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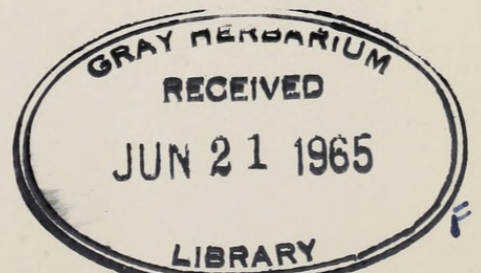
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THE OLIVE FAMILY IN CULTIVATION

MOST people who are interested in plants have some idea of what constitutes a species and are aware that in biological classifications they are grouped together into genera, but it is not so generally known that related genera are brought together to constitute families. The olive, *Olea europaea*, is the species *europaea* in the genus *Olea*, which, together with several closely related genera, make up the family Oleaceae (the suffix -*aceae* indicating that it is a family). Quite a number of families are readily recognizable, for example, the orchid, grass and daisy families but others are much more diverse in appearance and include plants which would not, at first, be thought of as being related. Such a family is the Oleaceae, containing the lilac, ash, fringe-tree, *Forsythia*, *Osmanthus* and jasmine, to mention a few of the constituent genera.

How big is this family and how is it characterized? The total number of species can only be estimated since much research yet remains to be done, not only in reviewing those species described during the last 200 years, but in examining new material gathered on expeditions to little-known areas of the world, especially in the tropics. One may safely say, however, that altogether there are between 400 and 500 species. The number of genera is even more a matter of opinion but 22 is the most likely figure, which, taken together with the species number, shows that the Oleaceae is relatively small compared with most of the families of flowering plants. Yet it contains many important horticultural plants and few are superficially so diverse, containing, as it does, the colorful lilac, the ash with its inconspicuous wind-pollinated flowers, the bright yellow *Forsythia*, and the starry jasmine. What is it that holds it together? The answer to this is found in the structure of the flowers; experience has shown that related plants can vary widely in their vegetative parts but the characters of the flower are much more stable and, in classification, a surer guide to relationships. In the Oleaceae there is a basic and unique pattern of four sepals on the outside, then four petals, usually joined together, two stamens joined to the petals and then, at the very center,



an ovary with two chambers, each containing two ovules. This is the basic plan and the different exceptions may be looked upon as "variations on a theme".

Although vegetative characters are often unreliable in classification it is worth noting that the olive family is characterized by being woody rather than herbaceous, and having opposite leaves. In size the members may range from small, spreading shrubs, not more than one foot high, to tall forest trees. In addition, some of them are climbers, the best known being the jasmines, and climbing members in tropical rain forests can become very large indeed. Opposite leaves are found throughout the family, with the sole exception of a small, distinctive and closely related group of eight species of *Jasminum* in which they are borne alternately. The Oleaceae is not the only family to possess opposite leaves of course, but this character can nevertheless prove a useful point of recognition.

A remarkable trait in the Oleaceae is the development of adaptations that favor cross and not self-pollination. In many genera the flowers are completely unisexual but in others some plants of a species have hermaphrodite flowers while others have those which are functionally only male or female and have either abortive ovaries or stamens. Other genera, for example *Jasminum*, *Forsythia* and *Abeliophyllum*, are what are known as heterostylous, that is, some individuals bear flowers in which all the styles are long while in other individuals they are all short. In the former, the two stigmatic arms are borne at the mouth of the petal tube, with the stamens at a lower level within; while those of the latter exhibit the reverse condition, the style is short and the stamens are borne at the mouth of the petal tube. Along with this arrangement goes the inability of flowers of one style length to be fertilized by pollen from others of the same type. In order to set seed, long styled flowers must receive pollen from those with a short style and *vice versa*. This means, in the case of cultivated plants, that if only one clone is grown, however much it is propagated, fruit will never, or only very rarely, be produced.

A noteworthy character which recurs frequently throughout the family, and helps to make it one of the most important from the horticultural point of view, is the production of fragrant flowers. Lilac and jasmine jump straight to mind, but *Osmanthus* is equally outstanding (and in fact, its botanical name means 'fragrant flower'). Such flowers also occur in other genera and even the privets are powerfully, if not very sweetly, scented.

Abeliophyllum

This genus contains a single species, *Abeliophyllum distichum*, a native of central Korea. It was introduced into cultivation in America, through the Arnold Arboretum, by means of seed received from Korea in 1924 and forms a shrub with slender, arching branches. It is one of the first plants to flower in the spring and produces a profusion of white blossoms, somewhat smaller but shaped very like those of *Forsythia* (Plate III, upper). In fact, some people have called it the



PLATE III

(Upper) Flowering branch of *Abeliophyllum distichum* on the left and *Forsythia ovata*, the smallest flowered species, on the right. (Lower) Flowering branch of *Chionanthus virginicus*.

white-forsythia, a name which is apt in some respects but could be very misleading. In order to flower well, it requires a sunny position and in the Boston area is quite hardy, but as the flower buds are borne naked throughout the winter, it should not be planted where it will suffer from the severest conditions or where early autumnal frosts are likely to affect the developing buds on unripened wood.

One of the plants at the Arboretum has a tendency to produce pink flowers which, however, fade somewhat on opening. With judicious breeding and selection it might be possible for this color to be deepened and in that way extend the color range of our earliest flowering shrubs.

Chionanthus

This small genus of three or four species contains the fringe-tree, *Chionanthus virginicus*, a good example of a native North American plant prized in cultivation. Each year in late spring a healthy plant will cover itself with a profusion of delicate flowers giving the shrub the appearance of being covered with fringes of fine white lace (Plate III, lower). The botanical name means "snowflower", an allusion to the abundant white flowers like showers and drifts of snow. *C. virginicus* has a natural range from Florida to Texas, north to New Jersey, Pennsylvania, West Virginia, southern Ohio, southern Missouri and Oklahoma. Although normally seen as a large shrub it can grow into a small tree about 30 feet high and in the opinion of many is one of the most outstanding flowering woody plants.

In addition, an east Asian species, *Chionanthus retusus*, is also known in cultivation. Not always so floriferous perhaps, and with slightly shorter petals, it flowers a little later than *C. virginicus* and, as a handsome plant in its own right, is well worth growing in any collection.

Fontanesia

There are two very closely related species in this genus, *Fontanesia phillyreoides*, a native of Turkey, and *F. fortunei*, from China. Neither are grown for their flowers, and for this reason perhaps are not widely known in cultivation, but they do produce handsome, much-branched, graceful shrubs with bright green foliage and are very suitable for background planting. The flowers have small greenish-white petals, which are followed, if cross pollinated, by a profusion of single-seeded, winged fruits, oval in shape and about $\frac{1}{4}$ to $\frac{1}{3}$ of an inch long.

Forsythia

Few spring-flowering plants are as well known as the universally admired *Forsythia* with its golden yellow somewhat bell-like flowers, from which is derived the rather contrived "common" name, golden-bells (Plate III, upper). *Forsythia* flowers before the leaves are on the trees, when everyone is longing for signs of spring and an end to the drabness of the last few weeks of winter. The genus contains about seven species, all of them from eastern Asia, except for one, *F. europaea*, which is found wild only in Albania. They are easily propa-

gated from cuttings or by layering, and, partly for this reason, are now widespread in cultivation.

For a full account of the introduction and development of the members of this genus, one should refer to the article by Dr. Donald Wyman, "The Forsythia Story", published in an *Arnoldia* written four years ago (Vol. 21: 35-38. 1961). Sufficient to say here that *Forsythia suspensa* var. *sieboldii* was first introduced to Holland from Japan in 1833 and from the start proved a popular plant. Later, the famous Späth Nurseries in Germany produced a hybrid of this species with *F. viridissima* which was called *F. × intermedia*. Numerous cultivars of this hybrid have been selected and are now widely planted, but more recently, by means of further hybridization and careful cytological treatment, several newer cultivated varieties have been developed. Some, like 'Arnold Giant' and 'Karl Sax' are polyploid and have particularly large, deep-colored flowers, others are diploid and include 'Pallida' and 'Primulina' with flowers which are pale yellow, while others like 'Arnold Dwarf', form low growing shrubs most suitable as a ground covers or bank plants.

Forestiera

A New World genus of perhaps twenty species of somewhat privet-like shrubs of little ornamental value, but occasionally grown in botanic gardens and other large collections. Most of the species are tropical or warm temperate, but three are hardier than the others and can survive, but do not thrive very well, in the Boston area: *Forestiera acuminata*, *F. neo-mexicana* and *F. pubescens*. The flowers have no petals and are somewhat inconspicuous, with the sexes separate. The fruit is a dark purple drupe, like a very small plum, $\frac{1}{2}$ inch long or less.

Fraxinus

This is certainly one of the most important genera in the family, if only for the timber trees it contains. Of the genera characteristic of temperate regions, this is the largest in number of species. In distribution it ranges throughout the Northern Hemisphere and extends southward into the tropics where, in Asia, it reaches as far as Java, and in the New World several species are found in Mexico and the West Indies.

Characterized in particular by the combination of their arborescent habit and pinnate leaves, the species exhibit a great range in floral types. In the so-called flowering or manna ash, *Fraxinus ornus*, a native of south Europe and southwest Asia, and a few other related species, the flowers possess both petals and sepals and are reminiscent of those of *Chionanthus* (Plate IV, upper). In other species there are sepals only, without petals, and in yet others not even any sepals. In addition to this, the flowers are very often unisexual. In consequence of these facts the flowers of most ashes are inconspicuous and often consist of nothing more than naked ovaries, or naked stamens, grouped together in wind-pollinated inflorescences which are usually produced before the leaves (Plate IV, lower).



PLATE IV

(Upper) Flowering branch of *Fraxinus ornus*. (Lower) Flowering branch of *Fraxinus excelsior*.

F. ornus and the even hardier species from North China, *F. bungeana*, with their fringe-like, white petaloid flowers ought to be more widely grown as relatively small, handsome flowering trees.

One of the best known characteristics of the ashes is their winged-fruits, or samaras, to give them their technical name. They look so different from either the capsules or the olive-like drupes of other well known members of the family, that, combined with their pinnate leaves and often imperfect flowers that lack petals and even sepals, many people have doubted that they should be classified in the same family. However, to judge from the series of forms in the genus as a whole, the flowers have become apetalous by reduction from the typical basic pattern for the family. Pinnate leaves, the other obvious difference from most Oleaceae are also found in a few other genera, for example *Syringa* and *Jasminum*, while the winged-fruit or samara is also characteristic of *Fontanesia* and *Abelio-phyllum*. In addition, a few ashes are noteworthy in having simple leaves, for example, *Fraxinus anomala* of the southwest U.S.A. and the cultivar 'Diversifolia' of the European ash, *F. excelsior*.

Jasminum

Containing 200 or more species, this is the largest genus in the family. It is mainly composed of tropical climbers with starlike flowers that possess more than the typical four petals (Plate V, left). None of them are native to the New World and the main center is tropical Asia, both mainland Asia and the islands of the East Indies. However, a few species are found in warm temperate regions and have been cultivated for several centuries.

The best known, perhaps, is the sweet scented, white jasmine, *Jasminum officinale*, a native of the Himalayas and southwest China. Closely related, and also possessing pinnate leaves, is *J. grandiflorum*, the Spanish jasmine, which is less hardy but, as its Latin name implies, tends to have larger flowers. This is the species cultivated commercially in the south of France and from the flowers of which the perfume, Oil of Jasmine, is extracted. Another species with pinnate leaves, somewhat intermediate in hardness between these two, is the Chinese *J. polyanthum* which makes a wonderful climber with pendulous branches loaded with sweet-scented flowers when grown in the south, or in a cool conservatory, and, even when relatively small, can make a handsome pot plant (Plate V, right).

The hardiest member of the genus, is the winter jasmine, *Jasminum nudiflorum*, which has opposite, trifoliate leaves and is particularly well known for its bright yellow flowers which appear during mild spells throughout the winter, in areas that are not too cold. It can even survive and flower in the spring at the Arnold Arboretum, when grown against a building or in similar favorable locations. Very closely related to this species is the primrose jasmine, *J. mesnyi* (*J. primulinum*), which in northern regions has to be treated as a plant for the conservatory or cool greenhouse. When grown as a "standard" it can be outstanding with wide arching and weeping branches covered with large, yellow flowers.

Another group of yellow flowered species contains a number of fairly hardy plants, although none of them are hardy enough for New England. They are characterized by the possession of alternate leaves, the only such examples in the family. The best known of these is the Italian jasmine, *Jasminum humile*, but there is one unusual species which should be singled out for special mention. This is *J. parkeri*, very suitable for cultivation either under glass as a pot plant in an alpine house, or outside as a rock garden subject where the frosts are not too severe. It is a diminutive species, native of a limited area in the eastern Himalayas, and only grows about a foot high. It forms a low mound which spreads and arches over rocks, etc. and has minute pinnate leaves. In the summer it bears small, clear yellow flowers about $\frac{1}{2}$ inch across, dotted about on the dark green cushion.

One species, *Jasminum beesianum*, is a weak climber and can be used as a ground cover. It has dull red flowers which, however, are not very prominent, but a hybrid of this species with *J. grandiflorum* has given us *J. × stephanense* a climber with pink flowers. Apart from these, and the yellow flowered species mentioned above, all others in the genus have white flowers, usually more or less starlike, and almost invariably sweetly fragrant. Except for cultivation under glass, they can only be grown in areas where there is no risk of frost. The most famous example is the Arabian jasmine, *J. sambac*, which has been grown and prized for centuries in the Orient. The dried flowers are used for scenting tea in China and, in other parts of the world, the fragrant buds are made up into wreaths and leis. This is presumably the species whose Arabic name is Yâsmîn, the origin of "jasmine" and its Latin form *Jasminum*.

One of the most spectacular of the species in cultivation is *Jasminum rex*, a native of Siam, with large flowers each 2-3 inches in diameter. The broad petals are pure white but the bud and outer surface of the corolla tube is flushed with dark red. Unfortunately these very showy flowers are without fragrance but the opportunities are wide in the fields of hybridization and breeding; nearly every *Jasminum* whose chromosome number has been counted so far has been found to possess the same somatic number ($2n=26$).

Ligustrum

The privets are important garden plants, not so much for their flowers, which are invariably white or cream colored, usually very strongly and almost overwhelming scented with a characteristic sweet but slightly fetid fragrance, but more for their value as hedge plants or for forming a dense evergreen background. The commonest species is *Ligustrum ovalifolium* and is, perhaps, the most widely used of all hedge plants. It grows quickly and densely, takes easily from cuttings, and stands any amount of trimming with hedgecutters or shears, but it is a "greedy" plant, with numerous fibrous roots near the soil surface and other plants often do not do well when grown close to a privet hedge. In New Eng-



PLATE V

(Left) Flowering branch of *Jasminum multiflorum*. (Right) Small flowering plant of *Jasminum polyanthum* grown in a pot.

land this species is deciduous but in slightly milder climates it remains evergreen throughout the year. In fact the genus is generally evergreen and some of the more tender species are particularly valuable farther south because of their thick, glossy leaves. For example, *L. lucidum* and *L. japonicum*, which will stand very little frost, are best seen in such climates as those of southern California and the southeasternmost states.

The fruit of *Ligustrum* is a small, fleshy drupe or "berry". Often, as in the English privet, *L. vulgare*, it is black and lustrous and an added attraction in the autumn, but one species, *L. sempervirens*, a native of western China, is noteworthy in falling between this genus and *Syringa*. In the latter, the fruits are dry dehiscent capsules and, technically, this is the only constant difference between the two genera, but in *L. sempervirens*, the soft fruit finally dehisces by means of two valves. In the past this species has been in cultivation but whether it is still to be found in any garden or collection is doubtful. It has died out in at least one botanic garden where it was cultivated a couple of decades or so ago.

Noronia

This Madagascan genus is included in this account because of one of the species, *Noronia emarginata*, which is widely, if sporadically, cultivated in tropical regions. It is met with occasionally as a garden tree in Hawaii and Florida and produces smallish but thick, waxy, yellow, fragrant flowers followed by drupes which are purple when ripe, about 1 inch long, and said to be edible. It has very thick, leathery leaves and has been recommended for planting in windswept areas where it is claimed to be resistant to damage by salt spray.

Olea

This is perhaps the most important genus from the economic point of view, because of the best known species, *Olea europaea*, the source of olives and olive oil. It has been in cultivation in the Mediterranean region for centuries and is one of the domesticated plants with an unknown wild origin. One or two species which produce small, inedible fruits and are native in the Sahara area, Abyssinia, and Madeira, have been claimed at various times to be the progenitors. The "wild" olive of the Mediterranean is almost certainly a cultivated olive gone wild, rather than the original species from which it has been developed.

Unable to stand much frost, *Olea europaea* is adapted to a Mediterranean climate and in the U.S. grows best in parts of California where, with its somber evergreen foliage, it is of great value as a shade tree, quite apart from its importance as the source of olives.

There are perhaps 30 species in this genus, distributed throughout Africa and from southern Asia extending to eastern Australia, New Caledonia and the New Hebrides. Although an occasional species may be grown as a botanical novelty, none of them, apart from the true olive, are in general cultivation.

Osmanthus

Closely related to the previous genus, *Osmanthus* is noted as containing evergreen shrubs with delightfully fragrant flowers. The leaves in some species, e.g. *O. heterophyllus* (*O. aquifolium* and *O. ilicifolius*), are very like those of holly but they are always borne opposite one another on the stems, not alternate as in the genus *Ilex* of the family Aquifoliaceae, the true hollies.

One species, *Osmanthus fragrans*, has been prized by the Chinese for centuries and the flowers (as with those of some species of *Jasminum*) are used for flavoring tea. The fruit is very like that of an olive and the main difference between the two genera rests in the technical character that the petals overlap in the bud in *Osmanthus* but are arranged edge to edge in the flowerbuds of *Olea*.

None of the species are hardy in New England, outside Cape Cod, but for the southeastern, southern and western states there are several species that are worth growing. They are among the best evergreens because of their glossy, deep green foliage, but in addition they bear a profusion of fragrant white, cream, or, in one case, orange blossoms. *Osmanthus heterophyllus* is a native in Japan and Formosa and has been in cultivation long enough for several forms with variegated foliage to appear: variants with white or yellow margins or streaks, and one with a dark purple coloration.

In areas where the winters are not so severe as those in New England, one of the most outstanding early spring flowering shrubs is *Osmanthus delavayi* (sometimes placed in a separate genus *Siphonosmanthus*, mainly distinguished by the possession of tubular flowers). In March or early April it covers itself with pure white, sweetly scented blossoms which, although individually not very large, are usually borne in such profusion, and contrast so strongly with the small holly-like evergreen leaves, that the plant is an asset to any garden.

The native American devilwood, *Osmanthus americanus*, which grows in the coastal plain from southernmost West Virginia to Louisiana is sometimes found in collections, but, as a garden plant, is not as valuable as the Asiatic species.

× Osmarea

Some years ago a hybrid between *Osmanthus delavayi* and *Phillyrea decora* was produced at the nursery of Burkwood and Skipwith in England. This hybrid was named × *Osmarea burkwoodii* (the generic name being an abbreviated compound of the generic names of the parent species). It has considerable value as an evergreen shrub with white fragrant flowers borne in the spring and because it grows quickly, exhibiting hybrid vigor, is of great value in the same areas where the genus *Osmanthus* can be grown.

Phillyrea

Another genus very close to *Olea* and *Osmanthus*, and differing from the latter in the technical characteristics of its fruit, *Phillyrea* is confined in the wild to the Mediterranean region, except for one species from the Turkish-Georgian border

area near the Black Sea. This last species, *P. decora* (*P. vilmoriniana*) is perhaps the most horticulturally valuable in the genus. It forms a low shrub with thick green leaves very reminiscent of the quite unrelated cherry-laurel, *Prunus laurocerasus*, of the rose family. The fruits are like small dark plums but the creamy white flowers are of no particular merit.

The flowers of the other species of this genus, however, are rather inconspicuous with greenish-white petals but the plants have great value as evergreen shrubs suitable for dryish areas with a Mediterranean climate, such as parts of southern California, most similar to their natural habitat.

Picconia

Little need be said of this genus which contains two species, one from the Canary Islands, *Picconia excelsa*, and the other from the Azores, *P. azorica*, but the former is grown occasionally as a good evergreen shrub or small tree in warm temperate or sub-tropical gardens. These species have frequently been placed in the genus *Notelaea* which, however, is confined to Australia and differs in minor characters of the inflorescence.

Schrebera

Similarly, this is a little grown genus, this time of sub-tropical and tropical regions, mainly from Africa, but with one Asiatic and one South American species. The leaves are characteristically trifoliate or pinnate but simple-leaved species occur and the flowers somewhat resemble those of a small jasmine, but with a colored "eye", they are said to be sweetly fragrant and are followed by large woody capsules somewhat like those of *Syringa*, but larger and much woodier.

Syringa

The lilacs are one of the best known and best loved of all flowering shrubs and are not to be confused with the unrelated genus *Philadelphus* which is often called syringa as a "common" name. The genus is not a large one but contains about 28 species, most of them native of temperate Asia, but with two from southeast Europe. The best known species is the European *Syringa vulgaris* and several hundred cultivars with white, pink, lilac, purple or bluish flowers, single or double, have been bred and selected (and even very pale yellow flowers in cv. 'Primrose'). This development took place mainly in France in the latter half of the last century and the first decades of the present. The Arnold Arboretum is justly proud of its large collection of nearly 500 varieties and species and the New England climate seems to suit them very well.

Not everyone, however, realizes that there are other types of lilac. Some of the best of these are quite distinctive. The earliest species to flower, *Syringa pinnatifolia*, has little horticultural value with its small white flowers, but it is of botanical interest because of its relatively diminutive pinnate leaves. Following closely after this, however, is the north Chinese and Korean *Syringa oblata*, a



PLATE VI

(Upper) Inflorescence of *Syringa* × *prestoniae* 'Isabella'. (Lower) Inflorescence of *Syringa amurensis*.

species very closely related to the European *S. vulgaris*, and with similar attractive, lilac colored flowers with a sweet scent. One of the most charming and distinctive species to follow is *S. laciniata*, so-called because of its variable, divided leaves. With deep lilac flowers borne in dense masses on the straight more or less upright branching twigs it makes a fine show and never fails to invoke comment and praise. It has been suggested that it is one of the parents of the Persian lilac, the other being the very rare *Syringa afghanica*, the only species not yet known in cultivation and native in a limited area of eastern Afghanistan and western Pakistan. The Persian lilac, *S. × persica*, came into cultivation in Europe along the old trade routes from the Orient and like the so-called Chinese lilac, *S. × chinensis*, has probably been in cultivation for centuries.

The majority of the species are Asiatic and some flower a little later than the common lilac. In an attempt to extend the flowering season and produce new hardy plants, Dr. Isabella Preston of the Dominion Experimental Farm, Ottawa, crossed *Syringa reflexa* with *S. villosa* in 1920 and produced a whole new race of seedlings which came to be called the Prestoniae hybrids or *S. × prestoniae*. As well as flowering later, the flower shape of these hybrids is somewhat different from that of the common lilac. The petal tube is more slender and the color is pink or mauve but without the exact sweet fragrance of the common lilac (Plate VI, upper). Quite extensive hybridization has taken place within the genus since then and, when growing lilacs today, one is not restricted to the varieties of the common species, most beautiful and sweet-scented though they are.

The last species of lilac to flower are quite distinct from the others and at first might not be thought to belong to the genus *Syringa* at all (in fact some botanists have placed them in a separate genus, *Ligustrina*). Basically, however, they differ only in their cream-colored flowers and the length of the petal tube. This group, with *S. amurensis* and *S. pekinensis*, lies somewhat between the lilacs and the privets. The fruit is undoubtedly that of a lilac but the flowers look more like those of a privet and possess the same strong scent (Plate VI, lower).

Summary

Some families, notably the rose family, the Rosaceae, and the heather family, the Ericaceae (and the orchids, for cultivation under glass), may have supplied a larger number of genera of important horticultural plants, but, for its size, the Oleaceae is particularly noteworthy.

As has been said the basic floral pattern of four joined petals, two stamens and an ovary of two chambers is general throughout the family but the occasional exceptions add interest. In *Chionanthus* the petals are divided nearly to the base (and in the related and large tropical genus *Linociera* these divisions actually reach the base and the petals are held in pairs by the stalk of the stamen). In other genera there are no petals at all, for example, most species of *Fraxinus* and *Forestiera*. In *Jasminum*, however, the number of petals has increased so that 7,

8, or 9 lobes are the usual number. The leaves may be simple, more or less divided to the base or completely trifoliate or pinnate, and, as has been mentioned, the fruit types exhibit considerable diversity. For perhaps the majority of species, the fruit is an olive-like drupe, although usually somewhat smaller than the cultivated olive. But there are dry dehiscent capsules in *Forsythia* and *Syringa*, to mention two, and winged samaras in *Fraxinus*, *Abeliophyllum* and *Fontanesia*. From the horticultural point of view, the members of this family are most notable as flowering shrubs which produce a profusion of yellow, white, pink or lilac flowers famed, in so many cases, for their fragrance.

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