

MASTIC.

Pistacia lentiscus, L.

By JOHN R. JACKSON, Curator of the Museum, Kew.

THE knowledge and use of this resin has descended to us from very remote times. Hippocrates, writing some four centuries before Christ, speaks of the use made of it for medicinal purposes. Theophrastus, a little later, describes the tree under the name of *Schinus*, and says that the resin exudes in drops or tears from incisions made in the bark, and soon concretes by the heat of the sun. Dioscorides also mentions the tree under the name of *Schinus dendron*, and the resin under that of *Retina schinine*, or mastiche.

The lentisk tree, from which mastic is obtained, is found in many parts of Southern Europe, Northern Africa, and Western Asia, but it does not yield the resin in equal abundance in all these countries, for Desfontaines tells us that in Barbary very little or no resin can be obtained from incisions, and the same may be said of Italy, Portugal, and other Southwest European countries. The principal supply of mastic, both in ancient and modern times, has always been obtained from the Greek island of Chios, or Scio, as it is now called, where the tree is carefully cultivated on a large scale. Some, however, is produced in Asia Minor, but the Scio kind is most in repute. The best account of the collection of mastic in Scio is that given by Tournefort, who visited the island in 1701, and very little alteration has taken place since his time, except in the manner in which the Turks obtain their revenue from it. He first tells us that the villages in the island are divided into three classes, those of Del Campo, those of Apanomeria, and those where they plant lentisk trees. The latter are 21 in number, viz.: Calimatia, Tholopotami, Merminghi, Dhidhimo, Oxodidhima, Paita, Cataracti, Kini, Nenita (where is the famous Chapel of St. Michael), Vounos, Flacia, Patrica, Calantia, Arnoghia (where they make stone pots), Pirghi, Apolychni, Elimpi, Elata, Vesta, Mesta (in the renowned Arvisian field). "All the lentisk trees belong to the grand signor, and they can't be sold but under condition that the purchaser pay the same quantity of mastic to the emperor; generally the land is sold and the trees reserved." He then gives a full description of the tree itself, and expresses his belief that if incisions were made in the lentisk trees in Candia and the islands of the Archipelago, and even in those of Provence, some of them would yield as much mastic as those of Scio. "Even in Scio," he says, "there are many trees that yield hardly anything. Such stocks, therefore, as plentifully shed their nutritious juice by incisions must be preserved and propagated." With respect to the cultivation of the tree, he merely informs us that "they sometimes prime 'em by moonlight in October." Regarding the collection of the resin, he says: "They begin to make incisions in these trees in Scio the first of August, cutting the bark crossways with huge knives, without touching the young branches; next day the nutritious juice distills in small tears, which by little and little form the mastic grains; they harden on the ground, and are carefully swept up from under the trees. The height of the crop is about the middle of August, if it be dry, serene weather; but if it be rainy, the tears are all lost. Likewise, toward the end of September, the same incisions furnish mastic, but in lesser quantities; they lift it to clear it of dust, which sticks so fast to the faces of those employed that they are forced to use oil to wash it off. There sometimes comes an aga from Constantinople to receive the mastic due to the grand signor, or else they appoint the custom house officers of Scio to receive it, who go to three or four of the chief towns before named, and give notice to the inhabitants of the rest to bring in their contingent. All these villages together owe 286 chests of mastic, weighing 100,025 okes. The cadi of Scio takes three chests, each weighing 80 okes; one chest goes to him that keeps the accounts; the officer at the custom house that weighs the mastic takes a handful out of each man's parcel. The garbler or sifter likewise has as much for his pains. If any person is caught carrying mastic to such towns as do not plant the tree, they are sentenced to the galleys, and stripped of all they are worth. Such of the peasants as gather not enough mastic to pay their quota buy or borrow of their neighbors, and those who have more than enough keep it for the next year, or sell it privately. Sometimes they compound with the custom house officer, who takes it at one piaster the oke, and sells it for two or two and a half. The planters of the lentisks pay but half the capitation, and wear the white sash round their turbans as well as the Turks."

The system here described by Tournefort remained in force with little or no modification until the year 1850, when a large number of the lentisk trees were destroyed by severe cold. This mishap induced the Turkish government to relinquish their claim to the exclusive collection of the mastic, and they made over the right to the twenty-one villages where the tree is cultivated, upon the condition that the inhabitants should pay the sum of 400,000 piasters per annum. The production of the resin is still confined to the villages in the southern part of the island, as mentioned by Tournefort, the northern part, and also the neighboring islands, being unfitted for its production.

Campbell, in his report on the trade of Scio between 1854 and 1858, states that before the cold of 1850 the lentisk trees produced from 45,000 to 50,000 okes; but, owing to the number of trees killed by the frost, the amount was greatly reduced in the subsequent years. The quantity and value of the mastic exported from Scio in each of the years from 1854 to 1858 is stated by Campbell as follows:

	lb.	£	s.	d.
1854.....	26,200	value 13,200	at 10	8 per lb.
1855.....	33,200	" 16,200	" 9	" 9
1856.....	40,500	" 20,727	" 10	" 3
1857.....	45,125	" 20,275	" 9	" 0
1858.....	43,750	" 22,325	" 10	" 2

In 1871 Scio exported 28,000 lb. picked and 42,000 lb. common mastic.

The principal portion goes to Constantinople, Smyrna, and other Turkish towns in the Levant, where it is largely consumed as a masticatory. The custom of chewing mastic has prevailed in the East from the most ancient times, and in some of the large cities is almost universally practiced by both sexes, particularly in the cafes, where the attendants present it to their

customers. Tournefort says: "The sultanas consume the greater part of the mastic assigned for the seraglio; they chew it by way of amusement, and to give an agreeable smell to their breath, especially in a morning fasting; they also put some grains of mastic in perfuming pots, and in their bread before it goes to the oven. Mastic is likewise beneficially used in distempers of the stomach, and the *Primevæ*, to stop bleeding and fortify the gums."

The English word *mastication*, applied to the art of chewing, is derived through the Latin *masticatio*, from *mastiche*, the ancient Greek name of the resin, evidently in consequence of this ancient custom of chewing mastic. The island of Scio, or Chios, as it was formerly called, also is supposed to have obtained its name from *Schinus*, the Greek name for the lentisk tree.

The yield of the resin is comparatively small; a fine tree may give only a total of from 8 to 10 lb., and a shower of rain during the gathering time produces disastrous results. Four qualities of mastic are known, namely, cake, which consists of the large pieces, and which is considered the best, and is sold chiefly for use in the seraglios; large tears, small tears, and the most inferior quality, which is mixed with fragments of leaves and other refuse, and is used in the preparation of the liqueur known as raki, or mastic brandy.

Mastic possesses stimulant and diuretic properties similar to common turpentine. It is now but little used in medicine in this country, although at one time it was a favorite remedy. With us its chief use is in the preparation of varnishes, for which purpose it is dissolved in oil of turpentine or alcohol. It is also used by dentists for filling up the cavities of carious teeth. Mastic is but little adulterated, though it is sometimes mixed with sandarac, olibanum, and similar resins. In the Indian bazars a resin very similar to mastic is sold produced by *Pistacia cabulica* and *P. khinjuk*, found all over Scinde, Belochistan, and Afghanistan, both of which species, however, have quite recently been placed under *P. terebinthus*, L. The better qualities of the resins from these trees much resemble true mastic, and sometimes find their way to the European markets under the names of East Indian or Bombay mastic.

HOW TO MAKE A TENNIS LAWN.

MINUTE and explicit directions for making a tennis lawn cannot well be given that will apply to every case. The question of expense, to begin with, is often the most important element of the problem; but even if this be a minor consideration, there will, usually, be other limitations, to meet which good judgment and experience will be required. The climate is the main difficulty that has to be contended with in this country, and the mistake most commonly made is insufficient and superficial preparation of the soil before seeding or sodding. This error not only greatly increases the expense of maintenance, but prevents the attainment of the best results even with the best of care taking. With a soil of proper texture and sufficiently fertile, it is only required to follow the directions which have been given in former numbers of this journal for making a good lawn, taking special care to have it firm and level. It often happens, however, that a tennis court is wanted where the soil conditions are unfavorable, and then the proper preparation of the soil may be a difficult and expensive task. This preparation of the soil involves two distinct qualities—its mechanical condition and its chemical composition. The soil should be porous enough to absorb sufficient rain water, and to afford ready passage for roots, and yet compact enough to prevent the water absorbed from quickly draining away and evaporating too rapidly; and it should, also, be so firm as not to be stirred up by the grinding action of feet upon it, which would otherwise break the roots and crowns of the grass. In short, the soil should be porous, and yet have a "binding" quality. Sand is porous, but will not bind. Clay will bind, but is not sufficiently porous. A proper mixture of the two will produce the mechanical quality desired.

It is safe to assume that most soils need enriching. For this purpose there is nothing better than rotted barn yard manure. But it is often more economical to add a mixture of properly prepared peat, muck, or leaf mould and commercial lawn fertilizer, than to use barn yard manure exclusively. The question as to how much manure should be added to a soil is so much one of expense and judgment that no definite rule can well be given. An ordinary farm field, in fair condition, may have manure, at the rate of twenty cart loads to the acre, plowed in when it is laid down to grass, and a top dressing of a like amount every three years or so. Ornamental grounds of large extent, in which a better result is desired, and yet in which a careful economy must be observed, may have at least twice that amount plowed in at the start, and an annual top dressing of half as much to the acre may be applied. A tennis lawn or any other ground upon which turf is to be maintained, that is subject to much wear, may, however, well have more.

The soil of a tennis lawn should be deep, that the roots of the grass may easily descend to permanent ground moisture, just how deep, up to three or four feet, being a question of expense. The top soil, or mould, and subsoil of good quality, taken together, should extend to that depth, if practicable, in order to retain sufficient moisture to last over droughts. It is more economical in the long run to so prepare the soil in the beginning as to store up natural moisture than it is to supply it artificially upon the surface when needed.

In some instances, however, there will be, at times, too much natural moisture in the soil, and under-drainage is the remedy for such cases. In the case of stiff, clayey soil, another and very important advantage in under-drainage is to make it more porous and pervious to roots. Drainage is best effected by laying land tiles at least two inches in diameter at a depth of three or four feet and thirty or forty feet apart, care being taken to give them a sufficient pitch and a proper outlet.

For deep preparation of the soil, trenching should be resorted to. This process consists in throwing back the top soil on a strip from three to ten feet wide, so as to expose the subsoil, which is then dug up and turned over, or thrown back if it is desired to work more deeply. The lumps are pulverized, clay or muck mixed in, if the original soil is too sandy, or sand and peat, if

too clayey, and stones, stumps, and roots of large size thrown aside, and all necessary grading and leveling done. Then the topsoil of the next strip is thrown upon the strip of subsoil thus prepared, great care being taken to sift out all the roots of weeds and coarse grasses. And so on.

It not infrequently happens in New England and other parts of the country that have been subjected to glacial action and deposit, that both the topsoil and subsoil consist of dry, coarse sand and gravel, upon which it is almost impossible to maintain good turf, after the ordinary preparation, without an extraordinary amount of manure and almost constant watering during dry weather. In such a case, it is an economy to throw back the soil strip by strip, as for trenching, and to place at a depth of three or four feet below the surface a layer of clay about six inches thick, which may be put in dry, if broken to a fine powder, or, which is usually easier, it may be wet and "puddled"—that is, worked into a comparatively homogeneous mass of mud. In either case it forms an impervious bottom to the lawn, thus preventing the rain which falls or the water which is applied from settling down too deep for the roots of the grass to reach it. The sides should, of course, be left sufficiently porous to allow excessive moisture to drain off.

Another case would be where the soil was almost pure clay, and where no muck or sand or finely divided mineral matter could be obtained without excessive cost. In such a case, the ground having been thoroughly underdrained, the usual way is to mix in almost any sort of vegetable fiber, such as leaves, half-decayed twigs, leaf mould from the woods, sods, weeds, the tops and refuse of vegetables, and the like.

After the subsoil has been thoroughly prepared, the topsoil is manured and deeply harrowed several times. The ground should then be leveled, rolled, and allowed to settle. If the previous work has been well done, the settlement will be uniform; if it is done late in autumn, the ground will become none too firm during the winter, and it should not be deeply plowed, but harrowed and leveled as early in spring as it can be worked. If good sod can be procured, the court will be ready for use as soon as the grass is green. The sods, of equal thickness, should be rolled down very firmly, to bring the grass roots in close contact with the soil. It is a good plan to sow the seed of Kentucky blue grass and the finer varieties of red top upon the sod as it is laid, and to repeat this sowing every spring. A dressing of some "complete" fertilizer—that is, one that contains nitrogen, potash, and phosphoric acid—can also be applied every spring; or fine manure can be spread over the lawn in autumn, to be raked off in spring. In case no sod can be procured, the seeds of the grasses above named can be sown after the ground is leveled and rolled, then lightly raked in and rolled again. If the seeding is done in early spring, the court can be used the same summer; but no seeded lawn is at its best the first season after sowing. Seed can be sown in early September, if the preparation of the soil has been made several weeks before, so as to allow time for settling.

No pains or expense should be spared to obtain the purest and freshest seed, which can best be done by applying to reputable dealers, who have sufficient call for it to warrant them in keeping it. Much disappointment has come from using inferior seed.—*Garden and Forest*.

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NOTES ON THE GERMICIDAL ACTION OF PEROXIDE OF HYDROGEN.*

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IN spite of the extensive use of peroxide of hydrogen and the commonly received opinion as to its value as a germicide, its germ-killing power has not, so far as I can learn, been investigated thoroughly. The prevalent impression of its value probably rests largely on the experiments of Kingzett, Guttman, and Miguel; but these, which were not conducted with the improved methods of bacteriology, prove nothing as to its germicidal power, but simply that in certain small proportions it prevents the development of some microbes (species not determined). Weeks,† using modern methods, found, devoting a short paragraph to the subject, that the "hydrogen dioxide, formula HO₂" [sic] destroyed pyogenic germs in exposures of one to one and one-half minutes. He gives no idea, however, of the strength of the solution used, and the impression given by him of the extreme instability of the compound requires some correction. I have therefore thought it worth while to test the substance in various strengths on the bacilli and spores of anthrax and on the white and yellow pus cocci.

The article used was Charles Marchand's fifteen-volume solution. The methods were: 1, that of Koch, in which threads, impregnated with the germs, are subjected to the influence of the germicide, and then, after washing in sterilized water, placed on the surface of the nutrient medium; 2, the following plan, which is somewhat simpler and more expeditious: A small platinum loopful of the germs is rubbed up rapidly in the germicidal liquid; from this emulsion a loopful, containing many hundred germs, is, after the desired length of exposure, transferred to a test tube, containing melted agar or gelatine, in which it is thoroughly shaken up. The tube is then placed in the incubator in a nearly horizontal position, and if any germs are left alive, they develop, scattered through the mass. This method has the advantage, without the bother, of plate cultures, or even of Esmarch's roll cultures, of giving an approximate idea of the proportion of germs that survive a given exposure. The method is open to the theoretical objection that the minute amount of the germicide introduced into the culture medium might prevent the growth of germs not really killed, but the weight of this objection is easily removed by a few control-experiments. Since completing my work I notice that Martens‡ has used a similar plan, and doubtless it has been used by many others, though I have not seen it mentioned.

It was found that the fresh fifteen-volume solution killed the white and yellow cocci and the anthrax bacilli

* Read before the Omaha Medical Club, July 18, 1888.

† Archives of Ophthalmology, xvi., 4.

‡ Virchow's Archiv, cxii., 2.