At Seneca Point, about five miles south of this locality, and in the Genundewa horizon, several more pieces of preserved wood have since been found. These specimens were enclosed mostly in nodular masses of grayish limestone and associated with the pteropod *Styliolina fissurella*. In the same locality, but in the Genesee shale immediately below, several excellent specimens have been found. Some of them represent complete woody cylinders but devoid of cortex and phloem, and range from one fourth inch to two inches in diameter. In some of these specimens the mesarch primary wood has been preserved and most of them show the grouped arrangement of the pits. These wood fragments were found in concretions of dark, dense limestone which are very abundant in the Genesee shale. However only a small per cent. of these concretions contain recognizable plant remains.

Directly across Canandaigua Lake from Seneca Point and in the Genundewa horizon more material was found. No preserved primary wood was found in these specimens, but in many cases the secondary wood was in good condition. The pits on the radial walls of the xylem cells are grouped in the same manner as described above.

On the west side of Cayuga Lake some well preserved plant material was found in a rock fall in the gorge just below the main falls of Taughannock Falls State Park. The secondary wood, which shows the grouped pitting, is in the best state of preservation of any material yet examined. The primary wood is in poorer condition. The exact horizon from which these materials came has not been determined, but the concretions within which they were enclosed closely resemble those of the Genesee shale. The Genundewa limestone is not recognizable above the Genesee shale in this locality.

During the autumn of 1926 several fragments of preserved wood were found in an outcrop of the Ithaca shale on the Cornell University campus. They consisted of both roots and stems, the largest being about three fourths of an inch in diameter. While the preservation in these specimens is rather poor, the nature of the primary wood and the pitting can be determined in some cases. A feature of interest in one of these specimens lies in the fact that the horizontal banding due to the grouping of the pits is not constant throughout the stem, but can be observed in only a few places. The majority of the tracheids show continuous pitting of the *Dadoxylon* type. These fragments did not occur in concretions as did the others but were in a bed of solid limestone of rather localized extent. Associated with the plant remains were numerous large brachiopods. This horizon is about five hundred feet above the Genundewa horizon where, or near where, most of the other material was found.

Mr. A. E. Alexander, a student at Cornell, has recently submitted a specimen from the Ludlowville shale, Spring Creek, Erie County, New York. In this specimen the wood structure has been preserved with marcasite. This material being perfectly opaque, the structure can not be studied in thin section. Consequently its exact nature has not been determined but the tracheids show two or three rows of alternately arranged hexagonal pits which are not grouped after the *Callixylon* fashion.

With the exception of the last the localities above described cover an east and west range of about fifty miles across central New York. The vertical range is about five hundred feet. They all belong to the lower part of the upper Devonian, and in every locality mentioned (except the last) *Callixylon* seems to be the predominating plant type. The locality in Erie County belongs to the middle Devonian.

The fragmentary nature of this material suggests that it was not deposited *in situ*, but represents pieces of drift wood which floated some distance before being buried and preserved. It is generally agreed that the Genesee shales, where some of the material was found, were deposited in a rather stagnant sea, and the material itself apparently represents dry land vegetation. No preserved cortex or phloem has been found in association with any of the material.

Some of the materials show faint suggestions of growth rings. In no case are they well marked and in many specimens there is no evidence of them at all. Where they do occur the cells we assume to be the summer wood have a slightly smaller radial diameter than the adjoining spring wood. In case of a stem which has been slightly crushed flattening of the cells seems to occur to a greater extent along the region of the ring.

CHESTER A. ARNOLD
CORNELL UNIVERSITY

EFFECT OF ULTRA-VIOLET LIGHT UPON DIGITALIS PURPUREA[1]

DURING the summer of 1927, an opportunity arose to test the influence of shorter rays of light upon a common medicinal plant, Digitalis purpurea or "Foxglove." In a five-section greenhouse, the center section was built of a special glass which transmits a considerable portion of the spectrum in the ultra-violet region.[2]

It was thus possible to develop the seedling plants

[1] Paper read before the Botanical Society of America, December 28, 1927.

[2] Acknowledgment is due The Vita Glass Corporation, of New York, for their cooperation in making this study.

under full exposure to these rays, while control plants in the same greenhouse were entirely out of range and received light only through ordinary, plain glass.

Seed was planted in the usual flats; and the experiment proper began when these seedlings were in the small, two-leaf stage. They were then arranged for study in two series as nearly identical as the eye could determine, each of which consisted of 160 plants.

INDOOR CONDITIONS

One series was placed under the special glass, the other under the plain glass. Henceforth, they were given identical care, keeping all other conditions uniform; soil, ventilation, moisture, and temperature as closely as possible. (A two or three degree higher temperature occurred at times under the plain glass, but at no time was it of any significance as plants were out of the greenhouse before this became high enough to be a factor).

For about six weeks, between late March and mid-May, plants were kept under close observation, and the advantage in growth was found to lie continually with those under the special glass. The second, third, and fourth pairs of leaves developed from two to four days earlier than the respective parts of the control plants. Treated plants were also somewhat larger and of darker green than the controls. Because these seedlings were to be used later in field work, no dry weight or ash determinations were made. Judgment was based upon careful consideration by four observers, including the gardener and the writer.

Seedlings used were of *D. purpurea,* and, so-called, *D. purpurea* var. *alba.* The former has typical purplish-red flowers; the latter, white flowers. The purple type, or "race," Group A-7, is somewhat sturdier than the white, Group C-23; but both give thrifty, typical plants.

OUTDOOR DISPOSAL

To decrease the chances of accident, seedlings were hardened in cold frames only five days, after holding in greenhouse until danger from frost was over. They were then transferred to the open Demonstration Garden, May 24, 1927, and set out in four adjacent rows, placing plants one yard apart each way. At this time, all were good, vigorous seedlings; but those which had the benefit of ultra-violet light were unquestionably the better in appearance.

Michigan weather last summer was very dry, but, by very frequent cultivation to conserve moisture, all plants lived. Although, at the time of the first harvest, August 10, 1927, none of the plants were above normal in size, the treated ones were still the larger. The difference, however, was no longer so striking.

PHYSIOLOGICAL TEST: FIRST CUTTING

Four samples were taken at this time, two from each group. To prepare a sample, the first twenty plants in a row were cut and the leaves well mixed. All samples were dried under uniform conditions. The crisp leaves were then crushed by hand and again thoroughly mixed before milling.

Tinctures were prepared by U. S. P. Method, and turned over with routine samples for physiological testing, which is done by the M. L. D. Frog-heart Method. Results obtained, shown in Table I, rather strikingly indicate that the stimulus received in seedling stage is carried over under field conditions.

TABLE I

Plants tested	First crop 8/10/27 Potency of Tincture		Increase of potency
	Exposed under special glass	Exposed under ordinary glass	
Group A–7	500% of St'd.	400% of St'd.	25.00%
Group C–23	335% of St'd.	300% of St'd.	11.66%

PHYSIOLOGICAL TEST: SECOND CUTTING

To provide a check series, the cut plants were allowed to grow again until September 27, 1927, when a second test was made, extreme care being taken to repeat in every detail the previous procedure. For this cutting, plants were at least 50 per cent. larger than before, due to a very favorable fall season with continual fine weather and frequent warm showers. So far as the eye could detect, there was at this time no difference between the two series; the plants not treated had "caught up" to the treated ones in size and general appearance. It is, therefore, the more interesting to note, Table II, that the potency was again higher, in each group, in the drug exposed to the ultra-violet rays during development of seedling stages.

TABLE II

Plants tested	Second crop 9/27/27 Potency of Tincture		Increase of potency
	Exposed under special glass	Exposed under ordinary glass	
Group A–7	400% of St'd.	300% of St'd.	33%
Group C–23	300% of St'd.	225% of St'd.	35%

These plants have all been mulched and, if they survive the winter, will be followed during their second-year stage. Meantime, it seems clear-cut that, so far as may be judged by one year's study, exposure to ultra-violet light is beneficial to both growth and potency of Digitalis purpurea.

ADELIA MCCREA

PARKE, DAVIS AND COMPANY,
DETROIT, MICHIGAN