonstrate the false premises taken by many objectors to the retouching of photographs, it might be mentioned that one of our great observatories found that many photographs, particularly those of nebulae and some of the more remote planets, did not reproduce well. The photographs were sufficient in themselves, but certain of the fainter tone qualities did not show in reproduction. These were carefully strengthened and in some instances the entire picture was copied in such a way that every tone of the original would reproduce satisfactorily. These methods were so severely criticized that they were abandoned. The objection was based on the theory that each minute granule of graphite or pigment would represent, especially in case of the nebular drawing, such vast objects that the adoption of such a method would be absurd. This view was heedless of the fact that every picture, whether drawing, painting, or photograph, is a jumble of pigment. Yet, in point of fact, the work of the artist in this particular instance insured half-tone results that would embody a complete and true image of the subject without any personal equation whatever. The point, however, in stating this incident is that the retouching (or drawing) was made only to aid reproduction and produce a half-tone cut that would show the subject with more complete distinctness than in its original form by bringing out parts that would reproduce and thus offer a better interpretation of the phenomena. Other specialists, less prejudiced, agreed it would have done exactly that, and with complete success.

The writer has no special interest in offering these comments other than his interest in the general subject of scientific illustrations. This latter has naturally drawn his attention to the defects discussed in this article and has led to mild astonishment that so many pictures are used without first having been expertly worked over and improved before they were engraved. Who has been so fortunate as to have a manuscript critically read without suggestions for improvement? Why not also be critical with photographic copy which, if well prepared and well reproduced, will tell its own story even more directly than words. In the final analysis a good photographic reproduction should be a pictorial and graphic expression and as such might well be subject to revision in a manner somewhat similar to that accorded text material.

California Institute of Technology, Pasadena, September 16, 1936.

A PLEISTOCENE RECORD OF THE PASSENGER PIGEON IN CALIFORNIA

WITH ONE ILLUSTRATION

By HILDEGARDE HOWARD

Rancho La Brea, that apparently never-ending source of information concerning the Pleistocene bird life of southern California, has yielded another important record. Six bones, representing four skeletal elements, are now identified as *Ectopistes migratorius*, the Passenger Pigeon. Though these bones have been in the Los Angeles Museum collections for years, their importance had somehow escaped notice until recently. Most of them, together with two specimens of *Columba fasciata*, had been put away labelled "pigeon." Not until two additional elements were recently found among some miscellaneous bones in the collection, were the specimens carefully studied and their significance noted. At this time comparisons were made with *Columba fasciata*, *Columba flavirostris*, and *Melopelia asiatica* as well as with *Ectopistes*

migratorius. Miscellaneous bones of the latter species were generously loaned by Dr. Wetmore from the collections of the United States National Museum.

Characters which identify the Rancho La Brea bones with *Ectopistes* are listed below, with characters of *Columba* given for purposes of contrast.

Coracoid.—L. A. Mus. no. E4960 from dump of pits 61 and 67. (1) Length 31.1 mm.; *Columba fasciata*, 35 to 39 mm. (2) Scapular facet slightly concave and well formed; *Columba* with facet flattened and indistinctly demarked. (3) Attachment of coracobrachialis muscle a rounded knob; this area in *Columba* flattened and indefinite. (4) Region of coracohumeral surface of head squared and somewhat angular; inflated and rounded in *Columba*.

Carpometacarpus.—L. A. Mus. nos. H2005 and H2006, pit unknown; no. E4959 from dump of pits 61 and 67. (1) Length 29.7 to 30.3 mm.; *Columba fasciata*, 32.3 to 34.8 mm. (2) Deep, pitlike depression on inner side at base of metacarpal I, near internal ligamentary tuberosity; pit absent in *Columba*.

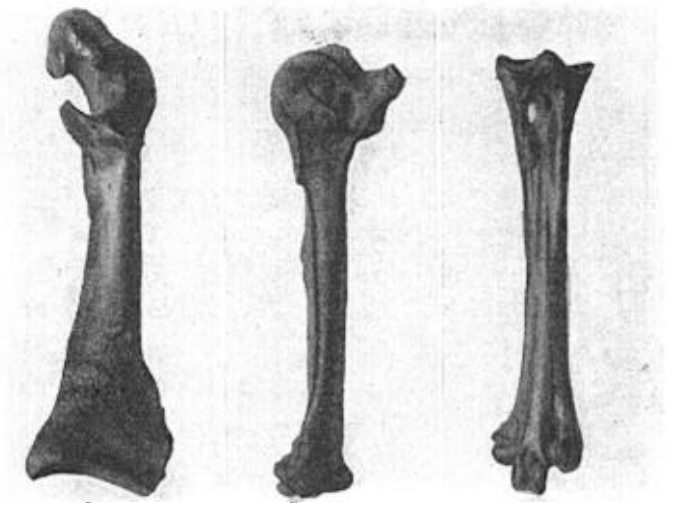

Fig. 6. Bones of Passenger Pigeon from Rancho La Brea Pleistocene. *a*, coracoid, L. A. Mus. no. E4960; *b*, carpometacarpus, no. E4959; *c*, tarsometatarsus, no. G4974; all × 2.

Photograph by W. C. Nemetz. Retouched.

Tarsometatarsus.—L. A. Mus. no. G4974, pit unknown. (1) Length similar in *Ectopistes* and *Columba fasciata*, but bone much more slender in the former (average ratios of breadth of proximal and distal ends and shaft to length of bone in *Ectopistes* 22.8, 22.5, and 9.7 per cent, respectively, and in *Columba* 24.5, 24.6 and 12.0 per cent). (2) Tubercle for tibialis anticus muscle more proximal in position (distance from proximal end through tubercle, relative to length, 25 per cent in *Ectopistes*, 29 in *Columba*). (3) Proximal ligamentary attachment well developed and definitely marked; in *Columba* less developed and indefinitely marked. (4) Distance of facet for metatarsal I from distal end less than in *Columba* (average ratio relative to length in *Ectopistes* 40.3, in *Columba* 48.2 per cent). (5) External condyle less developed anteroposteriorly in *Ectopistes* than in *Columba* (relative to breadth of distal end, condyle averages 50.9 in *Ectopistes* and 58.3 per cent in *Columba*).

Ulna.—L. A. Mus. no. G8833 from pit 36; an incomplete specimen identified as *Ectopistes* on the basis of size alone. Breadth and depth of distal end each 5.3 mm., breadth of shaft 3.0, in *Ectopistes*; same measurements in *Columba fasciata*, 6.3 mm., 6.2, and 3.4, respectively.

Reports within historical time of Passenger Pigeons in California have all been traced to flocks of the Band-tailed Pigeon. All authentic records indicate that

Ectopistes migratorius was an eastern and northern species within Recent geologic time; and the only previous fossil record of the species was from Tennessee. The Pleistocene occurrence at Rancho La Brea is thus the first record of the Passenger Pigeon in California.

Whether or not this pigeon occurred in great numbers in California during the Pleistocene can scarcely be determined from the remains found at Rancho La Brea. Though only three individual birds are, with certainty, represented by the six bones, the typical western bird, the Band-tailed Pigeon, with similar forest-loving habits, is limited to two specimens, each of a separate individual. On the other hand, the Mourning Dove with a predilection for openly wooded areas, such as we believe Rancho La Brea to have been during the Pleistocene, is more abundant, with at least seventeen individuals and twenty-nine specimens. In consideration of the environmental factors, therefore, we cannot judge the Pleistocene abundance of Passenger Pigeons in this western area by the number of birds found at Rancho La Brea.

Los Angeles Museum, Los Angeles, California, July 14, 1936.

OUTSPREAD WINGS AS A SUBSTITUTE FOR PERCHING

By JOHN W. SUGDEN

The observation of gulls and a flicker doing similar unusual acts under similar unusual circumstances suggests the influence of environment and the organisms' adaptive response to that environment. "The animal we know is the product of an age-long struggle to reconcile constitutional limitations with environmental exigencies" (Haviland, "Forest, Steppe and Tundra," 1926, p. 1). The physiological and morphological characters that have developed as a response to a given set of conditions, enable the organism to fit into its particular niche to its own advantage. This specialization increases the efficiency of the organism in that particular environment, but it also imposes a limit on its dispersal. If the particular conditions persist, the organism prospers and the competition it receives is from its own kind, or from those that are similarly constituted. During periods of unfavorable circumstances individuals may be able to meet the changed conditions by altering their activities, providing the structural characters are not so highly specialized as to make survival impossible. The mental capacity of birds, even with the disadvantage of a particular structural limitation, may allow them to react to an emergency imposed by an altered environment by the use of other structures in a modified manner.

Wings in birds have uses other than for flying. They may be used for balancing, or as an aid in running, both modifications of the flying function, or as a means of striking in an offensive or defensive reaction. In courtship they may be used for display or for drumming. Some birds, notably the hoatzin, use them for climbing, many use them to provide shade and shelter for their young, and some, as the pelican, beat the water to cause a commotion and thus drive the fish ahead. The following examples, in birds, tend to illustrate the use of wings to support the body in place of the feet which in these instances are too specialized to be used for perching.

A Red-shafted Flicker (*Colaptes cafer collaris*) was observed in the process of obtaining berries from a small bush during an especially severe and long-continued winter when its usual food supply was restricted. The bird, being unable to cling to