
The plants discussed below are all from the North American Miocene. They represent a flora containing many genera at that time widely spread over the Holarctic Region, but in later times driven southward, and to-day existing in much more limited areas; some in Asia, others in various parts of America. They show very clearly that many of the ostensibly endemic genera of various regions may well have originated elsewhere, and are merely making their last stand where we now find them.

Fig. 1. Geaster florissantensis.

Fig. 2. Pinus sturgisi.

Fungi.

Geaster florissantensis sp. nov. Fig. 1.

Diameter of "star" about $56^{\text{mm}}$, the segments about eight in number, five being visible, variable in form, the largest $20^{\text{mm}}$ long and about $11\frac{1}{2}$ broad at base, but one next to it only about 7 broad; color dark brown, texture apparently leathery, without any sign of venation.

Florissant, at a new station on the hillside not far from 20 (W. P. Cockerell, 1908). It occurs on a slab with numerous remains of Typha lesquereuxi Ckll., Ulmus hilliae Lx., and other plants. The appearance is exactly that of a modern Geaster in the expanded condition, and the irregularity of the segments is unlike that of any calyx known to me. Geaster is, of course, common in Colorado to-day.

Gymnosperms.

Pinus sturgisi sp. nov. Fig. 2.

Leaves in bundles of threes, apparently entire-margined, about $175^{\text{mm}}$ long and $1\frac{1}{2}^{\text{mm}}$ broad, very straight, sharp-pointed. Two fibrovascular bundles are very distinct, being preserved as white lines. In all respects, the plant agrees very closely with the living $P.\ taeda$ L., of the Eastern and Southern States.

Florissant; the type from Station 13 B (Miss Gertrude Darling, 1908), but the species was also found, less well preserved, at various stations in 1907. The species is dedicated to Dr. W. C. Sturgis, of the School of Forestry at Colorado College, in recognition of his contributions to Colorado botany. The fossil species of $Pinus$ from Florissant must now be considered to be three in number at least, separable as follows:

Leaves in bundles of five 1. $P.\ wheeleri$ Ckll. (doubtfully recorded as $P.\ paleostrobus$ (Ett.) Heer, by Lesquereux).

Leaves in bunches of three 1. $P.\ sturgisi$ Ckll.

Leaves about $175^{\text{mm}}$ long 1. $P.\ sturgisi$ Ckll.

Leaves about $70^{\text{mm}}$ long 1. $P.\ hambachi$ Kirchner.

I formerly sunk $P.\ hambachi$ under $P.\ florissantii$ Lx., which was based on a cone, but it must be restored, at least provisionally.

Heyderia C. Koch.

This genus, once widespread, is restricted to the Pacific coast region of North America ($Heyderia\ decurrens$ (Torrey) C. Koch) and China ($H.\ macrolepis = Libocedrus\ macrolepis$ Benth. and Hook. = Calocedrus\ macrolepis Kurz). At
Florissant, Colorado, it is represented in the Miocene by *H. coloradensis* Ckll., while in the Miocene of Europe, at Radoboj, *Heyderia salicornioides* (*Libocedrus salicornioides* Heer) is very well preserved. Other species, supposed to belong here, are from the Upper Cretaceous of Greenland and the Miocene of Spitzbergen.

**Angiosperms.**

_Ailanthus americana_ sp. nov. Fig. 3.

Samara about 38 mm long, 9 broad; seed 6 mm long and a little over 4 broad, placed with its long axis about 15 degrees from axis of samara; venation of wings well preserved, agreeing with that of *A. glandulosa* L.; apical part with a thickening along one side, as in Lesquereux, Cret. and Tert. Floras, Pl. xl, f. 7.

Florissant, Station 13 B, 1903. Type at University of Colorado.

_Ailanthus* (wrongfully called *Alianthus* in Knowlton's Cat. Cret. and Tert. Pl.) is at present confined to Asia, with three species. It is well represented in the Tertiary beds of Europe, and is credited with two American Tertiary species, one from the Miocene of Oregon, the other from the Green River beds of Wyoming. The Oregon species is very distinct from ours; that from Wyoming is based on a supposed leaflet with a remarkably long petiole, which seems to be doubtfully of this
genus. However, Lesquereux figures with his *A. longepetiolata* a samara, which he says “may not represent the fruit of the same species,” but which is evidently very much like that from Florissant. The seed is more transverse, however; the venation is not shown.

*Quercus knowltoniana* sp. nov. Fig. 4.

Acorn-cup 30 mm diameter; scales in about 10 rows, triangular, from about the fifth row sharp-pointed, but the more basal ones broad and angled rather than pointed; no visible marginal fringe.

Florissant (*Mrs. Charlotte Hill*). Holotype at Yale University, Cat. No. 1005. I had retained this curious fossil for months, hoping to be able to determine it, but failing to recognize its relationships. Dr. F. H. Knowlton recently visited my laboratory, and upon showing the fossil to him, he at once recognized what it was. Now that the fact has been pointed out it is so evident that the specimen is an acorn-cup that I do not understand my obtuseness on the subject. The species recalls the recent *Q. macrocarpa* Michx., the cups of which grow to an even larger size. I have no leaf from the shale that I can refer to it. The cup was evidently widely open and shallow, not partially closed as it is in *Q. lyrata*. Fossil acorn-cups have been found in the Miocene of Europe (*Q. palaeocerris* Sap., *Q. subcrenata* Sap.).

*Rosa ruskiniana* sp. nov. Fig. 5.

Represented by a bud about 16 mm long, and six in diameter. Hypanthium subglobose, no doubt producing a practically spherical fruit, covered with minute spines; sepals with very large and thick-stalked glands or gland hairs on the basal half, these very much larger than the spines of the hypanthium; apical portion of sepals long, with three or four large lobes on each side.

Florissant, Station 13 B (*W. P. Cockerell*, 1908). By the character of the hypanthium this is evidently related to *Rosa cherokeensis* Donn., but the sepals are strongly lobed. Such a rose would have trifoliate leaves, and these should resemble those of *R. hillii* Lx., at least to a considerable degree. As, however, it is impossible definitely to connect the bud with the leaves of *R. hillii* (we have not found the latter), I give the former a distinctive name; dedicating it to John Ruskin, whose copy of Lindley’s “Rosarum Monographia,” with many marginal notes, is in my library.
Hydrangea florissantia Ckll.

Rhus rotundifolia Kirchner, Trans. St. Louis Acad., viii, p. 184, is the same thing. The name rotundifolia was much earlier used in Hydrangea by Rafinesque. Kirchner’s type is, I believe, in the U. S. National Museum.

Sambucus newtoni sp. nov. Fig. 6.

Leaflet (doubtless a lateral one) about 132 mm long and 26 broad; texture thin, this and the venation exactly as in living species of Sambucus; form parallel-sided, rapidly narrowing apically to a sharp point, very much as in S. arborescens Nuttall; margin with exceedingly minute denticulations, 4 to 5 in 5 mm, and even these evanescent on the basal half.

Florissant, Station 13 B (George Newton Rohwer, 1908). The best side shows all but the base; the reverse lacks the apex, but shows nearly all of the base, which is substantially as in S. arborescens. This is the first American fossil Sambucus; in Europe the genus is represented by flowers in amber.

Lomatia acutiloba Lx. is on the same slab as Sambucus newtoni.
Anona spoliata sp. nov. Fig. 7.

Leaf apparently thick, oblong, entire, the blade 40 mm broad, and probably over 80 long (apex missing), the base broadly rounded, the midrib and petiole stout, the latter short, only about 9 mm long. Venation pinnate, the secondaries arising from the midrib at an angle mostly little less than a right angle, but varying in this respect, and gently curving upwards, terminating in submarginal arches connecting their tips, and variously enclosing areas of different shapes. Between the principal lateral veins are small and hardly noticeable ones, not proceeding far from the midrib. In the shape of the leaf, the short petiole, and the venation, this is almost exactly like the living Anona glabra L., of Florida. In one place two of the principal secondaries unite, as they sometimes do in A. glabra.

Florissant, Station 13 B (Geo. N. Rohwer, 1908). Sabina linguifolia (Lx.) Ckll. occurs on the same slab. Anona robusta Lx., from the Laramie (?) at Golden, Colorado, is a similar species, differing, however, in the character of the submarginal venation, which does not show the large enclosed areas. The resemblance of A. spoliata to A. robusta is, therefore, not nearly so close as to A. glabra. The European A.
elliptica Unger, from the Miocene of Radoboj, is close to A. spoliata in respect to the submarginal venation, but very different in the cuneate base, the leaf being very like that of Crescentia latifolia.

Juglans leonis n.n.


Rhus mensæ n.n.


Salix merriami n.n.


Zizyphus microphyllus Lx., and Magnolia lanceolata Lx., of the California Miocene, also bear preoccupied names.

Weinmannia dubiosa Ckll.

We found this at Stations 13 B and 14, at Florissant. The leaflets vary from five to seven.

Robinia brittoni sp. nov. Fig. 8.

Represented by a leaf, scarcely at all different from the living R. pseudacacia L. Five leaflets are preserved. Leaflets about 22 mm long and 9½ broad, very briefly mucronate at apex, and with short petiolules about 2 mm long, which are as usual opposite, the pairs about 14 mm apart. From the first pair of leaflets to the insertion of the leaf is only 12 mm. The shortness of the petioles agrees best with R. viscosa Vent., but the shape of the leaflets accords better with R. pseudacacia. Florissant, Station 13 B (Melford Smith, 1908). Dedicated to Dr. N. L. Britton, who has contributed so much to our knowledge of American trees.

Robinia is to-day confined to America, but it is found fossil at Öningen and other European localities.

Menyanthes coloradensis sp. nov. Fig. 9.

Represented by a crown bearing five leaves, in form and appearance exceedingly like the living M. trifoliata L., but

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