

PLANT SUCCESSION ON AN ARTIFICIAL BARE
AREA IN ILLINOIS

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The opportunities that botanists have had for studying the revegetation of bare areas of great extent have been few. The island of Kracatoa, laid bare by its volcanic explosion in 1883, has become a classic example. The Salton Sea area in southern California which is being so carefully studied by Dr. D. T. MacDougal and his collaborators bids fair to become as great a classic. The region laid bare by the eruption of Mount Katmai in Alaska, which is being made famous by Dr. R. F. Griggs, is a still more recent example. But this nearly completes the list. It is, therefore, of interest to note that we have in Illinois several bare areas of no mean proportions some of which are being left for nature to reclothe.

The areas to which I refer are those bottomland areas that have been "stripped" by coal mining companies in the practice of surface mining. Aid received from the Illinois State Laboratory of Natural History enabled me to make several visits to the properties of the Missionfield Coal Company, situated about five miles west of Danville, Illinois, during the summer of 1917. These properties which cover some thirty or forty acres are of special interest because they consist of three distinct sections which were worked at different times and therefore represent different stages of revegetation.

The area under consideration was originally covered with the bottomland forest characteristic of the region in which the sycamore is one of the dominant trees. This vegetation was all destroyed of course by the operations of the mining company and the land was left as a bare area consisting of alternating ridges, and furrows, the ridges varying from three or four feet to twelve or fifteen feet in height. I am indebted to Mr. W. G. Hartshorn for information concerning the time that has elapsed since the various parts of the area were worked by the coal company. The facts brought out by him are that the east section was operated about eighteen years ago and the middle

section about three years later, while work on the west section was started about six years ago and finished four years later.

The west section because of its recent abandonment is still largely occupied by the pioneer ruderal plants. Because of the nature of the surface (Fig. 1) both hydrarch and xerarch secondary successions are represented. In the bottoms of the furrows the two knotweeds, *Polygonum aviculare* and *Polygonum persicaria*, are the dominant and often the only plants. In the shallower furrows *Echinochloa crusgalli*, the barnyard grass, takes the place of the *Polygonum* or occurs along with it, and often scattering individuals of the giant ragweed, *Ambrosia trifida*, also are present.

The ridges present somewhat more variety in their floras although some of them are almost exclusively occupied by the sweet clover, *Melilotus alba*. Others, however, are covered with such plants as the wild aster, *Aster ericoides*; sunflower, *Helianthus hirsutus*; ragweed, *Ambrosia artemisiifolia*; evening primrose, *Oenothera biennis*, and occasional individuals of black mustard, *Brassica nigra*. On those parts of the section that have been longest abandoned one finds also patches of venus's looking glass, *Specularia perfoliata*, and of partridge pea, *Cassia Chamaecrista*, and occasional individuals of poke-weed, *Phytolacca decandra*.

The middle section of the area under consideration has been subjected to artificial interference which has not made it less interesting but has greatly retarded its revegetation. The interference is due to the fact that the mining company is almost constantly pumping water into it so that it is largely flooded as shown in Fig. 2. The shallow parts of the water are occupied almost exclusively by the cat-tail, *Typha latifolia*. Just above the water on the sides of the ridges there is usually a zone of cocklebur, *xanthium commune*. On some of the lower ridges the willow, *Salix nigra*, has become established in considerable numbers, while the higher ridges are in most cases still occupied by sweet clover, *melilotus alba*, and black mustard, *Brassica nigra*.

In the eastern section the xerarch and hydrarch successions mentioned in connection with the western section have become

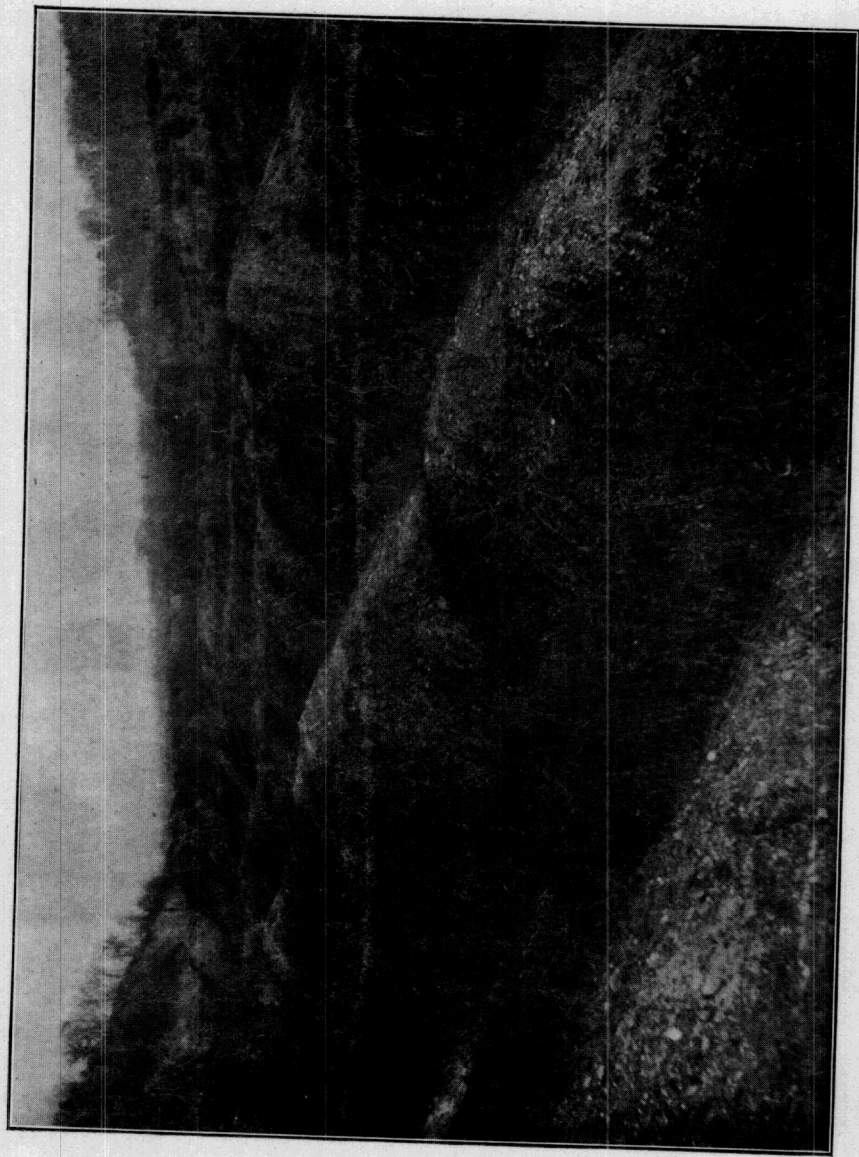


Fig. 1. The west section of the Missionfield Coal Company grounds showing the alter-

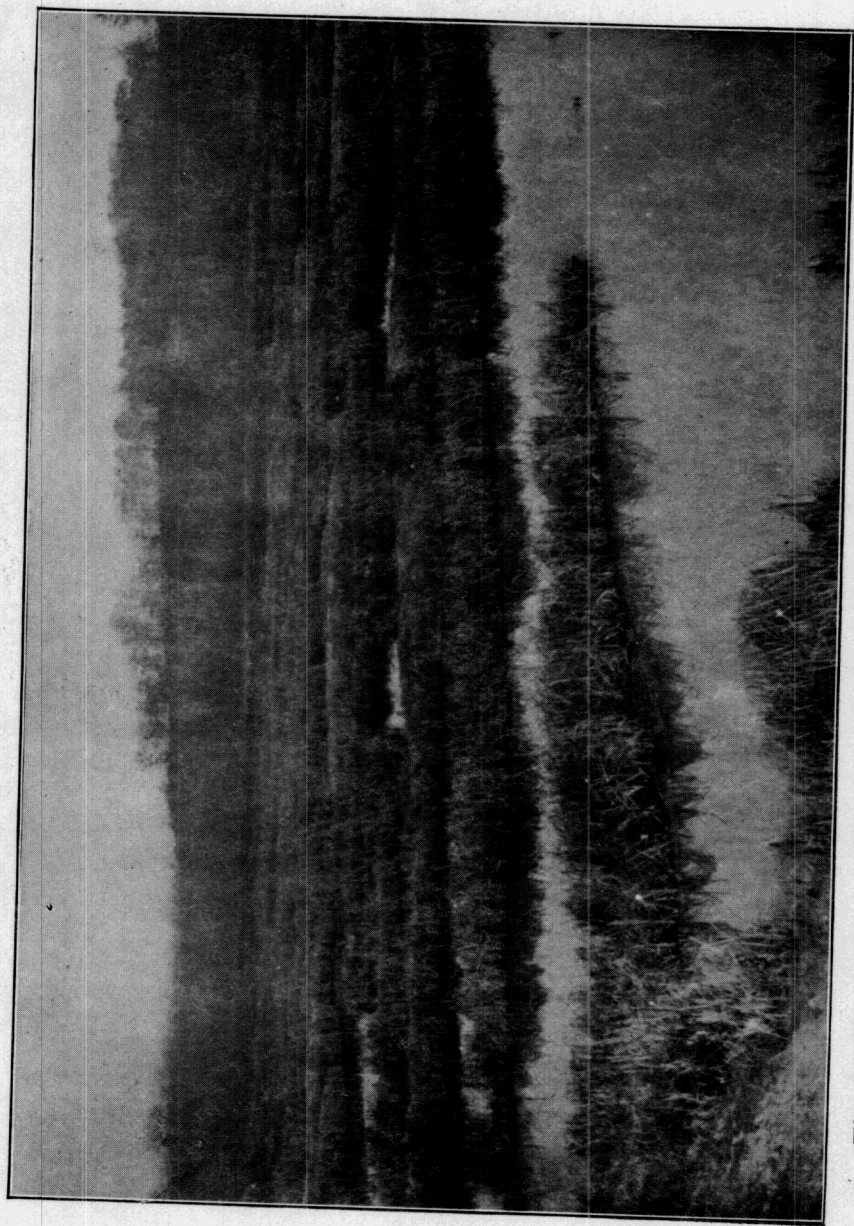
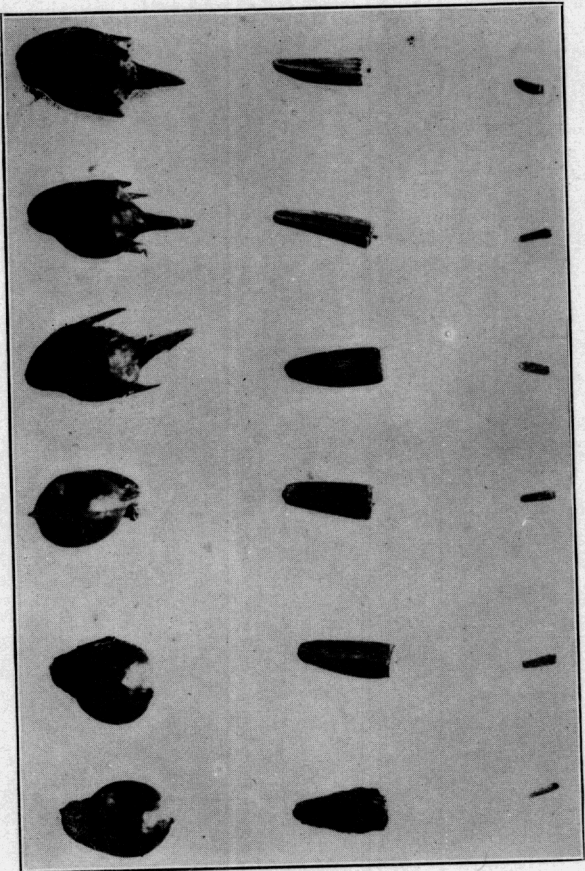


Fig. 2. The middle section of the Missionfield Coal Company. Explanation in text.



Row 1. *Erigeron annuus*.

Row 2. *Cichorium Inty-*
bus.

Row 3. *Ambrosia artemisi-*
ifolia.

PLATE III.

merged into one, and we find the vegetation well on its way toward the re-establishment of the bottom-land forest (Fig. 3). The trees consist of the willow, *Salix nigra*, which was probably the first to appear; the cottonwood, *Populus deltoides*, which occurs up to eight inches in diameter; soft maple, *Acer saccharinum*; red elm, *Ulmus fulva*, and sycamore, *Platanus occidentalis*, the last three all being small. The undergrowth is such as would be expected in such a situation and need not be described here.

As previously stated eighteen years have elapsed since this eastern section was abandoned by the mining company. Since numerous small individuals of the sycamore, one of the very characteristic bottomland trees, are already present it is probable that twenty-five or thirty years will be sufficient for the complete re-establishment of the typical bottomland forest.
