

The first part of the morning session was moderated by Tim Brotzman.

Plant Exploration in Hubei

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In 1879 after ascending the Ygantze River as far as Inchang, plant explorer Charles Maries reported that all the Chinese species of any merit had already been introduced. His view was widely accepted for over 20 years. In fact, in 1899 when Ernest Wilson was dispatched in search of *Davidia involucrata*, on behalf of Veitch Nursery of England, he was instructed, "Stick to the one thing that you are after, and do not spend time or money wandering about. Probably almost every worthwhile plant in China has now been introduced" (Wilson, 1929). Fortunately, Wilson did not follow this charge too closely and in the course of his Asian journeys over the next 11 years, he introduced well over 1000 new plants and literally changed the face of Western gardens.

Today, a hundred years later, attitudes similar to those of the 1880s still prevail. Even in botanical gardens, many people feel that any temperate garden plant species of worth has already been collected and tested. Yet, in my travels in China and Korea, I found a tremendous wealth of plants waiting to be tapped. For example, a quick review of the modern botanical literature reinforces this impression. In Fang, Wen-Pei's monograph of Chinese maples, he acknowledges 143 species (Fang, 1981). Of these, only six can be found readily in the American nursery trade and another 14 species can be readily located in botanic garden collections. One might quibble about the taxonomic status of some of these species, or a careful search might turn up a few more of these species growing in American nurseries or botanic gardens, however, the fact remains that less than 15% of all Chinese maple species are widely known in North America. Furthermore, a few undescribed species are probably still lurking in remote areas of China.

A high priority of current plant exploration programs is the reintroduction of new germplasm for species that are already under cultivation. Several widely grown landscape plants introduced from China are already showing loss of vigor from successive generations of inbreeding. Often the genetic pool was narrow from the start and successive generations of inbreeding have exacerbated the problem. Poor vigor in some lines of *Cornus kousa* has been attributed to this problem. Dr. Elwin R. Orton of Rutgers University, who has been active in hybridizing *C. kousa* and *C. florida*, reports: "Growers are urged to exercise caution in the selection of their seed source for growing seedlings of this species (*C. kousa*) as the seedling material in commerce today exhibits tremendous variation in plant vigor and quality. It is my belief that seed sources utilized at the present, in some cases, represent a relatively narrow genetic base as result of brother-sister matings among seedlings that trace to a single introduction of seeds collected abroad from a limited number of plants" (Orton, 1985).

Furthermore, when plants growing in North America originate from a single collection, these collections do not fully represent the potential genetic variation capable of expressing differences in size, habit, flower color, foliage quality,

hardiness, and adaptability to various environmental stresses. Many species like *C. kousa* are distributed over a wide geographic range and plants originating from different parts of that range will have different adaptabilities. For example, plants from the southern part of the range might be more heat tolerant while those from the north are likely to be more cold hardy.

With these issues in mind, a group of botanic gardens has come together to encourage active scientific exchange between Chinese and North American Botanical Institutions. Efforts to build collegial relationships in China began in 1991 when a NACPEC (North American China Plant Exploration Consortium) sponsored team composed of Lawrence Lee, U. S. National Arboretum; Peter Bristol, Holden Arboretum; and Paul Meyer, of the Morris Arboretum of the University of Pennsylvania to develop the foundation for a 10-year program of scientific collaboration.

The NACPEC plan involves the active two-way exchange of scientific information, plants, and seed, and personnel between China and North America. In addition to plant exploration trips in China, several American arboretums will host senior staff from the Nanjing Botanical Garden in 1995. The director of Beijing Botanic Garden plans to visit several NACPEC institutions to evaluate methods of promoting conservation in China. We are also exchanging North American and Chinese forestry species for timber research. All of these NACPEC initiatives seek to broaden our understanding of the diversity found in native plant populations; expand scientific exchange between our institutions; and provide nursery professionals with plants adaptable for use in North American gardens.

In the autumn of 1994, a NACPEC team visited Wudang Shan range, located in northwest Hubei Province. Explorers included representatives from the Arnold Arboretum, Longwood Gardens, Morris Arboretum, U. S. National Arboretum, and Nanjing Botanic Garden. The targeted area is famous for precipitous peaks, ancient palaces, and Taoist temples. Though the central peak of Wudang Shan has been visited by Taoist pilgrims for centuries, we found ourselves to be the first western visitors ever to visit the nearby villages.

As plant collectors, we selected this area for its exceptional diverse flora, among the richest in the temperate world. Unexplored by plant explorers who visited China early this century, this area now yields a rich diversity of seed of plants from a variety of microclimates. The plants are likely to be well-adapted to areas of Eastern North America ranging from Atlanta to Boston.

High on the list of targeted collection species is the paper-bark maple (*Acer griseum*). This maple is cultivated for its outstanding shiny exfoliating orange bark. It has been grown in the U.S.A. since the early twentieth century. All the plants in this country can be traced to one or two early collections. It is likely that this is an example where successive generations of plants in the United States have become inbred. After a number of days of searching, the team discovered several colonies of paperbark maple growing in the forest understory, in the shade of *Quercus aliena*, *Juglans regia*, *Pinus tabuliformis*, and *Castanea mollissima*. The trees were spotted growing both on thin soils over rock outcrops as well as in deeper, moister soils at the base of rocky cliffs. As might be expected, the trees growing in the deeper, richer soils were larger and more vigorous. As in cultivation, a high percentage of the seeds collected were hollow, not containing an embryo. A small percentage of the seeds, however, perhaps 5% to 10%, did contain embryos.

Another species that has generated much excitement is *Emmenopterys henryi*. This tree species, a member of the *Rubiaceae*, has been given an official conservation status of "vulnerable" because its forest habitat has been rapidly cleared for agriculture and by indiscriminate cutting. This large tree grows to 90 ft with showy clusters of white flowers in late summer. The bracts of the flowers persist into mid autumn, taking on tan to rose tints as the small capsules ripen. Only one group of two trees was found during the Hubei expedition, fortunately, one of these trees produced a heavy crop of seed.

Another high priority of the expedition was to select trees that might be well adapted to stressful urban conditions. The oriental cork bark (*Q. variabilis*) is one such urban street candidate. This tree has dark green, shiny leaves similar to those of chestnuts and its corky gray bark is attractive year round. It is well-adapted to poor disturbed soils in China and it vigorously resprouts following forest cutting or disturbance.

Chinese zelkova (*Zelkova sinica*) is another species that has potential as an urban street tree. In many ways it is similar to the more common *Zelkova serrata*. However, its bark exfoliates more dramatically, revealing a bright orange inner bark. Several mature specimens of this species now grow in American botanic gardens including the Arnold Arboretum and Brooklyn Botanic Garden. They are both beautiful and well adapted to urban conditions, but this species is virtually unknown in the American nursery trade.

Chinese witchhazel (*Hamamelis mollis*) and its hybrids are rapidly gaining favor in American gardens. They bloom in mid-winter when few other plants provide color. The species grows on dry, rocky cliffs in the forest understory to a height of 6 meters in association with *P. tabuliformis* [syn. *P. tabulaeformis*], *Q. aliena*, *Platycarya strobilacea*, and *C. mollissima*.

In all, the Hubei expedition yielded over 130 collections of seeds and cuttings. Each collection from the expedition was carefully documented with multiple herbarium specimens that will be filed in both Chinese and North American herbariums. Detailed collecting notes also back up each composite collection. Plants will be grown and evaluated in NACPEC cooperating gardens and surplus plants will be disseminated to other gardens and commercial institutions for further evaluation. Each of these collecting trips is only the first step in a long-term program of evaluation and introduction.

LITERATURE CITED

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