THURSDAY AFTERNOON SESSION

December 8, 1966

The afternoon session convened at 1:15 p.m. and began with a symposium on the propagation of specific plants. Dr. Charles E. Hess served as moderator.

MODERATOR HESS: Our first speaker this afternoon is an old friend to all of us, Al Fordham of the Arnold Arboretum who will tell us about the propagation of hard to root woody plants.

HARD TO ROOT WOODY PLANTS

ALFRED J. FORDHAM
Arnold Arboretum of Harvard University

In 1954 the Arnold Arboretum received a plant of *Kalmia latifolia rubra* from the Weston Nurseries of Hopkinton, Massachusetts. It was one of six selected from many thousands grown there through the years and was thought to be a seedling from one of Charles O. Dexter's specimens. Together with his important Rhododendron accomplishments, Dexter also made efforts to assemble superior forms of mountain laurel at his estate in Sandwich Massachusetts.

In 1957 when Roger Coggeshall was at the Arnold Arboretum, he worked with this clone and by using 2,4,5-TP succeeded in rooting 21 of 35 cuttings. They were made on the 20th of September and potted on the following 12th of February. The slides which follow show cuttings taken from plants of that propagation and they therefore are in a clonal line. Six 3-foot plants were moved into the greenhouse in the summer of 1965 so that soft wood cuttings could be processed as described by Alan D. Cook in Volume 10 of the Plant Propagator. However the pressure of work was such that they remained through summer and on until March of 1966. Cuttings were taken from growth lignified to a degree where stem bases were brown in color and firmly woody. Bases were wounded on opposite sides as is the practice with rhododendron cuttings.

Nine treatments were tested, using formulations furnished by Mrs. Barbara Emerson of the Amchem Research Department, Ambler, Pennsylvania. The 2,4,5-TP preparations were in powder form while IBA, and IBA plus NAA combination was in a stock solution. The limited amount of material available provided 10 cuttings for seven treatments and five each for two. All cuttings were lifted and evaluated on June 29, 1966.

A quick dip treatment using a 1% solution of IBA led to seven cuttings rooted and three callused.

A dip in 2% IBA solution led to five rooted cuttings, and 5 with small calluses.

A combination of 500 ppm each of IBA and NAA resulted in 7 cuttings rooted and 3 with small calluses.

The most successful treatment proved to be a combination of 1000 ppm each of IBA and NAA. Ten cuttings rooted uniformly and developed excellent root systems.

As a control, five cuttings were wounded and inserted without chemical treatment. By June 29, two had rooted, one cutting had a large root system and a second one was starting.

Five cuttings were also treated with a preparation of 8 mg IBA in a gram of talc (similar to Hormodin #3) with the fungicide thiram added at the rate of 15%. Two of these were rooted.

2 4 5-TP at 1000 ppm resulted in 10 cuttings rooted.

2,4,5-TP at 5000 parts per million led to 8 rooted and 2 with calluses.

Treatment with 2,4.5-TP at 10,000 parts per million led to a production of outsized calluses. Five cuttings went on to root above the callus while 5 did not. They were returned to the propagating case for another month. When examined after that time the calluses had increased in size and 6 cuttings had initiated roots above the callus. By November 21 all were rooted but only one had produced a growth flush, which may indicate that the buds have been inhibited by the strong 2,4,5-TP dosage.

IBA plus NAA at 1000 ppm each was the most effective treatment followed by the 1000 ppm 2,4,5-TP. However, it should be emphasized that these cuttings, though hard and woody, came from greenhouse material which may have had an effect. A new series of cuttings taken out-of-doors and inserted in August of this year look promising, leading to the suspicion that this particular clone has the ability to root well.

At the Arnold Arboretum the propagation of broad-leaved evergreens is carried out in polyethylene chambers. The benches are six inches deep and are constructed of ¾ inch transite. A 2x4 inch mesh welded wire known as turkey wire or utility wire is used to support the plastic covering. It is bought by the roll and can be cut and bent to any desired shape. The medium for broad-leaved evergreens is sphagnum peat moss and perlite mixed in equal parts. Bottom heat is maintained at 75°.

Albizia julibrissin stem cuttings will not root except in the juvenile stage but this species will propagate well from root cuttings taken in spring. Root pieces about ½ inch in diameter and 3 inches long were placed vertically in pots and 8 out of 10 cuttings were successful. Frequently shoots will appear in clusters from root cuttings of *Albizia.* When the surplus shoots are removed and inserted as cuttings they root readily as they are juvenile. Shoots that develop from root cuttings of *Koelreuteria paniculata* behave in a similar manner.

Many cuttings which root readily present a first winter survival problem, for they go into dormancy and never recov-

er. By leaving them undisturbed in the rooting medium and providing a cold period, loss can often be avoided. Cuttings of *Magnolia stellata* were inserted on the 24th of July and moved to cold storage the following November. On March 23rd they were returned to the greenhouse where 94% came into growth. Cuttings handled in this manner produce outsized root systems and therefore grow quickly when they are transplanted.

In another experiment 40 cuttings of *Magnolia kobus* x *stellata* were divided into two lots and inserted under polyethylene plastic. Lot #1 was placed in a chamber with bottom heat at 75°, while Lot #2 was put in a chamber without bottom heat. All cuttings in Lot #1 rooted heavily but only one cutting in Lot #2 did so.

During past meetings of this group *Taxus baccata repandens* has been discussed as subject considered difficult to root. A specimen at the Arnold Arboretum was acquired in 1890 and is now about 7 feet tall by 15 feet in diameter. Professor Ray Keen of Kansas State University visited us last year and requested that we root cuttings selected only from excurrent shoots which it produces abundantly. He suspects that propagants from this part of the plant might lead to specimens with characteristics similar to the cultivar known as 'Rams' — Horn Yew'. With the thought that propagational information might be acquired, the cuttings were treated in three different ways. Lot #1 was treated with a trade product called Hormo-Root-C which comprises 8 mg of IBA in a gram of talc together with 15% thiram. Lots #2 and #3 were treated with powder formulations of IBA at 1% and 2% respectively. Lots #1 and #2 each rooted 100% but the root systems of Lot #1 were far superior, probably due to the fungicide. During the 1962 Plant Propagator's Society meeting, Dr. Charles Hess described work at the Boskoop Experiment Station where the rooting of cuttings was greatly improved by adding captan to root inducing substances. After hearing his remarks we prepared a mixture as follows: fifty grams of Hormodin #2 and #3 were each combined with 10 grams of captan 50% wettable powder. During the 1963 summer season the wide variety of species that we routinely propagate were treated with these on a comparison basis. The results were so strikingly favorable that all powders since that time have contained a fungicide. At the Arnold Arboretum we make it a practice to use large cuttings when dealing with such subjects for we feel they root faster, better and often save years in producing specimens.

References concerning the propagation of *Cytisus* by cuttings often recommend specific sizes, one mentions cuttings two to four inches long, another suggests slender side shoots. Such small cuttings are neither essential nor desirable. They root but produce slender, brittle roots difficult to process. Cuttings of *Cytisus praecox* ranging in length from 2 to 40 inches

were gathered in late November, wounded, treated and placed in containers on an open greenhouse bench. In about six weeks all had rooted, with the larger cuttings producing apportionately large root systems.

The following is an example of the odd and sometimes perplexing things that may occur in plant propagation. On the 22nd of May, 1959, the director brought a branch of *Viburnum opulus* 'Notcutt's Variety' to the greenhouse. The plant was destroyed by vandals over the weekend and had lain in the sun for a couple of days. Spring growth had just begun and the new shoots were about ½ inch long — it was badly wilted and appeared hopeless for propagation. If anyone else had made the request it no doubt would have been tossed into the trash as soon as he rounded the corner. However, we made 15 cuttings comprising 3 sets of nodes. In two weeks, to our astonishment, extensive roots appeared at all nodes both above and below the medium, along the stem and even on the leaf ribs.

The propagation of woody plants difficult to root would have been a simpler topic fifteen or twenty years ago than it is today. A long list of subjects considered impractical to root at that time are now propagated commercially as routine practice. It has been said that with the advent of anti-biotics the science of medicine emerged from the dark ages. It may also be said that technological advances have accomplished much the same in the science of plant propagation. Root inducing substance procedures, intermittent mist and polyethylene chambers have been developed to a high degree of perfection. Many of the great strides made during recent years may be credited directly to this organization, the International Plant Propagator's Society.

MODERATOR HESS: Thank you, Al, for a fine presentation. Our next speaker is Tom Pinney, Jr., one of the Society's most progressive nurserymen who utilizes sound production techniques, cost accounting procedures and who has contributed tremendously to the Society and the industry. Tom will tell us about the propagation of birch.

THE PROPAGATION OF BIRCH

THOMAS S. PINNEY, JR. AND GENE W. PEOTTER
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Our nursery has sold Birch to the nursery trade for the past 100 years. During this time we have had many complaints and unhappy customers because the stock was collected and had notoriously poor root systems with crooked stems. The situation finally became so disturbing, and the demand was so great, that we decided that we must meet this problem with positive thinking and somehow develop a program of mass producing Birch in the nursery. As a result, 6 years ago