

**Article IV.—AN ENUMERATION OF THE LOCALITIES IN
THE FLORISSANT BASIN, FROM WHICH FOSSILS
WERE OBTAINED IN 1906.**

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When the material collected at Florissant, Colo., by the expedition of 1906 is fully worked out, it will be possible to compare the faunæ and floræ of the several localities in detail. It was evident even in the field, that the various beds were not all strictly contemporaneous, but whether there is a great interval of time between any of them, and what is the proper succession of those in different localities, are questions the discussion of which is best deferred until the fossils have been determined. In the meanwhile, however, it is necessary to refer to the several localities and beds, and it will conduce to clearness and save repetition if these are enumerated in a short paper devoted to this purpose.

Station 1.—Shale with conchoidal fracture in a small gulley near the graveyard, estimated to be 150 feet above the level of the town. This is on the divide between the northern and southern portions of Lake Florissant.¹ The fossils from this locality are principally freshwater Mollusca; *Planorbis florissantensis*, *Sphærium florissantense*, *Limnæa scudderi* and *L. sieverti*. Some bones and teeth, apparently mammalian, were also found, but they have not yet been freed from the matrix and studied.

Station 2.—Gulley by Cripple Creek road, west of graveyard, where the shale just appears at one point near bed of gulley. No fossils found except wood fragments, which come out of the earth, not out of the shale. The earth above the shale is doubtless Pleistocene; some species of Elephantidæ (presumably *Elephas*) was found in it years ago, according to local report.

Station 3.—Exposure close to the house occupied by the party in Florissant. This is in a bluff on the north side of the town, next to the road leading to Lake George. It is reddish, and full of vegetable remains, not very well preserved. It includes a considerable quantity of charcoal. A few rather good fruits were obtained.

Station 4.—Fossil-Stump Hill, just above the large fossil stump—(Henderson, Univ. of Colo. Studies, 1906, fig. 3, opposite p. 151). The hill is capped by lava, below which is about 23 feet of laminated shale, the fossils coming from about one-third of the way down from the top of this. Below

¹ This name is used to designate the Tertiary lake in which the Florissant shales were deposited.

this thick bed is about ten feet of irregularly bedded non-fossiliferous shale, extending to the base of the fossil stump, and originally enclosing it. Other shale extends *below* the level of the fossil stump (*cf.* Station 15).

Station 4, in the laminated shale, yields *Myrica drymeja*, *Populus lesquereuxi*, *Planera longifolia*, *Lomatia acutiloba*, *L. terminalis*, etc.

Station 5.—Railroad cut east of Florissant station. This is the place



Fig. 1. Fossil Stump of Sequoia Tree near Florissant, Colorado.

where the "wild-flower excursion" trains stop, and tourists are allowed to get out and collect fossils. It is the type locality of *Salix ramaleyi*, *Quercus ramaleyi* and *Amelanchier scudderi*. Insects are exceedingly scarce with the exception of *Corixa florissantella*, which is abundant, and which has been found in no other locality. The *Planera*, so common in other places, appears to be absent, but *Myrica drymeja* occurs in layer G. An *Alnus* occurs, having the characters of *A. kefersteinii*, and an *Ulmus* is provisionally referred to *U. braunii*. *Carpinus fraterna* is common in layer J, where *Staphylea acuminata* also occurs, but rarely. A *Rhus* is referred to *R. subrhomboidalis*.

The following section was taken at 5, counting from the top down :

1. Layer G. Six inches of laminated gray shale, with many small dark fragments.
2. Layer H. Two feet of thick gray shale, with conchoidal fracture; many plants, but no insects.
3. About 8 feet of similar shale, but more laminated, and without distinct conchoidal fracture.
4. Layer J. About two feet of shale, containing *Corixa*.
5. About ten feet to level of railroad, covered by talus.

Station 6.—Tunnel in side of hill beyond Wilson's (on road to Lake George). This is a large tunnel sunk obliquely into the side of the hill, affording a very complete series of layers or beds, which were recorded as follows, counting from the top down:

1. Hill above mouth of tunnel, about 25 feet, mainly pale gray with reddish, not truly laminated.
2. Layer F. Some finely laminated shale.
3. About 8½ feet of yellow sand, with granitic particles.
4. Two feet; yellow laminated with some alternating gray conchoidal.
5. Two inches of conchoidal shale.
6. ¼ inch yellow laminated.
7. 1½ inch conchoidal.
8. 1 inch yellow laminated.
9. 3 inches conchoidal.
10. Layer E. 5½ inches yellow laminated, fossiliferous.
11. 8½ inches conchoidal, reddish. One insect found.
12. Layer D. 4½ inches yellowish laminated, fossiliferous (specimens marked S D are from about three feet below D.)
13. 3½ inches gray conchoidal.
14. 1½ inches yellowish laminated.
15. 6 inches heavy conchoidal.
16. ½ inch yellowish finely laminated.
17. 3 inches gray conchoidal.
18. ½ inch closely laminated.
19. 3 inches gray conchoidal.
20. 2½ inches yellowish closely laminated.
21. 8 inches gray with conchoidal fracture.
22. One foot closely bedded yellowish gray with layers of crystals.
23. Three feet massive gray with conchoidal fracture.
24. Layer C. One foot gray and black streaked, fossiliferous.
25. One foot gray.
26. Three inches sulphur-color and gray.
27. Layer B. One foot gray and black, fossiliferous (*Planera*, etc.).
28. One foot, sulphur-color and black.
29. Four inches laminated dark gray, granular.
30. 2½ inches sulphur and black.
31. 3 inches massive gray.
32. 2 inches sulphur and black.

33. 8 inches massive gray.
34. 16 inches soft shale, light yellow with black layers.
35. 5 inches soft gray shale.
36. Layer A. One foot, black and white layers, with leaves of *Planera*, etc.
37. Nine feet of massive gray shale, to bottom of tunnel.

It will be noticed how the conchoidal layers alternate with the laminated. It is to be inferred that the former represent flows or showers of volcanic ash, and the latter the effect of water in working over the surface of such deposits. The indications would be that in this locality there were many



Fig. 2. Ancient Miocene Lake-Bed at Florissant, Colorado, looking north from Station 4.

slight eruptions, or if the eruptions were severe, they were not close at hand. The local severity of each fall, and the period intervening between each two, may perhaps be roughly estimated from the thickness of the layers.

Station 7.—By the road, just before reaching Wilson's ranch; bluff facing south. Probably the equivalent layer D in Station 6. Leaves and insects were found.

Station 7a.—Miscellaneous small outcrops near Wilson's.

Station 8.—Lava on hill just opposite Station 5. Contains remains of wood.

Station 9.—Side of hill facing north, about a mile southwest of the town, in the direction of, but beyond, the Y on which the locomotives turn. K is the top layer; L is halfway down. At the base of this hill is a swamp, and the opposite bluff is granitic.

Station 9, or some place immediately adjacent, is the type locality of *Malvastrum exhumatum* and *Myrica hendersoni*. *Planera longifolia* occurs in layer L.

Station 10.—Bed of thick laminated shale close to east end of Lake George. Contains a few poorly preserved leaves and twigs, and great quantities of an undescribed ostracod. This is the most western locality for the Florissant shales yet found, and is nearly two miles beyond Scudder's limit, as indicated by his map.

Station 11.—North end of Fossil Stump Hill. This is the locality of Scudder's section given in his 'Tertiary Insects,' pp. 21, 22. It furnished us with *Tmesipteris alleni*, *Comptonia insignis*, *Myrica drymeja*, *Populus lesquereuxi*, *Planera longifolia*, *Lomatia acutiloba*, *L. terminalis*, *Celastrus fraxinifolius*, *Acer mysticum*, *Sterculia rigida*, and many other plants. Among insects obtained there, perhaps the finest was *Tipula rigens*. The spider *Tetragnatha tertiaria* was also found.¹

Station 12.—West side of Fossil Stump Hill. Plants and insects found.

Station 13.—Shale on hill sloping south, opposite 9 and 14. It consists of alternating flows of sandy lava, forming sandstone layers, and fine laminated shale. The whole appears to dip *under* 9, but there is probably a fault.

The hill containing 9 and 14 is capped with coarse granite gravel, showing long exposure. The opposite hill, looking over 13 and against 9 (with the marsh between it and 9), consists of massive granite rock, with many detached boulders; there is a layer of shale on the top.

Station 13 furnished many plants and insects; among the latter a perfect specimen of *Hodotermes coloradensis*, and a very good *Palæovespa scudderi*. The plants include *Sphenopteris guyottii*, *Typha lesquereuxi*, *Myrica drymeja*, *Planera longifolia*, etc.

Station 14.—On same hill as 9, at level of L, but a little further west. This locality was extensively worked, and furnished our best materials. The fossil-bearing layer is capped by a very thick layer of massive rock, which doubtless conduced to the excellent preservation of the specimens. On a single slab at this locality we found *Populus lesquereuxi*, *Typha lesquereuxi*, *Cotinus fraterna*, and *Planera longifolia*, proving their exact contemporaneity and also contiguity. Another slab contained *Myrica drymeja*

¹ *Tetragnatha* is represented in the modern fauna of Florissant by *T. laboriosa* Hentz, kindly determined for me by Mr. N. Banks.

and *Populus lesquereuxi*. The leaves of the *Populus* grew to a great size; one was 70 mm. broad.

Station 15.—At Fossil Stump Hill; a lignitic layer one or two feet below level of the fossil stump. Contained remains of fern, sequoia (apparently) and the snail *Planorbis*. The exact place is about 8 yards northeast of the stump. The fern looked like an Eocene species.

Station 16.—In gully southeast of town, behind railroad-cutting hill. Here we obtained fish-scales.

Pleistocene (see also under Station 2).

The north fork of Twin Creek has extensive peaty layers of mostly charred remains. No shells were found, though considerable search was made. The beds have a bluish-gray color, with coarse gravel in layers between. The following section describes the beds as found in one place on the west side of the creek, from above down:

1. Recent alluvial earth and gravel, 13 inches.
2. Blue-gray soil, 9 inches.
3. Coarse gravel, 8 inches.
4. Blue-gray, with vegetable fragments, 2 feet.
5. Coarse gravel, 1 foot.
6. Blue-gray with gravel intermixed; contains charcoal, 6 inches.
7. Gravelly alluvium, 2 feet.

The members of the expedition were Dr. W. M. Wheeler, Mr. S. A. Rohwer, and Mr. and Mrs. Cockerell. In addition, Miss Josephine Cowie and Miss Neva Lillie spent ten days with us in June and collected a number of fossils. Visitors, who did some collecting, were Miss J. Bentley and Miss B. Hopkins.