

RECORDS OF FRINGILLIDS FROM THE PLEISTOCENE OF  
RANCHO LA BREA

By WILLIAM R. DAWSON

The question of what species of the family Fringillidae are represented in the Pleistocene of Rancho La Brea is one that has not been easy to answer. The small size and remarkable uniformity of skeletal structure within this family make identification difficult. A. H. Miller (Univ. Calif. Bull. Dept. Geol. Sci., 19, 1929:15), having chiefly limb elements and a sternum at his disposal, was forced to list the fringillid remains from Rancho La Brea under the heading "Indeterminate Sparrows" because their nature defied identification. Later, availability of a few fringillid upper mandibles from the asphalt deposits enabled Sibley (Condor, 41, 1939:126-127) to identify *Spinus*, *Amphispiza* and *Spizella* on the basis of distinguishing characters peculiar to this element. The utilization of the upper mandible was obviously the key to the identification of members of this family.

Only recently, however, have any further specimens of fringillid mandibles from Rancho La Brea come to light. Pierce (Bull. So. Calif. Acad. Sci., 16, 1946:113-119) in perfecting a method of obtaining remains of Arthropoda from the asphalt deposits, was able at the same time to recover numerous fragile vertebrate specimens, including upper and lower mandibles of passerine birds. Of these, 66 from Los Angeles Museum Pit "A" proved to be those of fringillids (49 upper, 17 lower mandibles). It is from these specimens that the present work was developed, the emphasis being upon identification of the upper mandibles.

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The identification of any bones as small as those of the Fringillidae introduces special problems. Measurements at best prove to be approximate and are of value in deciding between species in only a few genera. After scrutiny of upper mandibles of modern fringillids, certain characters appear of value in separation of the genera, and the minor variations in these same characters are, in some cases, helpful in species differentiation. These are characters connected with the palatal surface of the premaxilla, the shape and location of the nostrils, and the profile of the internarial bridge.

In the Fringillidae the palatal surface conforms to a certain basic pattern which has almost as many modifications as there are genera. In the typical fringillid, this area has a groove running longitudinally down its center. This is herein referred to as the central groove. The ridge through the center of this groove is termed the central ridge; the lateral walls of the groove, the secondary ridges. Lateral to the secondary ridges and just within the outer margins of the palate are depressions, one on each side, the secondary grooves.

The nostrils in the Fringillidae are of two basic types: those which open more dorsad than laterad and those which open more laterad than dorsad. Of these, the dorsad group are always nearly round, and the laterad group are in most instances elongate. These

characters seem to conform well to the present classification of the Fringillidae. The dorsad group includes the members of the subfamily Richmondeninae; the laterad group encompasses the subfamily Emberizinae. The members of the subfamily Carduelinae appear to resemble the Richmondeninae more closely than the Emberizinae.

The profile of the internarial bridge is of importance in some genera. It ranges from an almost straight line to a line with a sharp angle, the angle occurring usually at the center of the bridge.

These are the characters, in the main, upon which the identification of the fossil fringillid upper mandibles were based. The lower mandibles referred to herein were identified by: (1) The shape of the symphysis and its size in relation to the entire structure, (2) the shape of the rami and the configuration of their lateral surfaces, and (3) the size and shape of the articular processes. In addition to these characters, the size, shape, and location of the foramen that appears in each ramus occasionally were of value.

The fossil mandibles under consideration represent 3 subfamilies, 11 genera, and 13 species of the Fringillidae. This adds 10 species to the list of passerines heretofore recorded from Rancho La Brea and encourages further study of these elements.

The following is the list of species of fringillids recognized in the present collection from the Rancho La Brea Pleistocene. An asterisk indicates those for the first time recorded from this locality.

Subfamily Richmondeninae	* <i>Pipilo fuscus</i>
* <i>Pheucticus melanocephalus</i>	* <i>Poocetes gramineus</i>
Subfamily Carduelinae	* <i>Chondestes grammacus</i>
* <i>Hesperiphona vespertina</i>	<i>Amphispiza bilineata</i>
<i>Spinus tristis</i>	<i>Spizella</i> sp.
Subfamily Emberizinae	* <i>Zonotrichia leucophrys</i>
* <i>Pipilo angelensis</i> , n. sp.	* <i>Passerella iliaca</i>
* <i>Pipilo maculatus</i>	* <i>Melospiza melodia</i>

*Pheucticus melanocephalus*. Black-headed Grosbeak. One upper mandible; one lower mandible. The upper mandible consists of the anterior one-third of the premaxilla. Comparison of it with the heavy-billed members of the Fringillidae shows it to be identical in palatal configuration with *Pheucticus*. It differs from *Richmondena* in having sharper, more distinct secondary ridges and a deeper, narrower central groove; it is distinguished from *Hesperiphona* in having a less concave palatal surface.

Enough of the lower mandible is present so that comparison with a corresponding part of *Pheucticus melanocephalus* shows the following similarities: short rami in comparison with the symphysis, well developed median articular processes, and smooth lateral ramal surface with a small foramen.

*Hesperiphona vespertina*. Evening Grosbeak. One lower mandible. This specimen shows the heavy symphysis and general shape of ramus peculiar to this genus. Comparison with a specimen of the modern Evening Grosbeak, shows it to be identical in every detail.

*Spinus tristis*. American Goldfinch. One upper mandible; one lower mandible. The upper mandible clearly exhibits the deep central groove characteristic of *Spinus*. It closely resembles *S. psaltria* as well as *S. tristis* in the configuration of the palatal surface. Its breadth falls within the range of only the latter species, however. In addition to its size, it resembles *S. tristis* in lacking the notch in the posterior palatal border of the premaxilla which is characteristic of *S. psaltria* and other members of the genus.

	Fossil <i>Spinus</i>	<i>S. tristis</i>		<i>S. psaltria</i>	
	L. A. Mus. no. K7299	M. V. Z. nos. 19719	19720	M. V. Z. nos. 74926	74927
Width at maxillaries in millimeters	5.3	5.5	5.3	4.9	5.1

The lower mandible resembles *Spinus* in having a symphysis which is nearly half as long as the rami. In addition, the foramen in each ramus is large. It resembles *S. pinus* and *S. tristis* in size; but in shape it resembles only *S. tristis*, the broader of the two.

*Pipilo*. Towhees. This genus is represented by 10 upper mandibles which may be assigned to two species. In addition, two lower mandibles indicate the presence of a third species. In all members of the genus *Pipilo* the upper mandible exhibits well defined central ridges and well marked central and secondary grooves. Only two other genera of the Emberizinae resemble it in these respects: *Chlorura* and *Junco*. *Pipilo* is distinguishable from both, however, by the presence of distinct maxillary processes extending noticeably posteriad to the inferior nasal processes.

#### *Pipilo angelensis* new species

*Type*.—Complete upper mandible, L. A. Mus. no. K7291; Pleistocene, Rancho La Brea, Pit "A".

*Referred material*.—One complete upper mandible, L. A. Mus. no. K7292, designated as cotype, and six incomplete upper mandibles listed under L. A. Mus. no. K7293.

*Description of type*.—Large in comparison with the towhees of today. Central groove wide, with tendency to constrict at posterior end. Secondary grooves and ridges well developed. Posteroventral surface of internarial bridge posterior to nares (that part of the premaxilla bordered by the superior nasal processes) rises abruptly and exhibits a ridge which is a continuation of the keel on the underside of the internarial bridge. Each superior nasal process exhibits a longitudinal ridge located just inside the junction of the superior and inferior nasal processes.

The upper mandible of *Pipilo angelensis* has characters in common with both *Pipilo fuscus* and *Pipilo maculatus*, the other two representatives of this genus in the Rancho La Brea Pleistocene. The posterior ventral surface of the superior end of the nasal bridge resembles that of *P. fuscus* in its sharp rise and in the presence of a center ridge. The

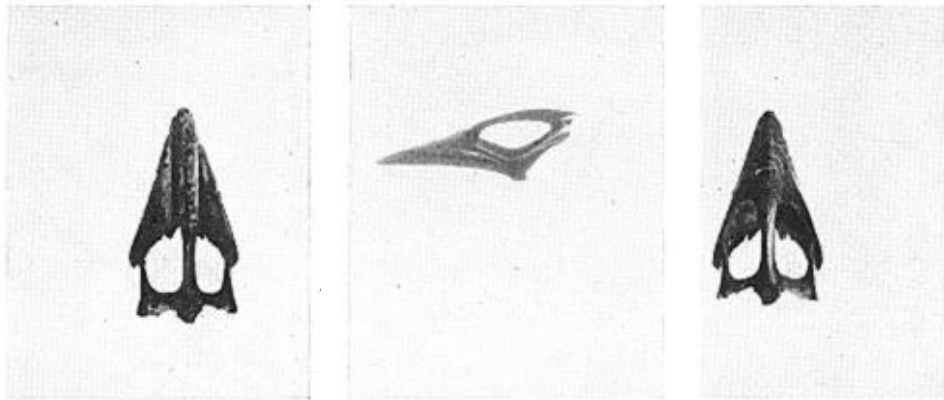


Fig. 16. Upper mandible (type) of *Pipilo angelensis* from the Pleistocene of Rancho La Brea (L. A. Mus. no. K7291). Left, palatal view; center, lateral view; right, dorsal view.

rise in *P. maculatus* is more gradual and the center ridge is absent. The lateral ridges found on the posteroventral surface of the superior nasal processes are not found in either *P. maculatus* or *P. fuscus*. The palatal surface of the premaxilla in *P. angelensis* shows the same well developed central and secondary grooves and sharp ridges as in *P. maculatus*, but its central groove is less constricted.

Comparison with *P. aberti* shows *P. angelensis* to have more distinct secondary ridges and grooves, a relatively longer and lower nostril, and a wider central groove. *Pipilo consobrinus* of Guadalupe Island, on the basis of skin measurements available, is much smaller.

	Measurements in millimeters										
	<i>P. angelensis</i>		<i>P. fuscus</i>			<i>P. maculatus</i>			<i>P. aberti</i>		
	Type	Cotype	max.	aver.	min.	max.	aver.	min.	max.	aver.	min.
a. Width across maxillaries	7.6	7.6	7.3	7.0	6.9	7.2	7.1	6.9	7.5	7.1	6.8
b. Height, at front of nares	3.1	2.9	3.5	3.1	2.8	3.1	2.9	2.8	3.4	3.5	3.3
c. Length from anterior end nares to tip of mandible	8.7 <sup>ap.</sup>	8.7 <sup>ap.</sup>	8.5	8.2	8.1	8.5	8.2	8.1	8.7	8.4	8.1
d. Length of nostril	5.4	5.3	5.1	4.9	4.8	5.3	4.9	4.7	5.0	4.9	4.9
e. Height of nostril	3.2	3.1	3.3	3.1	3.0	3.0	2.86	2.8	3.5	3.3	3.2
Ratios (in per cent)											
a to c	87.3	87.3	86.5	85.7	85.3	88.9	86.4	84.1	92.6	88.3	83.9
b to a	40.8	38.1	47.9	43.9	40.6	43.6	41.3	38.9	48.6	47.0	45.3
d to c	62.1	60.9	62.2	60.5	58.8	62.3	60.1	57.3	60.6	59.1	57.6
e to d	59.3	58.3	66.0	62.8	60.0	59.6	57.7	56.0	70.0	67.7	65.4

*Pipilo fuscus*. Brown Towhee. Two incomplete lower mandibles. The most complete specimen consists of the symphysis and the left ramus, so it is possible to utilize all the characters which distinguish *P. fuscus* from *P. maculatus* in this element. The outer ramal surface of *P. fuscus* exhibits a distinct diagonal ridge which passes anteriorly from the ventral to the dorsal border of the ramus, starting at a point below the end of the ramal foramen and stopping just posterior to the dentary. The ramus of *P. fuscus* descends sharply from the posterior border of the dentary, whereas the ramus of *P. maculatus* is almost straight. In addition to these characters, *P. fuscus* is noticeably smaller than *P. maculatus*, as is illustrated in the following measurements:

Species	L. A. Mus. no.	Length of ramus	Length of symphysis
<i>P. fuscus</i>	Bi 275	23.5	7.0
	Bi 276	23.3	7.0
<i>P. maculatus</i>	Bi 1723	25.7	7.3
	Bi 1724	25.2	7.0
Fossil <i>Pipilo</i>	K 7298	23.5	6.8

Because this fossil agrees in all characters with *P. fuscus*, it is so assigned. The less complete specimen exhibits enough of these characters so that it can be considered of this species also.

There are two other upper mandibles which may possibly be assigned to this species. They are so fragmentary, however, that positive identification is impossible. That they are definitely *Pipilo* is all that can be ascertained.

*Pipilo maculatus*. Spotted Towhee. Two upper mandibles. These specimens are similar to *P. maculatus* as distinguished from *P. fuscus* in the greater breadth of the central groove, sharper secondary ridges, and deeper secondary grooves. In addition, the posterior part of the central groove shows a constriction in *P. maculatus* and the fossil which is lacking in *P. fuscus*.

*Pooecetes gramineus*. Vesper Sparrow. One upper mandible. The tapering central ridge, broad flat secondary ridges, narrow central groove, and posteriorly flattened inter-narial bridge serve to assign this fossil to *Pooecetes*. It corresponds so closely to available specimens of *P. gramineus*, the only member of the genus now known in North America, that assignment to this species seems justified.

*Chondestes grammacus*. Lark Sparrow. Three upper mandibles. These three speci-

mens are ascribed to *Chondestes* on the basis of the broad, anteriorly widened internarial bridge, the nearly round nostril, and small ridge on the posterior portion of the internarial bridge. Their resemblance to *Chondestes grammacus* and the fact that this species has no North American relatives today make this assignment logical.

*Amphispiza bilineata*. Black-throated Sparrow. One incomplete upper mandible (tentatively referred); four lower mandibles. Within this genus there is much variation in the upper mandible. The characters that remain constant, and therefore may be considered of generic value, are the broad and fairly deep central groove and the slender shape of this element. *Spizella* is the only genus with which *Amphispiza* might be confused. The latter differs from *Spizella*, however, in having a relatively broader internarial bridge. The fossil specimen is so fragmentary that identification is difficult. It appears, however, to resemble *Amphispiza bilineata* in having deep secondary grooves and sharp secondary ridges rather than the poorly developed ones of *Amphispiza belli*, and so is tentatively referred to this species.

The four lower mandibles assigned here all show the long rami and small symphysis characteristic of *Amphispiza bilineata*. Like the upper mandible this element in *Amphispiza* might be confused with that of *Spizella*. It differs from this latter genus, however, in having longer dentaries and a smaller foramen in the ramus. *Amphispiza bilineata* may be distinguished from *A. belli* by: (1) higher and relatively shorter rami, (2) possession of a definite diagonal ridge running anterodorsally, which is much more distinct in *A. bilineata* than in *A. belli*, (3) presence on the outer surfaces of the rami of *A. bilineata* of shallower grooves than in *A. belli*. The fossils are well preserved and so are definitely assigned to *Amphispiza bilineata*.

It is interesting to note that of this species more lower mandibles have been recovered than upper. Judging from structure of these elements as exhibited by modern *A. bilineata*, this may be explained by the seemingly greater durability of the lower mandible.

*Spizella*, sp. Six upper mandibles (one complete). The conspicuous central groove and the slender internarial bridge serve to assign these fossil upper mandibles to *Spizella*. The most complete specimens seem to approach *S. arborea* in size of the nostril. The fragmentary condition of most of the specimens and lack of complete comparative material make it unwise to attempt specific assignment.

*Zonotrichia leucophrys*. White-crowned Sparrow. Three upper mandibles. The upper mandible of *Zonotrichia* has a wide central groove and wide secondary ridges. It might be possible to confuse it with *Melospiza melodia* except that it lacks the great elevation of the internarial bridge of the latter species. *Zonotrichia leucophrys* and *Z. coronata*, the species which occur in the Los Angeles area today, resemble each other closely except that in the latter species the ratio of nostril length to the width of mandible through the maxillaries is noticeably higher. These ratios in the fossils agree with those of *Z. leucophrys*.

Measurements in millimeters

Species	L. A. Mus. no.	Length of nostril (a)	Width across maxillaries (b)	Ratio of (a) to (b) in per cent
<i>Z. leucophrys</i>	Bi 1321	4.0	6.0	66.7
	Bi 1321'	4.0	6.1	65.6
	Bi 1678	4.1	6.0	68.3
	Bi 1682	4.1	6.3	65.2
	<i>Z. coronata</i>	Bi 1320	4.3	6.0
Bi 1402		4.5	6.1	73.8
Bi 756		4.5	6.3	71.5
Fossil <i>Zonotrichia</i>	K7288(a)	4.1	6.2	66.2
	K7288(b)	3.8	6.0	63.3
	K7288(c)	4.1	6.3	65.2

*Passerella iliaca*. Fox Sparrow. Two lower mandibles. Both of these specimens exhibit the internal flange on the ramus which characterizes *Passerella iliaca*, as pointed out by A. H. Miller (Univ. Calif. Publ. Bull. Dept. Geol. Sci., 21, 1932:182). One of these specimens is much larger than the other and corresponds in length of the ramus (25.2 mm.) to measurements of the subspecies *stephensi*, *brevicauda*, and the large type of *mariposae* from Shaver, California, as given by Linsdale (Univ. Calif. Publ. Zool., 30, 1928:321). The smaller fossil, which is 22 mm. in length, agrees with Linsdale's measurements of subspecies *iliaca*, *townsendi*, *fuliginosa*, *canescens*, and the populations of *mariposae* from Manzanita Lake and Lake Tahoe, California.

*Melospiza melodia*. Ten upper mandibles. These fossil specimens exhibit the noticeably elevated nasal bridge and the palatal surface with a narrow central groove and indistinct secondary ridges characteristic of *Melospiza*. Both *M. lincolni* and *M. georgiana* have markedly smaller mandibles than the fossils. Specimens of *M. melodia*, however, agree closely in all respects.

Life-zone and Habitat Preferences of Existing Fringillid Species Here Listed from the Pleistocene of Rancho La Brea

Species	Number of specimens	Life-zone and habitat today <sup>1</sup>
<i>Hesperiphona vespertina</i>	1	Canadian and Transition zones (breeding). Firs (breeding). In other seasons, most any bud or berry-producing tree or bush.
<i>Poocetes gramineus</i>	1	Canadian (occasionally), Transition, and Upper Sonoran zones (breeding). Open, or sparsely covered grassland.
<i>Passerella iliaca</i>	2	Canadian, Transition (breeding), and Upper Sonoran zones. Chaparral.
<i>Zonotrichia leucophrys</i>	3	Anywhere below level of heavy snow. Low bushy type of cover.
<i>Pheucticus melanocephalus</i>	2	Transition, Upper and Lower Sonoran zones. Riparian woodland, oak woodland, and associated shrubs, and open coniferous forests.
<i>Spinus tristis</i>	2	Transition (near coast), Upper and Lower Sonoran zones. Riparian association, chiefly willows and cottonwoods (breeding). Open fields.
<i>Pipilo maculatus</i>	2	Upper Sonoran Zone. River-bottom thickets and chaparral.
<i>Melospiza melodia</i>	10	Upper Sonoran Zone. River-bottoms. Shrubs, fresh-water marshes.
<i>Pipilo fuscus</i>	2	Upper Sonoran Zone. Edges of chaparral. Open brushland and oaks.
<i>Chondestes grammacus</i>	3	Upper and Lower Sonoran zones. Open terrain with scattered bushes and trees.
<i>Amphispiza bilineata</i>	4	Lower Upper Sonoran, and Lower Sonoran zones. Sparsely vegetated desert terrain.

<sup>1</sup> With special reference to southern California.

CONCLUSIONS

With the exception of *Pipilo angelensis*, all the species here discussed occur in the Los Angeles area today. Excluding *Amphispiza bilineata* and that unpredictable wanderer, *Hesperiphona vespertina*, all could conceivably be found at some time of the year in the Rancho La Brea area itself, if it were not for the changes brought about by city growth.

The accompanying chart lists the life-zones and habitat preference of each of these species. From these it is possible to construct a picture of Pleistocene Rancho La Brea which agrees very closely with that given by A. H. Miller (Univ. Calif. Publ. Bull. Dept. Geol. Sci., 19, 1929:18-19) in connection with other passerine birds.

The area around the tar pits must have offered meadows or open fields, brush, and probably some type of riparian growth in addition to the trees that are known to have occurred there. The meadows or open fields and their weedy borders would have been suitable for such forms as the goldfinches and the Vesper and Lark sparrows. The brush would have afforded shelter for the towhees, Fox Sparrows, and zonotrichias. Extensive chaparral areas are found in the Santa Monica Mountains, a short distance from Rancho La Brea, today. A riparian association would have suited the goldfinches and Song Sparrows and very possibly *Pheucticus*. The live oaks and other trees recorded in the area by Frost (Univ. Calif. Publ. Bot., 14, 1927:73-98) could also have afforded suitable environment for this latter bird.

*Hesperiphona* is not as illogical a visitor as it may seem. There is a Recent record (Willett, Pac. Coast Avif. No. 21, 1933:160) of its occurrence in Cahuenga Pass approximately 5 miles from Rancho La Brea. In the tar pits, evidences have been found of its environmental associates, the Pileated Woodpecker and Saw-whet Owl (A. H. Miller, Condor, 39, 1937:252).

As stated by Sibley (Condor, 41, 1939:126), who reported both *Amphispiza bilineata* and *A. belli*, using mandibular material from the University of California's Rancho La Brea locality no. 2051, the occurrence of the Desert Sparrow suggests a rather arid climate. Even though *A. bilineata* seems out of harmony with the rest of the species listed here, a shrew with similar environmental requirements (*Notiosorex*) has been found in great numbers (Compton, Univ. Calif. Publ. Bull. Dept. Geol. Sci., 24, 1937:87-88).

The list of fringillid species presented here not only augments existing knowledge of the passerine population of the Rancho La Brea deposits, but also further confirms previous ideas as to the environmental conditions existing in the area during the Pleistocene.

*Los Angeles County Museum, November 24, 1947.*