

NEBC MEETING NEWS

October 2001. President Lisa Standley introduced Dr. Kanchi Gandhi, Gray Herbarium Card Index Bibliographer and Database Manager, and Editor of the International Plant Name Index for Harvard University. Gandhi spoke to us on “The Phytogeography of India.” To familiarize the audience with the subcontinent, Gandhi presented a series of slides showing the geographical, geological, and political India. British India at one time included Sri Lanka (Ceylon) and Myanmar (Burma), as well as what is now Pakistan, part of Afghanistan, and Bangladesh. In 1907 J. D. Hooker divided what was then India and Malaysia into nine phytogeographical provinces. Of these, Sri Lanka, Myanmar, and Malaysia represent three provinces, whereas the remaining six provinces encompass what is now recognized as India: (1) the Eastern Himalayan Province (including Nepal) receives 100–600 in. rain/year and the vegetation is lush; (2) the Western Himalayan Province is relatively drier than its eastern counterpart; (3) the Indus Plain is dry, with desert areas and thorny vegetation; (4) the Gangetic Plain receives moderate rainfall and is characterized by dry deciduous forest; (5) the Malabar Province (Western Ghats) along the southwestern coast receives 75–200 in. rain/year with rainfall declining markedly as one moves east, and it supports a variety of forest types; and (6) the Deccan Province on the eastern side of the Indian peninsula is drier, and is characterized by a dry deciduous forest.

Gandhi then showed slides of plants that occur in most parts of India. These included *Ficus religiosa*, commonly called the Bo-tree because Buddha was sitting under this tree when he received enlightenment. It is native in the Himalayas but is planted throughout India, especially in temples. *Ficus benghalensis*, the banyan tree, is a common shade tree; it keeps producing prop roots and can extend over a large area if undisturbed. Others are widely planted because of their economic or medicinal value. Examples included: *Azadirachta indica* (neem); *Mangifera indica* (mango); *Tamarindus indica* (tamarind); *Musa* (banana); *Artocarpus* (Jack fruit); and *Moringa oleifera* (called the miracle plant because of the high vitamin and mineral content of its leaves and fruits). Gandhi also mentioned several other common plants including succulent members of the Euphorbiaceae found in the scrub area of the Deccan phytogeographic province and some

common aquatics such as *Trapa*, *Nymphaea*, *Nelumbo*, and *Ottelia*.

Next, Gandhi described some of the regional diversity in India, focusing first on the Eastern Himalayan region and its botanical affinities with China. Some genera the region has in common with eastern Asia are *Reevesia*, *Dillenia*, *Adina*, and *Alnus*. In contrast, he described a sort of transect of the vegetation in Hassan, which is representative of the diversity in the state of Karnataka on the Arabian Sea. Southwestern Hassan is characterized by moist deciduous forest, rainforest, and semi-evergreen forest typical of the Malabar phytogeographic province. This end of the spectrum receives between 100–200 in. rain/year and one can find species of *Drosera*, *Garcinia*, *Costus*, *Arisaema*, and *Strobilanthus* as well as *Piper nigrum* and several species of palms. In northeastern Hassan the rainfall is only 15–25 in. per year and the vegetation is similar to that of the Deccan phytogeographic province: scrub and dry deciduous forest. Some notable plants of this area are *Gloriosa superba* (a lily with tendril-like leaf tips), *Dodonaea viscosa* (varnish leaf), *Pterocarpus marsupium*, *Tectona grandis* (teak), and *Santalum album* (the fragrant sandalwood tree).

Once we had some idea of the diversity of the Indian flora, Gandhi went back to the theme of phytogeography. He stated that the broad divisions of Hooker were modified in 1939 by Chatterjee and in 1955 by Razi; the latter identified 21 phytogeographic regions within present-day India. Although India is about one third the size of the United States, it has a relatively diverse angiosperm flora of about 17,000 species compared with 25,000 for the U.S. Hooker commented that India was a “meeting place” for plants from surrounding regions and suggested that it had no recognizable indigenous species. Subsequent work has shown this to be an overstatement; although India has no endemic families, about 140 genera and 5100 species (ca. 30% of the flora) are endemic. Three areas of endemism are identified, with most of the endemics occurring in the Himalayas (3500 spp.) and the Malabar province (1500 spp.). These two regions of high endemism are separated by the largely sedimentary Gangetic Plain, resulting in a second type of unique distribution: disjunct genera. For example, 75 species of *Impatiens* are found only in the Malabar Province and 100 in the Himalayas, while none occur in the Gangetic Plain. Another disjunct genus is *Rhododendron*, with one species in the south and over 100 in the Himalayan region.

Gandhi said there were two hypotheses to explain the disjunct distributions: long distance dispersal and Pleistocene glaciation that once covered southern India. Gandhi concluded his presentation by showing slides representing families and genera with disjunct or endemic distributions within India.

November 2001. The evening's speaker was Jennifer Forman, a graduate student in the Ph.D. program in the Biology Department at the University of Massachusetts—Boston and student representative to the NEBC Council. She presented a talk entitled "Through the Looking Glass: History and Consequences of the Introduction of American Species into Europe."

Jennifer introduced the topic by pointing out that although there was a high level of concern about invasive plants in the United States, many of which were introduced from Europe, few have explored the fate of American introductions into Europe. Jennifer has conducted an extensive literature review and developed a database of 6000 American (North, Central, and South American) plant introductions into Europe to address that issue. Her talk was focused on how the exchange of plant species between Europe and America affected the floras of each region, and on the history and current status of American plants introduced into Europe.

In developing her database, Jennifer grouped introduced plants into four categories. In the first category are benign introductions; this group includes plants that cannot grow on their own in the new area. The second group includes casuals and escapes that are occasionally found outside cultivation, but are not able to maintain their populations. The third group consists of naturalized plants that are able to establish populations and reproduce in the wild. Finally, there are the invasive or weedy species that are established and spreading.

Approximately 26% of the flora of North America consists of naturalized plants, with European introductions having a particularly large impact. Most introductions were intentional and followed colonization, but plants were also introduced accidentally. Currently, about 7% of the North American flora can be considered invasive. Examples of European plants that are now invasive weeds include *Lythrum salicaria*, *Cytisus scoparius*, and *Vincetoxicum nigrum*.

As with European introductions to America, most introductions

of American plants into Europe were deliberate. Trees such as *Pinus strobus*, *Picea sitchensis*, and *Prunus serotina* were introduced so they could be used in shipbuilding and for fuel. Other plants were sent to physic gardens where they were valued for their medicinal properties (e.g., *Sassafras albidum*, *Podophyllum peltatum*) or because of their horticultural interest (e.g., *Chrysolepis chrysophylla*, *Cypripedium acaule*). Many of the prominent names in North American botany, such as Mark Catesby, John Bartram, André Michaux, and John Tradescant, were responsible for introductions through the seed and other plant material they sent back to Europe. For example, Tradescant and his son introduced *Robinia pseudoacacia*, *Rhus typhina*, and *Liriodendron tulipifera* to England. As in America, other introductions were accidental and arrived in Europe along with textiles, in ship's ballast, or with transported animals. Some of the American species introduced into Europe, including the orchid *Bletia purpurea* and the cactus *Echinocereus triglochidiatus* remain in cultivation to this day. Others, such as *Tradescantia pallida*, are occasional escapes. A few, including *Pinus radiata*, *Lysimachia terrestris*, and *Mimulus guttatus*, have become naturalized. Some of the naturalized plants, such as *Rhus typhina*, *Rudbeckia hirta*, and *Phytolacca americana* are weedy in the United States. Of the approximately 6000 introductions to Europe from America in her database, about 8% have become either naturalized or weedy in Europe.

Jennifer pointed out that there have been a number of explanations as to why so many European plant species are invasive in America, but not vice versa. One suggestion is that the Old World species are better weeds in that they grow faster and produce more seeds. A second explanation is related to the fact that immigration rates were much greater from the Old World to the New. It may also be that ecosystem damage due to deforestation and post-colonization grazing facilitated the establishment of introduced species.

Using contingency tests, Jennifer was able to test several ideas about the species introduced to Europe from America. She was able to show species from some families (e.g., Poaceae and Amaranthaceae) were more likely than those from other families to become weedy. In addition, the latitude of the origin of the species affected the probability that a species would become naturalized in Europe. For example, more species from North Amer-

ica are naturalized in Europe than those introduced from Central or South America. She also showed a very clear positive relationship between the number of methods of introduction and the likelihood that a particular species would become established. Finally, she pointed out that the weediness of a species in America was a good predictor of whether a species would become established in Europe. She concluded by suggesting that a warning list be made available for the 222 weedy American species introduced into Europe that are not yet invasive there.

—KAREN SEARCY, Recording Secretary *pro tempore*.



Searcy, Karen. 2002. "NEBC MEETING NEWS." *Rhodora* 104, 101–105.

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