Magnolia obovata

Eric Hsu, Putnam Fellow, Arnold Arboretum of Harvard University
Photographs by Philippe de Spoelberch

I first encountered *Magnolia obovata* in flower at Sir Harold Hillier Gardens and Arboretum, Hampshire, England, where the tightly pursed, waxy, globular buds teased, but rewarded my patience. As each bud unfurled successively, it emitted an intoxicating ambrosial bouquet of melons, bananas, and grapes. Although the leaves were nowhere as luxuriously lustrous as *M. grandiflora*, they formed an elegant wreath for the creamy white flower. I gingerly plucked one flower for closer observation, and placed one in my room. When I returned from work later in the afternoon, the room was overpoweringly redolent of the magnolia's scent. The same olfactory pleasure was later experienced vicariously through the large *Magnolia* × *wiesneri* in the private garden of Nicholas Nickou in southern Connecticut.

Several years earlier, I had traveled to Hokkaido Japan, after my high school graduation. Although Hokkaido experiences more severe winters than those in the southern parts of Japan, the forests there yield a remarkable diversity of flora, some of which are popular ornamentals. When one drives through the region, the silvery to blue-green leaf undersides of *Magnolia obovata*, shimmering in the breeze, seem to flag the eyes. In "Forest Flora of Japan" (1894), Charles Sargent commended this species, which he encountered growing through the mountainous forests of Hokkaido. He called it "one of the largest and most beautiful of the deciduous-leaved species in size and [the seed cones] are sometimes eight inches long, and brilliant scarlet in color, stand out on branches, it is the most striking feature of the forests."

Ecology and distribution

The specimens I saw in Hokkaido, Japan during the summer of 1999, were rarely more than twenty to thirty feet tall; in some cases, the trunks emerged from the side of the stumps. Neither flowers nor fruits were found on the trees. Presumably, the Japanese keep *M. obovata* coppiced to generate more wood, which is highly valued for furniture and utensils. *Magnolia obovata* grows with *Quercus mongolica* var. *grosseserrata*, *Tilia japonica*, *Acer mono*, *Betula platyphylla* var. *japonica*, *Betula maximowicziana* Regel, *Sorbus alnifolia* C. Koch, and

Magnolia obovata.

Magnolia kobus. In clear-cut areas, it is occasionally seen with planted seedlings of *Abies sachalinensis* (F. Schm.) Mast. Vasak (1973) reported finding this species on Kunashiri Island, one of the islands within Southern Kuriles near Hokkaidom, associated with *Abies sachalinensis. Picea ajanensis* Fisch., *Phellodendron amurense* Rupr. var. *sachalinense* F. Schm., *Quercus mongolica* Fisch. var. *grosseserrata* (Bl.) Rehd. & Wils., *Kalopanax septemlobus* (Thunb.) Kiodz., *Betula ermanii* Cham., *Acer ukurunduense* Trautv. & Mey., *Populus sieboldii* Miq., *Prunus sargentii* Rehd., *Sorbus commixta* Hedl., *Diervilla middedorffiana* Carr., *Euonymus macropterus* Rupr., *Sambucus sieboldiana* Bl., and *Menziesia pentandra* Maxim. Other shrubs in the understory were *Lespedeza bicolor* Turcz., *Skimmia japonica* Thunb. var. *intermedia* Kom. f. *repens* (Nakai) Hara), *Ilex rugosa* F. Schm., *Empetrum asiaticum* Nakai, and *Vaccinium praestans* Lamb.

Life history

Like other members of the Magnoliaceae, *Magnolia obovata* has large, fragrant flowers devoid of nectar, that are borne successively over time, and close with decreasing light. They are generally pollinated by beetles, rather than honeybees or bumblebees, which tend to seek nectar-rich flowers. While engorging themselves on the pollen grains,

the beetles inadvertently disperse pollen from one flower to another. These floral traits are characteristic of primitive angiosperms (Thien 1974, Bernhardt and Thien 1987).

Kikuzawa and Mizui (1990) have carefully chronicled the flowering and fruiting phenology of *Magnolia obovata*. Flower buds are developed in the previous year and they are readily distinguished from the narrow vegetative buds by their swollen bases. While other magnolias, such as *Magnolia denudata* or *Magnolia* × *soulangeana*, flower well before the leaves, *Magnolia obovata* flowers after five to eight leaves emerge in mid-May. Turning purplish-brown, the bud swells noticeably, shredding the brown bracts. The three green outer tepals, enclosing the flower, are revealed, exposing the white petals over time. In several occasions, the stigmas become receptive before the flower fully opens, while the stamens remained huddled against the androphore (the prominent center of the flower). Sometimes the stigmas are receptive when the petals unfold entirely and the strong fragrance is emitted. This stage is regarded as that of the female, and it lasts until the following day. The next day, the male stage commences when the stamens open and release pollen and now unreceptive stigmas become appressed against the gynoecia. Between the female and male stages, the flower closes and then opens again after the male stage when it signals its decline with the shed of stamens. Climatic conditions may vary the flowering progression. Approximately ten days after flowering, the gynoecium swells and elongates about 3.9in (10cm) in mid-July. By mid-September, the fruit capsules are 5.9–7.9in (15-20cm) and have turned red. Kikuzawa and Mizui (1990) hypothesized that the short longevity of the flowers, the long flowering period, and simultaneous occurrence of flowers at different stages is related to the mimicry of the female-stage flower to the male-stage flower.

Interestingly, *Magnolia obovata* invests considerable energy into fruit production that is poorly compensated by the number of seedlings that survive to sapling stage. Inbreeding depression has been confirmed in *Magnolia obovata* (Isagi et al. 2004; Ishida 2006). A paternity analysis of 322 seedlings raised from seeds from fourteen flowers of three adult trees revealed that 70.8% of the seedlings originated from self-pollination, but these seedlings rarely survived to sapling stage (Isagi et al. 2004). In fact, 29.2% of the seedlings were the result of outcrossing; only 10.9% were from trees within the research site (170 acres) and 18.3% were from trees outside of it (Isagi et al. 2004). Ishida (2006) confirmed these results that significant inbreeding depression for later survival leads to a low level of inbreeding with regard to gene transmission to the next generation. Because nat-

ural selection had eliminated those of self-pollinated origins, the competitive advantage belonged to those of outcrossing origins. Thus *Magnolia obovata* is able to maintain a reasonable level of genetic diversity in the populations.

As it is the typical case for the genus (Delphino 1875; Eyde 1975; Endress 1990; Faegri & van der Pijl 1979), beetles (*Cetonia roelofsi* Harold and those of *Oedemeriidae, Mordellidae, Cerambycidae,* and *Elateridae*) are the primary pollinators of *Magnolia obovata,* although bumblebees and flies have been reported as well (Tanaka and Yahara 1988).

Magnolia obovata seed cone. Notice the bright red hue.

Economic use

Like its close cousin *Magnolia officinalis, Magnolia obovata* is an economically important timber tree in Japan. The soft, close-grained wood is often used for furniture, building interiors, engravings, and clog supports. Farmers sometimes use the leaves to wrap foods, especially on rice-planting days (Kurata 1971). Sargent (1888) observed that the Japanese preferred the wood for sword sheaths, and retained the charcoal to polish lacquer.

Horticultural and cultivation history

Magnolia obovata was first introduced to cultivation in United States in 1865 by Thomas Hogg. Hogg planted one tree raised from the seed in his brother's garden in 84TH Street, New York City, near the East River—this tree in 1888 was "twenty-eight feet high, with a trunk thirty-one inches in diameter three feet from the ground; and it will be a misfortune if the improvements now being made in that part of the city necessitate its destruction (Sargent 1888)." An effort to dis-

Magnolia obovata with wasp.

tribute the plants in the nursery trade was carried out by S.B. Parsons, in Flushing, Queens, New York (Sargent 1888). Skan (1906) noted that the specimen illustrated in Curtis's *Botanical Magazine* was a plant grown at Royal Botanic Gardens, Kew, from seeds received from a Japanese nursery (likely Yokohama) in 1890. It first flowered fifteen years later in June 1905; in the same month, another specimen in the garden of B.E.C. Chambers, Esq. of Haslemere, first purchased from Yokohama in 1884, flowered as well. The Yokohoma Nursery, Co., Ltd., which had branch offices in London and New York, offered *Magnolia obovata* (under *M. hypoleuca*) in their catalogs; the 1913-14, 1914-15, 1916-17, and 1917-18 Descriptive Catalogues have a black and white photograph depicting a young tree. Plants were selling $1.20 per 10, and $10.00 per 100, whereas seeds were $0.70 per pound and $3.50 per 100 cones.

George Johnstone (1955) highly appraised this species:

> Even if the heavily scented flowers are out of reach... this species earns its keep by its magnificent leaves, as well as by the crimson fruit cones which in some seasons decorate the tips of the branches later in the year. In the summer the leaves are attractive both on account of their size, sometimes as much as 18 in. in length, and for their glaucous undersides which can be seen to advantage when disturbed by the wind; while in the autumn they make their contribution to the pageant of color with pale yellow, or in the far West with a deep bronze, equaled only by that of the American Black-Jack Oak (*Quercus marilandica*).

Given that members of section Rhytidospermum readily cross-pollinate with each other, *Magnolia obovata* is known to hybridize with other species. Spongberg and Weaver (1981) reported an interspecific hybrid between *M. obovata* and *M. tripetala*, originally labeled as *M. obovata* (Accession #1280-27*C). This interspecific hybrid was named 'Silver Parasol' to describe the gray bark and the parasol-like whorl of the large leaves. Vasak (1973) mentioned the same hybrid growing as seedlings in the vicinity of its parent trees in Czechoslovakia: "Some hybrids have even larger leaves than both parental species, but their flowers have rather a bad smell and they are not so decorative as those of the non-hybridized species." Another hybrid with which *M. obovata* shares parentage is *M.* × *wiesneri*, named after a Mr. Wiesner who purchased a plant originally labeled *M. parviflora* (*M. sieboldii*) from Mr. Tokada, a Japanese nurseryman exhibiting at the Paris Exposition of 1889. It was determined later to be intermediate between *M. obovata* and *M. sieboldii*. William Kosar, former research horticulturist at U.S. National Arboretum, Washington, D.C., created a cross between *M. virginiana* and *M. obovata* in 1956, but whether this plant still exists in cultivation is uncertain (Santamour 1969). [ed. note: A selection from that cross, *M.* 'Nimbus,' is still in cultivation.]

'Lydia': This *M. obovata* cultivar was selected by Polly Hill of Polly Hill Arboretum, West Tisbury, Martha's Vineyard, Massachusetts, from seedlings given by Tsuneshige Rukujo in Japan. The original tree, currently 51ft (15.5m), is still alive and well in Polly's Playpen, an enclosed area where camellias, rhododendrons, and other choice plants grow; its silvery trunk is beautifully adorned with lichens and mosses. 'Lydia' was registered in 1986. The sister tree raised from the seed lot grows near 'Lydia', and self-sown seedlings have been found in the vicinity of the Arboretum.

'Pink Flush': Originally acquired and selected from a group of seedlings from Exbury Gardens, Hampshire, England, by Francis Hanger, the former curator of the Royal Horticultural Society's garden at Wisley, 'Pink Flush' has a rosy glow to the petals (Gardiner 2000). A sister seedling, another pink form, was grown at Savill and Valley Gardens, and exhibited unnamed, but given an Award of Merit at the Royal Horticultural Society's show in Vincent Square, London (Gardiner 2000). It was first listed and sold in the Otto Eisenhut nursery catalog, page 3, 1989, Ticino, Switzerland.

Taxonomy

There has been considerable nomenclatural confusion over the naming of this species until Hunt (1998), with the counsel of Dr. Brummitt,

resolved that *obovata* is the correct specific epithet. Dandy (1973), Ueda (1986), and Callaway (1994) considered *M. hypoleuca* as legitimate, whereas Rehder and Wilson (1913) and Hara (1977, 1986) validated *M. obovata*. The confusion stemmed from various interpretations of Thunberg's original description and the references he used. Thunberg (1794) had based the specific delineation on types of *M. denudata* and *M. liliflora*, first published as plates 43 and 44 in Kaempfer's *Icones Selectae Plantarum* (1791). Ohba (1998) clarified the stance that Dandy (1973) and Ueda (1986) had taken to invalidate *M. obovata*; these two authorities were abiding by the rule of botanical nomenclature where references indicate the types of the name. While the Kaempfer illustrations do not depict *M. obovata*, Thunberg (1794) does describe the species: "*Folia obovato-oblonga, integra, glabra; subtus parallelo-nervosa et tenuissime reticulata nervis villosis, palmaria suque pedalia.*"

In "The Gardeners' Chronicle" feature on Chinese magnolias, Wilson (1906) erroneously confused *M. obovata* (*M. hypoleuca*) with *M. officinalis*, another economically important magnolia in China for its medicinal purposes, and referred *M. liliflora* under *M. obovata*. The "Hou p'o" tree noted here is *Magnolia officinalis* as Wilson further informs the reader that "its bark and flowers constitute a valuable drug, which is exported in quantity from central and western China to all parts of the Celestial Empire." Elwes and Henry (1906-1913) similarly perpetuated this specific misconception: "In central and western China it is commonly cultivated around dwellings in mountainous districts at elevations between 2,500 and 4,500ft (762 and 1.372m) It is known to the Chinese as hou-p'o, its bark being esteemed as a valuable drug, which is exported to all parts of China. Neither Wilson nor myself ever found the tree in a wild state in China; but it is probably indigenous in some of the unexplored districts." However, Rehder and Wilson (1913) later rectified the error under *M. officinalis*: "This species has been confused with *M. obovata* Thunberg (*M. hypoleuca* Siebold & Zuccarini) and naturally enough, as the foliage of the two species is identical. But with the complete material before us it becomes obvious that they are distinct, if closely related, species."

Propagation

Magnolia obovata is typically propagated from seed, which will germinate readily if sown and stratified fresh. Seedlings are sometimes used as rootstock for *M.* x *wiesneri* and cultivars, such as 'Pink Flush'. To date, 'Lydia' has not been propagated (Stefan Cover, pers. comm.).

References

Bernhardt, P. and Thien, L.B. (1987). Self-isolation and insect pollination in the primitive angiosperms: new evaluations of older hypotheses. Plant Systematics and Evolution 156: 159-176.

Callaway, D.J. (1994). The World of Magnolias. Portland: Timber Press.

Dandy, J.E. (1973). *Magnolia hypoleuca*. Baileya 19: 44.

Del Tredici, P. (1986-87). 'Lydia' (*Magnolia hypoleuca*). Magnolia 21(2) Issue 42: 12.

Delpine, F. (1875). Ulteriori osservazioni e considerazioni sulla dicogamia nel regno vegetale. Milan.

Elwes, H.J. & Henry, A. (1906-1913). The Trees of Great Britain and Ireland Volume 6. Edinburgh: Privately Published.

Endress, P.K. (1990). Evolution of reproductive structures and functions in primitive angiosperms (Magnoliidae). Mem. New York Bot. Gard. 55: 5-34.

Eyde, R.H. (1975). The foliar theory of the flower. Amer. Sci. 63: 430-437.

Gardiner, J. (2000). Magnolias: A Gardener's Guide. Portland: Timber Press.

Hara, H. (1977). Nomenclatural notes on some Asiatic plants, with special reference to Kaempfer's Amoenitatum exoticarum. Taxon 26: 584-587.

Hara, H. (1986). Typification of the Japanese plants named by Thunberg. Journal of Japanese Botany 61: 353-363.

Hunt, D. (1998). Not so dandy after all. In Hunt, D. (ed.), Magnolias and their allies. The Dendrology Charitable Company, Ltd.

Isagi, Y. et al. (2004). Highly Variable Pollination Patterns in *Magnolia obovata* revealed by Microsatellite Paternity Analysis. International Journal of Plant Sciences 165(6): 1047-1053.

Ishida, K. (2006). Maintenance of inbreeding depression in a highly self-fertilizing tree, *Magnolia obovata* Thunb. Evolutionary Ecology 20: 173-191.

Johnstone, G.H. (1955). Asiatic Magnolias in Cultivation. London: The Royal Horticultural Society.

Kaempfer, E. (1791). Icones Selectae Plantarum.

Kurata, S. (1971). Illustrated Important Forest Trees of Japan. 2^{NS} ed. Tokyo: Chikyu Shuppan.

Rehder, A. & Wilson, E.H. (1913). Magnoliaceae. In Sargent, C.S. (ed.), Plantae Wilsonianae 1: 391-418. Cambridge: Cambridge University Press.

Santamour, F. (1969). Cytology of Magnolia Hybrids. I. Morris Arboretum Bulletin 20(4): 63-65.

Sargent, C.S. (1888). New or Little Known Plants: *Magnolia hypoleuca*. Garden and Forest 1: 304.

Skan, S.A. 1906. Tab. 8077: *Magnolia hypoleuca*. Curtis's *Botanical Magazine*.

Spongberg, S. & Weaver, R. (1981). *Magnolia* 'Silver Parasol'. Arnoldia 41: 70-77.

Tanaka, H. and Yahara, T. (1988). Pollination of Magnolia obovata. The World of Plants (Newton Special Issue) 2: 37 (in Japanese).

Thien, L.B. (1974). Floral biology of Magnolia. American Journal of Botany 61: 1037-1045.

Thunberg, C. (1794). *Magnolia obovata*. Transactions of the Linnean Society of London 2: 336.

Ueda, K. (1986). A nomenclatural revision of the Japanese Magnolia species (Magnoliaceae) together with two long-cultivated Chinese species. I. *M. hypoleuca*. Taxon 35: 340-344.

Wilson, E.H. (1906). The Chinese Magnolias. The Gardeners' Chronicle 3RD Series 39: 234.

Vasek, E.V. (1973). *Magnolia hypoleuca* in nature and in cultivation. Newsletter of American Magnolia Society 9(1): 3-6.