

New Trees

Recent Introductions to Cultivation

John Grimshaw and Ross Bayton

A large, mature tree with a thick, reddish-brown trunk and branches, characteristic of a cork oak (Quercus suber). The tree is covered in dense green foliage. The background shows a clear blue sky and a hazy, mountainous landscape. In the foreground, there are several pine trees with green needles. The overall scene is a natural, outdoor setting.

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Plate 1. Fallen leaves of *Acer pycnanthum* reveal their autumn colours and glaucous undersides. Image P. de Spoelberch.

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Plate 2 (opposite).
Liquidambar acalycina
SABE 1950, photographed
at Kew. Image T. Kirkham.

Forewords

When I worked at the Royal Botanic Gardens, Kew, in the mid 1990s, I used to be given surplus trees and shrubs. A high proportion of these gifts had been introduced into cultivation through expeditions going out from Kew and collecting in the wild. Imagine my frustration when I failed to find these species covered in the most comprehensive tree books – Bean and Krüssmann.

My chance came when I became Chairman of the Scientific and Education Committee of the International Dendrology Society in 2002. I rather timidly suggested that we ought to do something about all the taxa that had been introduced into cultivation since 1970. To my astonishment there was universal agreement and even enthusiasm. We costed the project and raised the money, through the great generosity of many donors. Then came the hard part. We wanted a lead author who had an easy writing style, was a good taxonomist, and understood the difficulties of growing trees. In John Grimshaw we found a winner, who has driven the project forward with enormous energy and skill. He was soon joined by Ross Bayton, whose main task was to write up the descriptions of the individual species – a boring task you might think, but essential if the project was to be authoritative. He did this with a sure touch, as well as working on the glossary and index. The third member of the team was botanical artist Hazel Wilks, who has produced superlative line drawings, beautiful in themselves and an essential element in helping to identify different species.

One of the extraordinary things about this book is the way the dendrological world has come together. People have given so much in so many different ways, whether by measuring a tree, providing field notes, a photograph specially taken, or perhaps most important of all, reviewing the account of a particular genus. Given that 180 genera and over 800 species are described in full, with notes on hundreds more, the help that was received from experts in their various fields from all over the world was fundamental to the book. This coming together of dendrologists was brought home to me when a group of international amateurs and experts gathered at Colesbourne Park in January 2007 to review the different generic accounts. One of the experts said to me that it was the most exciting thing he had ever done in his life.

The project has been assisted by many botanic gardens throughout the world, a great many individual experts and many arboreta. The members of the Scientific and Education Committee have been stalwart in their support, sometimes speaking forthrightly, sometimes critically, but always with the aim of making a better book.

The journey has been a long one, with a subject that has continued to grow during the process. It has been a huge achievement for all those who have taken part, and has been not only fun, but enormously worthwhile.

Giles Coode-Adams, October 2008



Acer oblongum var. *itoanum*

As Head of the Arboretum at the Royal Botanic Gardens, Kew it is my job to maintain and increase the diversity of the hardy woody plant collections, to meet the scientific research and educational needs of Kew. This is the role that William Jackson Bean played when he was the Assistant Curator of the Arboretum, between 1900 and 1922, when many of the trees that he was planting were new to cultivation, though they now form the backbone of the treescape we know at Kew today.

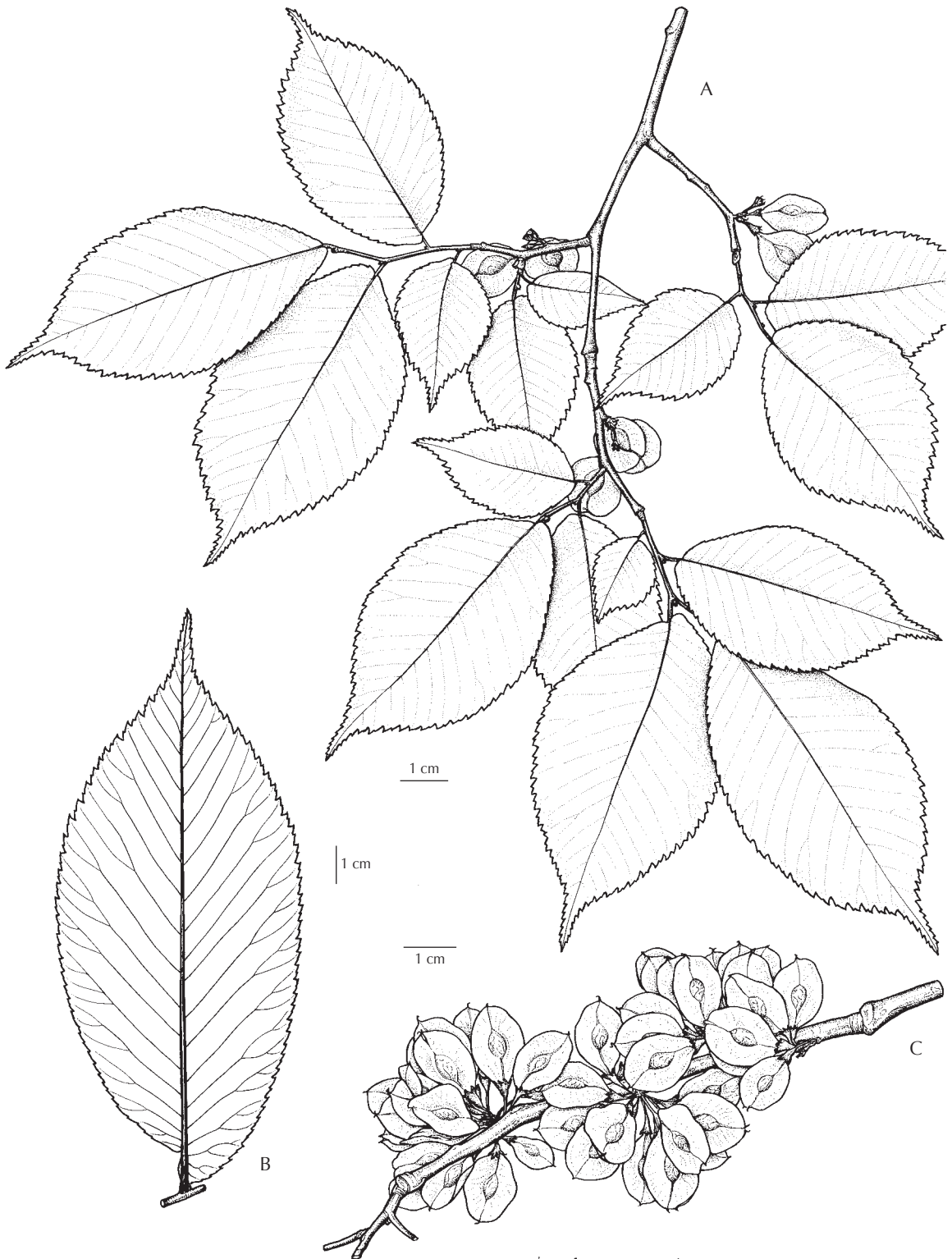
Just as then, many of the trees we are currently planting have been acquired from fieldwork and expeditions, made by myself and other collectors, from Kew and similar organisations across the world – although with improved communications and transport such work is somewhat easier than in the past. Climate change, too, coupled with a deeper appreciation of the value of a good provenance, has broadened the boundaries of plant exploration, and we are able to find hardy plant material from countries over a much wider area, including Taiwan, Vietnam, China, Chile and Mexico. As a result we can now experiment with tree selection with confidence and push the parameters of hardiness, by planting species that we wouldn't have dared to try in previous years. The consequence is that gardeners all round the world now succeed with many plants never before grown outdoors without protection.

When looking at young trees recently established in the gardens my mind often takes me back to the actual parent tree and the very find spot in the wild from where the original seed was collected, pleasurably reliving memories of conditions endured or the many international friendships made, on expeditions whose goal was to establish such trees in cultivation for all to enjoy. Dendrologists and arboriculturists are always keen to have the best specimens of their trees and find out how other growers have fared with the establishment of new introductions, comparing growth rates and first-flowerings – sometimes in a spirit of friendly competition, but principally as an international body of enthusiasts freely exchanging plant material, disseminating information and sharing our observations with others.

I am often given specimens for Kew by friends and curators of other arboreta, or find myself with collections of my own in the nursery, with only the field notes to go on for cultural information. Similarly, on my walks through the Arboretum I often come across notable specimens in the heritage landscape and feel the need to know more about their history and background, perhaps questioning why they were planted in that location, or wanting to check their recorded historical size against more recent measurements. In such cases, the first book I turn to is W.J. Bean's *Trees and Shrubs Hardy in the British Isles*, that reliable and informative classic reference. However, in the last few decades, as new taxa have arrived in our gardens from locations around the globe, and established collections are renamed by taxonomists, the number of species missing from this monumental work has increased. Recently I needed more information on *Acer pictum* subsp. *okamotoanum*, a tree that I collected in South Korea in 1989, but found it missing from Bean's work.

To address this and many other such omissions, the International Dendrology Society commissioned *New Trees*, to complement Bean's great work, and I have been fortunate to have been working on the fringes of this publication with John Grimshaw and Ross Bayton, providing information and material from the collections in the Arboretum at Kew.

I am greatly looking forward to using the book, and am confident that dendrologists and horticulturists around the world will find it both a pleasure to read and a valued reference.



H. L. Wilks

ULMACEAE

ULMUS L.

Elms

Ulmus comprises 20–45 species, distributed across the temperate northern hemisphere and into subtropical Asia and Central America. Elms are deciduous or evergreen trees, or rarely shrubs. The branches may be more or less smooth, or have two flat opposite corky wings or longitudinal corky layers. The leaves are in two distinct rows; they have pinnate venation and each vein extends to the leaf margin, where it terminates in a tooth; the margins are serrate or double-serrate. There are two stipules at each node, membranous and caducous, leaving a pair of scars at the leaf base. Inflorescences are fascicled, racemose or cymose. The flowers are hermaphrodite and/or unisexual, pedicellate, appearing in spring before the leaves, or rarely in autumn or winter; the perianth is campanulate, four- to nine-lobed, the tepals membranous, the number of stamens equal to the number of tepals. Floral characters are generally not significant in elm taxonomy, and are poorly reported in the literature. The fruit is a flat, usually more or less circular samara, with the seed in the centre or towards the apex; samaras are usually notched at the apex (Sherman-Broyles *et al.* 1997, Fu *et al.* 2003).

Most interest in elms, dendrological or otherwise, focuses on their effect in the landscape as magnificent umbrageous trees – Tennyson’s ‘immemorial elms’, or the iconic English Elm, as described by H.J. Elwes (in Elwes & Henry 1913): ‘Its true value as a landscape tree may be best estimated by looking down from an eminence in almost any part of the valley of the Thames, or of the Severn below Worcester, during the latter half of November, when the bright golden colour of the lines of elms in the hedgerows is one of the most striking scenes that England can produce.’

There is much beauty in their detail too:

And whoever wakes in England
Sees, some morning, unaware,
That the lowest boughs and the brushwood sheath
Round the elm-tree bole are in tiny leaf

(R. Browning, *Home-thoughts, from Abroad*)

All the mystery and magic of spring is captured in that word ‘unaware’. Even before the leaves appear, the flush of flowers and the bright green of the samaras are welcome sights as the days begin to lengthen.

In their eclectic way, Elwes & Henry (1913) left the elms to the end of their magisterial if randomly arranged work, allowing them longest to study them, but even in books produced in a different order, *Ulmus* remains the last great dragon in the way of a dendrological survey. The modern view of the genus revolves around Dutch elm disease (see below), which colours all perspectives on it in the pallid yellowish



Plate 560. Elms have special value for their magnificence in the landscape. This is one of the *Ulmus davidiana* var. *davidiana* trees at the Morton Arboretum, grown from seed obtained from China in 1980, as part of the research programme conducted at the Morton by Dr George Ware. Image J. Grimshaw.

Figure 95 (opposite). *Ulmus bergmanniana*: habit with fruits (A); leaf underside (B); cluster of fruits (C).



related to the *S. platanifolius* group (Fritsch 1996a, 1996b). Fritsch (1996a) provides a key to the three taxa, adapted here.

-
- 1a. Stalked stellate hairs on vegetative parts (where present) white or tawny; pedicels 8–17 mm, of equal thickness throughout; corolla lobes widely spreading; pollen pale yellow; Mediterranean Basin *S. officinalis*
- 1b. Stalked stellate hairs on vegetative parts (where present) golden-yellow to dark brown; pedicels 4–9 mm, widening from base to apex; corolla lobes moderately spreading; pollen orange-yellow; North America 2
-
- 2a. Larger undehiscent capsules 7–10 mm, hairs on capsule greyish; pedicel 1.3–2.3 times length of calyx; leaves often coarsely lobed or irregularly undulate; Mexico (northeastern), USA (Texas) *S. platanifolius*
- 2b. Larger undehiscent capsules 11–15 mm, hairs on capsule brownish; pedicel 0.5–1.4 times length of calyx; leaves entire; USA (California) *S. redivivus*
-

The superficial similarities between the Californian Snowdrop Bush and its Mediterranean equivalent *S. officinalis* are remarkable, but it is good that the various unfeasible explanations of their linkage as varieties of each other can now be laid to rest. *Styrax redivivus* is a lovely member of the California chaparral and dry woodland flora, combining beautifully with *Cercis occidentalis* both in the wild and in gardens (S. Hogan, pers. comm. 2007), and brings *Styrax* into the reach of those with hotter drier gardens than tolerated by most others of the genus. It is summer-dormant, flushing out as the winter rains arrive, and is not tolerant of any combination of heat and humidity (S. Hogan, pers. comm. 2007). Summer watering should be avoided. It is appreciated by gardeners in California but not widely grown elsewhere.

Styrax serrulatus Roxb.

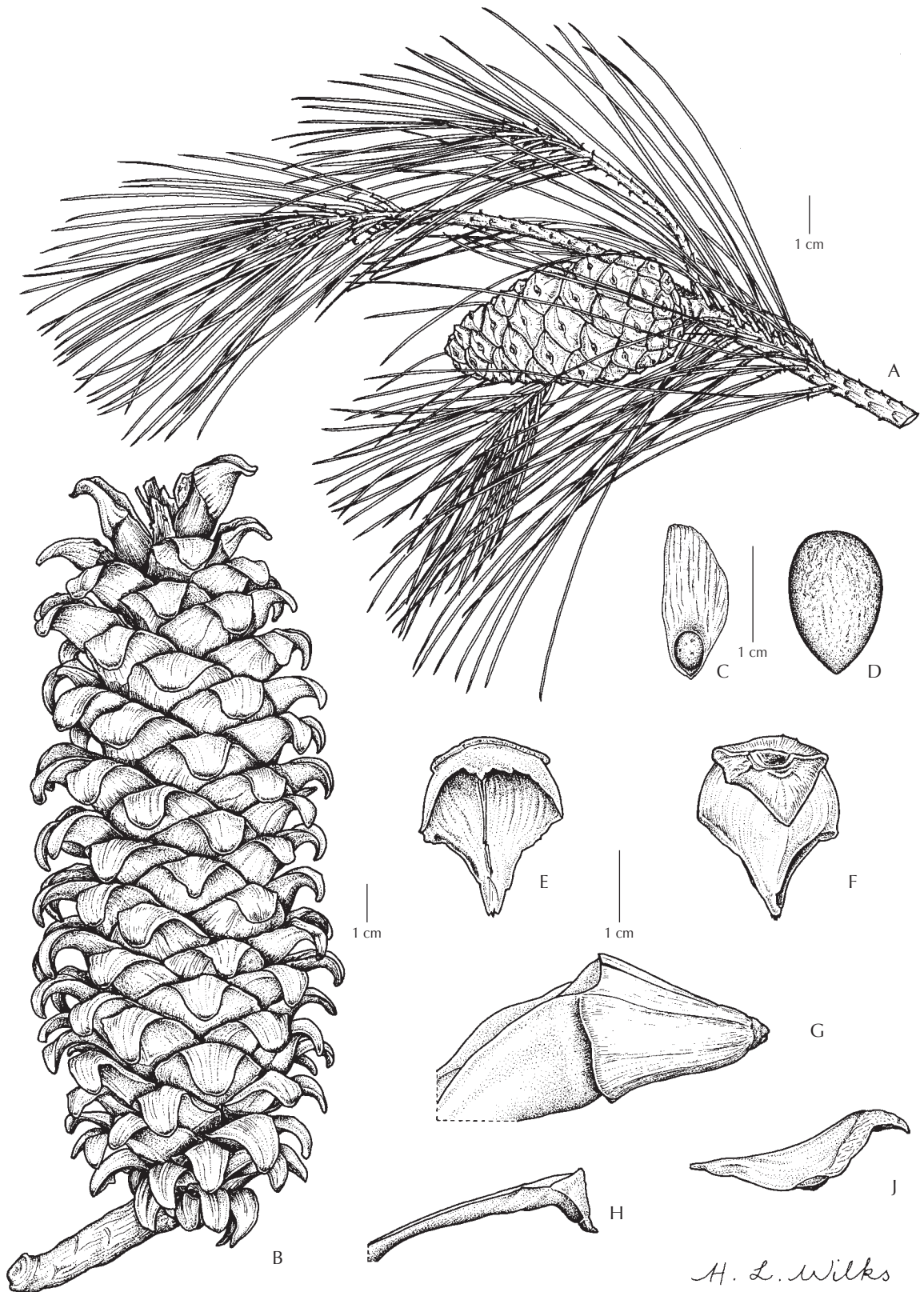
Tree 4–12 m, 0.25 m dbh. Branchlets densely covered with brown stellate tomentum. Leaves papery, 5–14 × 2–4(–5.5) cm, ovate or oblong to lanceolate, glabrous or with sparse stellate tomentum, five to seven secondary veins on each side of the midrib, margins serrate or rarely entire, apex acuminate; petiole 0.3–0.5 cm long. Inflorescences terminal, racemose or paniculate, 3–10 cm long, with numerous flowers; pedicels 0.3–0.8 cm long. Flowers 1–1.3 cm long; calyx densely yellow-tomentose, five-toothed, corolla tube 0.2–0.3 cm, lobes 0.7–0.9 cm, oblong to lanceolate, stamens shorter than corolla. Fruit ellipsoid to ovoid, 0.8–1.6 cm long, densely covered with grey-brown tomentum. Flowering March to May, fruiting June to November (China). Hwang & Grimes 1996. **Distribution** BHUTAN; CHINA: southern Guangdong, southern Guangxi, Hainan, southeast Xizang, southern Yunnan; INDIA; LAOS; MALAYSIA: Malay Peninsula; MYANMAR; NEPAL; TAIWAN; THAILAND; VIETNAM. **Habitat** Forests between 500 and 1700 m asl. **USDA Hardiness Zone** 7–8. **Conservation status** Not evaluated. **Illustration** Hwang & Grimes 1996. **Taxonomic note** The name *S. serrulatus* is sometimes incorrectly given as a synonym of *S. japonicus*.

The wide natural range of this plant is not matched by its presence in cultivation, where it is extremely scarce. Two specimens have grown in the Hillier Gardens since the 1970s and seem to be correctly named, the larger one currently 5 m tall with a spread of about 8 m, with several stems (A. Coombes, pers. comm. 2008). The species has also been in cultivation at the JC Raulston Arboretum since 1994, when it was received from Sonoma Horticultural Nursery, California. When seen in May 2006 it was a somewhat sparse multistemmed bush, 2.5 m tall, and had just finished flowering.

S. shiraianus Makino B519, K368

S. shweliensis (NOW *S. hookeri* C.B. Clarke, NT831) B519, K369

Plate 539 (opposite).
The Californian Snowdrop Bush, *Styrax redivivus*, is a beautiful small tree from the chaparral of the lower slopes of the Sierra Nevada. Image Phytophoto.



peel early in life, or may remain smooth for several years. In the lace-bark pines (*P. bungeana*, *P. gerardiana* and *P. squamata*) it resembles that of *Platanus*, as it peels off in segments revealing the lighter-coloured new bark below. Pines are evergreen and aromatic, and often have resin in the wood, bark, leaves and cones. The crown is initially conical with regular (pseudo-) whorls of branches and an erect leader, though some may also be multistemmed. At maturity several lower branches may be shed, forming a broad and open crown. There is strong shoot dimorphism, with branching shoots and reduced foliage (dwarf) shoots. The branching shoots are stout, and may be glaucous or pubescent. Branching shoots generally produce a single flush of growth each season, ending with a winter bud. The winter bud can be terminal or subterminal, and is composed of the shoot apex and new needle fascicles, covered by scale leaves; winter buds are prominent features of pines throughout the winter. In spring the winter bud elongates into a long rather bare-looking shoot on which the short foliage shoots are present as small growths; at this stage the new shoots are known as 'candles', and are held vertically. The new secondary leaves then emerge from the short shoots and the shoot assumes its normal position.

The foliage shoots are very small and comprise a bundle (fascicle) of secondary leaves with a persistent or deciduous sheath at the base; in lay terms they are the familiar clusters of 'pine needles'. These foliage shoots do have a minute bud, though this develops only rarely, most typically after browsing damage to the shoot distal to the fascicle. Fascicles persist for 2–12 years or more and develop in the axils of cataphylls (see below). The secondary leaves within a fascicle remain attached to each other, usually falling as a single unit (except in section *Quinquefolius*, where the leaves may fall individually). The developing fascicle is terete (except in *P. krempfii*, where it is flattened) and contains several leaves, ranging in number from two to eight (a single leaf in *P. monophylla*), and the arrangement of the leaves as they develop in the fascicle determines the transverse shape of the individual leaves. The number of leaves in a fascicle is an important character in pine identification, though it can be subject to environmental influences (Yeaton *et al.* 1983). The needles may be epistomatic or amphistomatic, with the stomata arranged in longitudinal grooves that run the whole length of the leaf. The margins are usually entire, but may be serrate. Primary leaves are produced on shoots on young plants less than a year old (up to five years or more in a few species) but these are later replaced by cataphylls, which are scale-like, non-photosynthetic leaves. Cataphylls can have stomata on the upper surface (epistomatic), and form an elevated pulvinus (decurrent or non-decurrent) at the base. They may be shed before the needles or persist long afterwards.

The male strobili are oblong to cylindrical and are clustered at the basal end of new long shoots. The female strobili (cones) are subterminal, solitary or clustered, and pendulous. They are sessile or pedunculate, and mature in the second or third year. The cones may be persistent or shed early, and may be serotinous, opening only after a fire. The seed scales are imbricate, spirally arranged around a central rachis, persistent, thin or woody. The exposed apex of the scale in a mature, closed cone (the apophysis) bears the remnant portion of the exposed scale that developed in the first year (umbo); in species where maturity occurs in the third year (for example, *P. pinea*), the umbo shows a second concentric

Figure 67 (opposite).

Pinus brutia: habit with immature cone (A).
P. strobiformis: seed cone (B).
P. massoniana: winged seed (C).
P. cembroides: seed (D); seed scale, upper surface (E), lower surface (F).
P. maximartinezii: seed scale, side view (G).
P. pseudostrobus var. *apulcensis*: seed scale, side view (H).
P. armandii var. *mastersiana*: seed scale, side view (I).

Plate 394. New shoots in the 'candle' stage on *Pinus durangensis*. The fascicles of secondary leaves – the 'needles' – are just emerging. Image P. Williams.





New Trees: Recent Introductions to Cultivation complements the existing standard encyclopaedic references to trees by Bean and Krüssmann, providing comprehensive botanical descriptions and horticultural commentary on over 800 tree species introduced to cultivation in recent decades, for which there is no comparable source of information.

Commissioned and produced by the International Dendrology Society, this major reference work covers species grown in the United Kingdom, Europe and North America, with horticultural notes from a network of growers and enthusiasts backed up by recent scientific studies. The resulting accounts are packed with information presented in an accessible style.

The book is illustrated with over a hundred line drawings by Hazel Wilks, and 580 photographs, portraying many rarely seen trees. Introductory chapters discuss conservation issues and modern techniques of tree-growing as well as a background to the species accounts. A unique feature is the cross-referencing to other texts, making it easy to locate information on species not described here. There is a comprehensive glossary and bibliography.

"New Trees is an immensely readable document recounting the discovery of new introductions, supported by beautiful original photographs and line drawings. It will undoubtedly be an important reference book for a generation of dendrologists, garden enthusiasts and botanists."

Philippe de Spoelberch, Arboretum Wespelaar, Belgium

"By any standard this is an impressive achievement, deserving of a place on every tree lover's bookshelf, especially those of a curious mind and adventurous spirit."

Roy Lancaster, Vice-Chairman, RHS Woody Plant Committee

"A groundbreaking reference to the wealth of new tree introductions, and the need for their conservation in cultivation."

Tom Hudson, Tregrehan, Cornwall

"Just a brief review reveals the immense scholarship that has gone into this gargantuan tome."

Peter Wharton†, University of British Columbia Botanic Garden, Vancouver