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- No. 1 The Olive Branch.
 No. 2 The Flowers of the Olive in bloom.
 No. 3 An enlarged flower consisting of calyx, four lobes, two stamina and one pistil.
 No. 4 Showing half-section of the Olive.
 No. 5 Showing stone of the Olive.

THE TREE, THE OLIVE, THE OIL
IN THE
OLD AND NEW WORLD

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THIS BOOK I
DEDICATE TO THE MEMORY
OF MY BELOVED MOTHER
ELLEN HURLEY

JOHN HURLEY, PH. G.

*Hail to Minerva's famous tree,
Bearing Olives filled with oil;
A wondrous aid to health and strength
Well repaying care and toil.
Great has been the Olive's blessing
To the old world and the new—
May its orchards thrive and prosper—
Yielding fruit the ages through.*

HISTORY OF THE TREE.

Its original habitation is very uncertain, but it may be assumed that it was brought from the central table land of Southern Asia by the Indo Greek progenitors of the Greeks and Romans, by them introduced into Southern Europe, probably Greece.

At its transplanting into Asia it was in its wild state, and there the cultivation of olives is supposed to have begun. Also it is thought to be indigenous to Egypt.

The Phœnicians, the first far-wandering seamen, probably took the olive to Carthage, from which city the traders bore it to Spain, first as oils, for which gold bars were obtained: then later the seeds, sprouts and roots for cultivation.

The Phœnecian colony where Marseilles stands imported olives into France twenty-five hundred years ago. The fragrant olive tree is found in China and Japan, its leaves being used to perfume Chinese teas.

The question is not clearly stated when we ask if such and such olive trees of a certain locality are really wild (indigenous). They may have been sown by man or birds at a very early epoch: for this tree is remarkable for its longevity. The ancients limited its existence to two hundred years. But modern authors assert that in climates suited to its constitution, it survives its fifth century. The Monks of Jerusalem affirm that the olives of the Garden of Gethsemane are the same that witnessed the agony of Christ.

Later statements are made that the trees easily reach the age of a thousand years.

The effect of the sowing is a naturalization, which is equivalent to an extension of area. The point in question, therefore, is to discover what was the home of the species in very early prehistoric times, and how by different means of transport this area has grown larger.

The wild olive, called in botanical books the variety *sylvestris*, or *oleaster*, is distinguished from the cultivated olive tree by a smaller fruit. At what remote period of human progress the wild olive passed under the care of the husbandman and became the fruitful garden olive, it is impossible to conjecture. Therefore, it is not by the study of living olive trees that this question can be answered. It must be found in what countries the cultivation began and how it was propagated. The more ancient it is in any region the more probable it becomes that the species had existed here from the time of those geological events, which occurred before the coming of prehistoric man.

The frequent reference to the plant in the Bible; the importance attached to its produce; its implied abundance in the land of Canaan; the prominent place it has always held in the economy of the inhabitants of Syria, lead us to consider that country the birthplace of the cultivated olive, whence it was introduced into Africa and the south of Europe.

There is little doubt that long before the assertion of Pliny that no olives existed in Italy in the reign of Tarquinius Priscus, it was grown in Africa by the Carthaginians and in the south of Gaul at the colony of Massila. Although Fenestella tells us "That in the year of Rome 173, being the reign of Tarquinius Priscus, it did not exist in Italy, Spain or Africa."

Its prehistoric area probably extended from Syria toward Greece, for the wild olive is very common along the southern coast of Asia Minor, where it forms regular forests.

An improved variety, possessed at first by some small tribes, was slowly distributed to adjacent tribes. And yielding profusely with little labor that oily matter

so essential to healthy life in the dry, hot climate of the east, the gift of that fruitful tree in that primitive age, became a symbol of peace and good will among the warlike barbarians.

At a later period, with the development of maritime enterprise, the oil was conveyed as an article of trade to the neighboring Pelasgic and Ionian nations, and the plant doubtless soon followed.

The earliest Hebrew books mention the olive *sait*, or *zeit*, both wild and cultivated. It was one of the trees prominent in the land of Canaan. As has been previously stated, the olive was first mentioned in Genesis at the time of the flood. Taking into account this incident of Holy Writ, it may be added that discoveries of modern learning show that the Mount Aarat of the Bible must be the east of the mountain in Armenia which bears that name, but which was anciently called Masis.

A French writer has placed the mountain in question in the Hindu Kush, even near the sources of the Indus. This theory leads one to believe it near the land of the Aryans, yet the olive has no Sanskrit name, not even in that form from which the Indian languages are derived.

If the olive had then as now existed in the Punjab, the Eastern Aryans in their migrations to the south would naturally have given it a name. Also if it had been known in the Mazanderam to the south of the Caspian Sea, as at the present day, the Western Aryans would have known it.

To these negative indications it can only be objected, that the wild olive attracts no considerable attention. Also that the idea of extracting oil possibly arose late in this part of Asia.

Babylonia grew no olive trees, its inhabitants making use of oil of Sesame. It is certain that a country so subject to inundation was not at all favorable to the cultivation or even growing of the olive.

It is not known if there is a name Zend, but the Semitic word "*Sait*" dates from a remote antiquity, for it is found in modern Persian "*Seitum*" and in Arabic

"Zaitum." It even exists in modern Turkish among the Tartars of the Crimea, "Seitum," which may signify that it is of Turanian origin, or from the remote epoch when the Turanian and Semitic people intermixed.

The ancient Egyptians cultivated the olive tree which they called "Tat." Several botanists have ascertained the presence of branches or leaves of the olive in the Sarcophagi. Nothing is more certain. It would be interesting to know to what dynasty belong the most ancient mummy cases, in which olive branches have been found. The oil found in Pleban tombs was probably imported from Syria.

The Egyptian name, quite different to the Semitic, shows an existence more ancient than the earliest dynasties.

In Cyrenaica the olive was much grown and the harvest of oil was considerable; but it is not said that the olive was found in its wild state there. On the contrary, the quantity of oil mentioned seems to point to a cultivated variety. Kralik (a very accurate botanist) on a journey to Tunis and into Egypt, did not anywhere find the olive growing wild. Only the cultivated olive is found in Egypt. It is doubtless from the southern coast of Asia Minor and in the Archipelago that the Greeks early knew the tree. If they had not known it on their own territory, but had received it from the Semites, they would not have given it the special name *elaia*, whence the Latin *olea*.

As stated previously, the Goddess Minerva carried the olive from the north of Greece into Sicily and Sardinia. It is more than possible that this may have been done by the Phœnicians, but in support of the idea that the species or a perfect variety was introduced by the Greeks. It may be mentioned here that the Semitic name *seit* has left no trace in the islands of the Mediterranean. The Græco-Latin name is found here as in Italy, while upon the neighboring coast of Africa and in Spain the names are Egyptian and Arabic, as will be explained later.

Whenever the olive may have been transplanted on the Hellenic Peninsula, all traditions point to the limestone hills of Attica as the seat of its first cultivation.

In the famous Iliad the presence of the olive tree in the garden of Alcinous and other familiar allusions show it to have been known when the Odyssey was written.

By the time of Solon the olive had so spread that he found it necessary to enact laws to regulate the cultivation of the tree in Attica, from which country it was probably distributed gradually to all the Athenian allies and tributary states.

To the Ionian Coast, where it abounded in the time of Phales, it may have been in an earlier age brought by Athenians.

Samos, if we may judge from the Greek epithet Aeschylus uses, *eleuophetog*, must have had the fruitful plant long before the Persian Wars. It is not unlikely that the valuable tree was taken to Magna Graecia by the first Achaean Colonists.

In Pliny's time it was already grown abundantly in the two Gallis provinces and in Spain. Indeed, in the earlier days of Strabo, the Pigurians supplied the barbarians with oil.

The Romans knew the olives later than the Greeks. Pliny in speaking of the cultivated olive says, "The olive was known first in Rome at the time of Tarquin the Ancient, 627 B. C." The species then existed in Great Greece as well as Greece and Sicily.

Africa was indebted for the olive mainly to Semitic agencies. Along the southern shore of the great inland sea, the tree was carried by the Phenicians and at a remote period to their numerous colonies in Africa.

The tree was supposed to have been taken into Sardinia and the Balaeric Islands by these same merchants. And if it is true that old olive trees are found in the Canaries, on their rediscovery by mediæval navigators, the venerable trees probably owed their origin to the same enterprising pioneers of the Ancient World.

The writer De Candole says that "the means by which the olive was distributed to the two opposite

shores of the Mediterranean are indicated by the name given the plant by their respective inhabitants, the Greek name passing into the Latin *olea* and *oliva*. That in turn becoming *ulivo* of the modern Italian, the *olive* of the Spanish, and the *olive, oliver*, of the French."

HISTORY OF THE OLIVE.

The history of the olive and its production begins in the days before written manuscripts. On prehistoric monuments sculpturings are found which show oil being used for anointing as well as other ceremonial services.

The precious oil used in Biblical days was always olive oil, perfumed, purified and sanctified. The widow's cruse which during the terrible famine remained inexhaustible was that in which she kept olive oil.

For ages so precious and valuable was the olive that in all remaining records of the people of the holy and ancient times is found mention of the most serviceable and delectable fruits, olives, dates, figs, and grapes. Unquestionably these were the most valuable products of those days. In Biblican history the mention of the olive frequently occurs. Noah, after the waters of the flood abated, sent out from the Ark a dove "and the dove came unto him in the evening, and lo, in her mouth was an olive leaf pluckt off."—Gen. viii, 2. Again we read in Judges ix, 8-9: "The trees went forth on a time to anoint a king over them, and they said unto the olive tree, Reign thou over us. But the olive tree said unto them, Should I leave my fatness (French version reads 'my sweetness and my oil') wherewith, by me they honour God and man, and go to be promoted over the trees?"

The mythological interpretation of the growth of the olive tree readily invites attention.

The Athenians held it in such esteem that they ascribed its production to their tutelary Deity. This beneficent miracle, which is retraced in the monuments of Athens, is differently represented by ancient mythological authors. It is thus related by Apollodorus Athiensis: "In the reign of Cecrops leave was given to the gods to assume the patronage of cities in which they might appropriate to themselves peculiar honors. Upon which Neptune came into Attica, standing in the middle of the Citadel, he smote the earth with his trident, causing the sea to flow at his feet.

"After him appeared Minerva, who, calling Cecrops to be a witness of what she was about to perform, caused an olive tree to spring from the ground.

"Now it happened that this olive tree which grew in the shrine of Erectus was burned with the rest of the temple by the barbarians. On the second day after the burning the Athenians, who by the King were ordered to sacrifice, went up to the temple. To their amazement they found a shoot from the stump sprung up to the height of a cubit."

Another legend reads in this manner: "Among the most celebrated cities of Greece the one that stands out supreme in its glory is Athens, said to have been founded by Cecrops. It is here that the olive is thought to have first appeared." The story tells us that Neptune and Minerva aided in the foundation of Cecrop's city and that they quarreled as to which one should name the city, as the honor was to depend upon the value of the gift these two Gods bestowed upon the land.

Neptune gave a swift horse, but Minerva's gift of the olive tree quite eclipsed his in value, so the city was named after the giver of this precious tree. Athens Cecrops put the question to vote, the men pronouncing in favor of Neptune, but the women for Minerva, she winning by one vote. Neptune's son, Hallirhotius, wishing to avenge his father, attempted to destroy the olive tree. He was wounded in the impious attempt and died. Thus Minerva became patron Deity of the City of Athens.

From her father Jupiter, one of whose names was Mopios, the olive was called mopiai.

The olive tree that Minerva caused first to appear grew on the rocks near the city that had been struck by Neptune's trident; it was surrounded by a wall and called the Acropolis, and was guarded by a band of warriors who alone were allowed to dwell there.

Aristides said, "Attica is the center of Greece, Athens of Attica, the Acropolis of Athens." He well might have added, "the olive tree is the center of the Acropolis."

It is around this olive tree on the Acropolis and its surrounding temples that the history of the great republic is centered.

It became the place of safety in the moment of danger; its citadel at the summit was strengthened by the groves of wild olive trees, which grew on the slopes of the rock. And about sixty years after the Pelasgians further fortified it by replacing some of these with walls.

Phidias, Praxiteles and others celebrated the birth of Minerva's tree, and Horace wrote, "The one thing which is necessary is to keep safe the Citadel of Pallas, and everywhere to put the select olive in a conspicuous place."

Also it was considered an act of the highest piety and honor to Minerva to consecrate to her statues made of the wood of the olive tree.

There is a very quaint legend connected with the Church Nossa Senhora Da Oliveira (Our Lady of the Olive Tree) at Gui Maraens (Portugal, near Oporto): "In the time of the Goths, Wamba was busy on his farm ploughing when some messengers arrived from the nobles and announced his accession to the throne.

"Surprised, Wamba replied that he would be king when his goad blossomed with leaves, at the same time thrusting it into the ground. By divine intervention it took root, branches sprouted, bearing leaves and fruits of the olive."

In the year B. C. 484 the Historian Herodotus writes as follows: "The land of the Epidaurians yielding no fruit, the Epidaurians sent to consult the oracle at Delphi concerning the calamity. The Pythian bade them erect statues of Dauria and Aurelia, and when they had fulfilled the command it would fare better with them. They asked whether the statues should be made of wood or stone, but the oracle decreed they should be made of the wood of the cultivated olive."

The Epidaurians thereupon requested the Athenians to permit them to cut down an olive tree, thinking this tree to be the most sacred. It is said at that time that there were no olive trees in any other place in the world.

The only condition under which the Athenians permitted them to use the tree was that annually they should bring victims to Minerva, Polias, and Erechtheus.

The Epidaurians having agreed to these terms, their request was granted. Having made and erected the statues, their land became fruitful and each year they fulfilled their promise of sacrifices. It is noted that in the lands of the famous nations of ancient history the olive appears as the most conspicuous product, bringing the conviction that the growers of the olives or the people raised on olive-growing soil were destined to be great, wise, and wealthy. Thus the Persians, Syrians, Romans, Grecians, Egyptians, Israelites, Philistines, Arabians, Babylonians and many other races who left names of great deeds were children of the olive land, nourished on the fruit of the tree so famous in ancient history.

At all times the poets and historians of ancient nations praised olives and described them. There was then a sweet olive which royalty served without preparation to eat as one would enjoy dates and figs.

In modern history, when the original growers of the olive had worn themselves out by wars, during which those who met death were invariably the best men, resulting in the degradation of the race stock, we find that Spain in the hey-day of her power, and France during the Napoleonic war were people of the olive.

The veneration of the olive by the Greeks was very great. Florentinus, who lived about 218 A. D., wrote in his commentaries on agriculture, "the olive being pure ought to have them that gather it chaste, for it will thus produce a great abundance of fruit. Also it is said that in Azarbe of Celicia, chaste boys cultivate the olive, and for this reason there the olive is very fruitful."

This Grecian industry languished beneath a despotism which the most ingenious calculations fail to elude. In ancient Athens a premium was given for the multiplication of the olive, and severe penalties were inflicted upon the proprietors who destroyed it on their own estates.

Now, to avoid the exactions to which he is a prey, the unhappy Athenian prefers cutting down his olives and selling them at a price unequal to their annual produce.

The majesty of the Roman sway has conferred high honor upon the olive. With it they crowned the troops of the Equestrian Order (who are wont to defile upon the ides of July). It is used by the victor in the minor triumphs of the Ovation; also in Athens they are in the habit of crowning the conqueror with olive, and at Olympia the Greeks employ the wild olive for a similar purpose.

In Africa and Southern Spain the olive retains appellatives derived from the Semitic *zait* or *zeit*; but the complete subjugation of Barbary by the Saracens sufficiently accounts for the prevalence of Semitic forms in that region; and *aceytuno* (Arab *Zeitum*), the Andalusian name given to the tree itself, is a vestige of the Moorish conquest.

After the conquest of Africa by the Arabs, the thriving orchards of olive trees, covering two million five hundred thousand acres, that were located all through Southern Tunis, disappeared, so that at the beginning of the last century olive culture in that region had practically died out. Although today Southern Tunis is an arid, treeless waste, almost desert, in South-eastern Tunis the dry land orchards are the wonder and admiration of olive growers the world over.

A remarkable fact, and one which has not been noted or at all spoken of by philologists, is that the Berber name for the olive, both tree and fruit, has the root *taz* or *tas*, similar to that of the ancient Egyptians. The Kabyles of the district of Algiers, according to the French-Berber dictionary, which is published by the French government, calls the wild olive *tazebboujt*, *tessttha*, *ou tamashinet*. These are strong indications of the antiquity of the olive in Africa.

The Arabs having conquered this country and the Berbers having been driven back into the mountains and the desert, also having subjected Spain, excepting the Basque country, the names derived from Semitic

zeit have prevailed even in Spanish. The Algerian Arabs call the cultivated olive *ziltoun*; the wild *sen-boudji*; the oil *zit*; while the Andalusians call the wild olive *azebuche*, the cultivated *aceytuno*.

In other provinces we find the name of Latin origin, *olivio*, side by side with the Arabic words. The oil is in Spanish *aceyte*, which is almost the Hebrew name, but the holy oils are called *oleos santos* because they belong to Rome. The Basque use the Latin name for the olive tree.

It is an established botanical fact that no leaf of the olive has hitherto been found in the tufa of the south of France, and Tuscany or Sicily, where the laurel, the myrtle and other shrubs now existing have been discovered. This is an indication, until the contrary is proved, of a subsequent naturalization.

In modern times the olive has been spread widely over the world; and though the Mediterranean lands that were its ancient home still yield the chief supply of the oil, the tree now is successfully cultivated in many regions unknown to its early distributors. Soon after the discovery of the American continent it was conveyed thither by the Spanish settlers. In the United States one of the homes of the olive is in Southern California, where it is extensively cultivated.

Authorities differ as to the size of the olive tree. The bulk of the patriarchal ones is said to be very great. It is an authenticated fact that in France olive trees have reached such size that two men can hardly compass them with their arms.

THE OLIVE AND ITS GROWTH

In ancient history there are but few varieties of the olive mentioned. Virgil speaks of but three, the "Orchites," probably the "*Olea Maximo Fractu*" of Tournefort. It has its name from the Greek *orxis*, the *testis*, a name by which it is still known in some parts of Provence. "The Radius or Shuttle Olive" and the "Poisa," probably the "*Clea Media Rotunda Præcox*" of Tournefort.

In Campania, Horace and Martial speak in praise of the Venafran Olive. Hardouin suggests that Licinius Cassus may have introduced the Licinian Olive. Ancient Italian authors enumerated comparatively few, from twelve to sixteen varieties, but a modern writer in that country has summed up the variety to over three hundred. The species of interest to us is the "*Olea Europea*," as this is the only variety that has yet repaid man's care by the increase in weight of its berry. The olive (*Olea Europea* of Linneus) was so called by Linneus to indicate that its home was there; that there it is cultivated by choice and has been held in honor from the remotest antiquity.

Mr. Caruso, Professor of Agriculture at the National University of Pisa, separates the olives under three heads as: "The domesticated olive, the wild olive, the seedling of the cultivated olive, although two only, that of the domesticated olive and wild olive, would answer all practical purposes."

The olive will live in almost any soil except a dry and compact or a humid one, while we safely assume that the olive prefers a soft, friable, moderately cool soil, one rich in lime and potash, a permeable soil, such as a limey clay of medium consistency, not inclined to either dryness or humidity. The roots then encounter no obstacle in extending themselves and the air and moisture would circulate sufficiently. Lime abounding phosphate, magnesia, with an abundance of silicates of alum and mercury and a sufficiency of potash and soda are the chemical and physical requisites which

this tree will find most advantageous to its development, that will cause it to produce abundantly, and, other circumstances being equal, to give the very best oil.

Hence it may be seen that the olive will flourish wherever its roots will penetrate easily and there is no deficiency of alkali, such as a loose soil of rocky clay or sand of volcanic or granite formation.

But while the olive will subsist on many different soils or prosper in several, it is not to be concluded that it may be condemned to bare impoverished ground.

It must be remembered that the latitude must largely guide one in selecting the kind of soil for an olive orchard. In Southern Spain the mean summer temperature is as high as eighty-two degrees. There they hold red soil in very low estimation, preferring the light colored or white, considering the red soil attracts too much heat and requires too much irrigation. In Central Spain the light red soil with a porous tendency to carry off the frequent rains is preferred, while the white is entirely condemned. Still further north the dark porous soils are exclusively used.

The calcareous soils through their action on the natural and artificial fertilizers quickly put into circulation the elements of nutrition of the olive and so promote its growth; but for this very reason it is necessary that the tree should be frequently manured in order to obtain an annual product. It is the want of nourishment in the ground that causes the olive to fruit only every other year or every third year. Excessive moisture is deleterious, also in a dry hard soil the tree contracts, splits and leaves the roots gorged with sap. The most favorable soil is an open, loose and fairly fertile one, and ought to be at least a yard in depth.

The olive is fond of a chalky soil; that is, one made up of lime carbonates. The carbonate of lime is indispensable to vegetable life and it is noticed that the oil from olives grown on a calcareous soil is better than from a soil lacking in this element.

The fact is established that the best soil for the olive is that in which lime predominates; and where silica exists, and there is no lack of clay. It will readily

be seen that such a soil would give passage to moisture, while at the same time there would be consistency enough to sustain the tree and preserve the elements of nutrition. Liebig says that "at the time of flowering of any vegetable if the soil abounds in phosphates the fruit sets well and is started on the road with every advantage; on the contrary, if these are lacking the flowers fall off and the tree gives its strength to the wood."

The quality of the fruit is essentially affected by that of the soil; it succeeds in good loams which are capable of bearing corn, but on fat lands it yields oil of an inferior flavor and becomes laden with a barren exuberance of branches and leaves.

All varieties of lives dread the extremes of heat and cold; thus the temperature of the climate is quite if not of more consideration than the soil.

Neither do they delight in very low nor in very elevated situations, but rather in gentle declivities, with an exposure adapted to the climate where the fresh breezes, playing among the branches, may contribute to the health of the trees and to the fineness of the fruit. The ancients contend that the olive would not grow unless it had sea air, and established the rule that it should not be planted more than ninety miles inland.

Theoprastus, the famous Greek writer (previously quoted), has asserted that "the olive does not grow at a distance of more than forty miles from the sea." Also that "the reason why the olive flourished to such an extent in Attica was because it craves thin soil with its outcroppings of calcareous rock, which, while it suits the olive perfectly, is fit for little else agricultural."

The Arabic and Latin authors hold to the same facts, but it has been established that the olive can be grown at any distance inland provided the soil and climate are favorable to it.

In high altitudes it requires that it be placed on hill-sides exposed to the south; that it may be warmed by the reflected heat. For successful cultivation the yearly mean temperature should be not less than fifty-seven

degrees Fahrenheit. Pliny says "the olive of the low ground is more liable to disease than that grown on high ground."

In general it may be said that the olive requires the same kind of soil as the grape, in proof of which we often see them growing together. The olive is not so hardy as the grape vine, the latter requiring only 10,800 degrees Fahrenheit to ripen its fruits, whereas the olive needs 12,700 degrees, although some varieties will ripen with 10,800 degrees from blossoming time to maturity.

The beauty of the olive is far from corresponding to its intrinsic value. It varies in size according to the climate in which it grows. The olive yards of France contain trees generally from eighteen to twenty feet in height and from six inches to two feet in diameter, the temperature being scarcely warm enough for the greater development of the trees.

In Spain Pliny writes of it as one of the largest trees. On Mount Atlas, Desfontaines saw wild olives from forty-five to sixty feet in height. Beaujour compares the olive of the plains of Marathon to the finest walnut for stature.

The main limbs of the olive are numerous divided the branches are opposite, and the pairs are alternately placed upon conjugate axes of the limb. The foliage is evergreen, but a part of it turns yellow and falls in the summer and in three years is completely renewed. In the spring or early autumn, the seasons when vegetation is in its greatest activity, the young leaves come out immediately about the circatrice of the former petioles, and are distinguished by their suppleness and by the freshness of their tint.

The color of the leaves varies in different varieties of the olive, but they are generally smooth and of a light green above, whitish and somewhat downy with a prominent rib beneath. On most of the cultivated varieties they are from fifteen to twenty-four lines long, from six to twelve lines broad, lanceolate entire nearly sensile, opposite and alternate in the branches.

The olive is slow in blooming, as well as in every function of vegetable life. The buds begin to appear about the middle of April, and the bloom is not full before the end of May or the beginning of June.

The flowers are small, white, slightly odoriferous, and disposed in auxiliary racemed or clusters. A peduncle about as long as the leaf issues from its base, upon which the flowers are supported by secondary pedicles like those of the common currant. Sometimes the clusters are almost as numerous as the leaves and garnish the tree with wanton luxuriance; at others they are thinly scattered over the branches, or seen only at their extremity. It is essential to remark that they are borne by the shoots of the preceding year. Each flower is complete in itself, consisting of a calyx, a monopetalous corolla divided into four lobes, and of the organs of reproduction, namely two stamina and one pistil.

A week after the expanding of the flower the corolla fades and falls. If the calyx remains a favorable presage is formed of the fruitfulness of the season; unfortunately the hopes of the husbandman are liable to be blasted at this period by the slightest atmospherical disturbance, which is apt to cause the germ to fall with the flower. Warm weather accompanied by gentle breezes will facilitate the fruitfulness and aid materially in the development of the fruit.

The fruit of the olive is called by botanists a drupe; it is composed of pulpy matter enveloping a stone, or ligneous shell, containing a kernel.

The olive is ovate, pointed at the extremity, from six to ten lines in diameter in one direction and from ten to fifteen lines in the other; on the wild trees its size hardly exceeds that of the red currant.

The skin is smooth, and when ripe of a violet color; in certain varieties it is yellowish or red. The pulp is greenish, the stone oblong, pointed, and divided into two cells, one of which is void.

An olive usually takes on four colors, although all varieties do not follow the same rule. Green is followed

by yellow, then a reddish purple, which is succeeded by wine red and lastly by a black red or glossy black.

The young olive sets in June, increases in size and remains green through the summer, beginning to change color early in October, and is ripe at the end of November or early in December. On the wild olive five or six drupes are ripened upon each peduncle; but on the cultivated tree a greater part of the flowers are imperfect, and as green fruit is cast at every stage of its growth, scarcely more than one or two germs upon a cluster arrive at maturity.

With the cultivation of untold ages the olives have changed as all fruit changes. In the beginning, when it was a tiny berry, it saved the lives of savage tribes. These tribes learned to transplant them, learned to till the soil, and the ways of fertilizing it. Soon they discovered the art of selection so that the fruit grew larger and larger, the pulp more nourishing, and more oil with a better taste and flavor was harvested.

In this way thousands of years of unrecorded cultivation passed, till the days when Cato declared that "the bitterest olive made the best oil." While Pliny discussed the medicinal qualities of black olives in the treatment of burns. Also Horace writes, "I prefer the savory olive to the best fruits in my garden."

Hesiod, an ancient writer who looked upon the knowledge of agriculture as conducive in the very highest degree to the comforts of life, declared that "there was no one who ever gathered fruit from the olive tree sown by his own hands," in those times so slow was it in reaching maturity. Now at the present day it is sown in nurseries even, and if transplanted will bear fruit the following year.

In all the olive-growing countries the berry and the olive serve as the chief food, not only of the wealthy and titled inhabitants, but also of the poorer class of people. Among many nations it serves as milk and butter. Aside from a staple article of food, olives are used for pickling, drying and the production of oil, which is always in great demand. The bark and wood of the olive tree in many ways is remarkable enough

to demand attention. On the trunks and branches of the young tree the bark is smooth and of an ashy hue, and when it is removed the cellular skin appears of a light green. On old trees the bark upon the trunk and principal limbs is brown, rough and deeply furrowed.

During the spring and autumn when the sap is in motion the bark is easily detached from the body of the tree.

The wood is heavy, compact, fine grained and brilliant, while the alburnum is soft and white; the perfect wood is hard, brittle and of a reddish tint, with the pith nearly effaced. It is employed by cabinetmakers to inlay the finer species of wood which are contrasted with it in color; also it is used in ornamenting articles, for instance dressing cases, jewel caskets, tobacco boxes, etc. The wood of the root, which is more agreeably marked, is preferred.

The olive wood was classed by ancients among the hard and durable species; it was compared to ebony, cedar, box, and the lotus. On account of its hardness it was used for the hinges of doors, and before metal became known to art, it was selected by the Greeks for the material used in the construction of the images of their gods.

In the Citadel of Athens three statues of Minerva were preserved which exemplified not only the value of this wood, but the progress of Grecian art.

The first, made of olive wood and of rude workmanship, was said to have fallen from heaven; the second, of bronze, was consecrated after the victory of Marathon; the third, of gold and ivory, was one of the miracles of the age of Pericles.

From its resinous and oleaginous nature the olive wood is extremely combustible, burning as well before as after it is dried. The value of the fruit renders this property unimportant, but it is interesting to know that after the severe winter of 1790, which proved fatal to the olives throughout the Provinces of Languedoc and Provence, the country was warmed some time with the precious wood. (c)

We are told as a fact that when the trunk of the tree had perished by fire or frost, it sprouts anew, also that a bit of the bark, with a thin layer of wood, if buried in the earth, becomes a perfect plant.

THE OLIVE IN THE NEW WORLD

As is generally understood, the olive is essentially the product of civilization and cultivation; the wild olive bears little fruit, that little is of scarcely any value; hence as civilization declined the tree becomes neglected, and in consequence reverts to its former state, and naturally soon becomes worthless, as in Palestine and to some extent in Greece and Egypt. Civilization dies; so does the olive if not recuperated by new life in new lands.

"Civilization's march is westward and has been since the days of Babel and Babylon; so is that of the olive. The civilized man and the civilized olive have both left their primeval home and migrated from Palestine to Egypt, and Greece, thence to Rome and Western Europe, thence finally across the water to America—always the best olives with the best men."

"The once mightiest of the earth, where are they? With their olives—dead. Then, with the conquerors went the olive west, to Greece and Rome. Where are these? With their olives—dead, dying or deteriorating—while with the new civilization new olives spring up."

Hence it is fitting that we turn from the old world's history and civilization of the olive to its life and production in the new world.

The true North American olive belt, that region peculiarly adapted to the growth and extensive production of this wonderful fruit, includes a portion of Mexico proper, all of Lower California, much of the State of California, exclusive of the mountain heights.

There is another section of the United States which, although it is not especially adapted to the culture of the olive, still the fruit with a fair measure of success can be grown there. This region includes parts of Arizona, Texas, Georgia, South Carolina, also limited portions of Southwestern Utah and Nevada.

Probably nowhere in the world, neither in Asia or Europe, is the olive more in its natural element than in Southern California, so often called the Italy of America.

As to the life-giving and ever-fruitful soil of California, that land which had never known a spade until three hundred years after that of Italy, had become in a measure irresponsible to cultivation without an abundance of artificial stimulant.

When one claims for Southern California superiority as the true and natural home of the far-famed olive, it is no fiction of the imagination or idle boast, but a stern fact amply capable of demonstration.

San Diego, in Southern California, is the spot where all the requirements of soil and climate are found, which formerly were available only in foreign environment. It was in this beautiful spot in 1796 that the Franciscan Missionaries first planted the tree of Palestine in Alta, California, the reason for which is obvious. In the interest of their church they expected the newly-planted groves would yield fruit from which their holy oil could be obtained in abundance. The grove is still standing, where it will remain and flourish, bringing forth fruit for centuries to come, while time passes lightly over its swaying silent trees.

San Fernando also shares the honor of some of the earliest olive orchards, while some of the oldest trees are found in Capistrano. From an Agricultural Year Book we learn that about the year 1800 at Fernando five hundred trees were planted; now about four hundred and fifty of them are in a fairly flourishing condition. It is probable that none of the California trees have reached a diameter of more than two feet, a fact which emphasizes the great age of the monster olive trees of the Mediterranean region.

It may be interesting to note a new method of propagating the olive which latterly has been considerably developed in California: that of rooting small cuttings in sand in a hothouse. This system, the year book of agriculture tells us, was first tried at the Berkeley Experiment Station. The time to plant the little cuttings in the hothouse is during the late autumn and winter. From three to eight months are required to root them, according to the prevailing conditions of temperature and moisture, and the variety which is being

rooted. A little bottom heat is required while rooting most varieties, but some of the more easily rooted ones may be started under glass without heat or even in a cool frame or lath house. Well mature twigs of about the diameter of a match and about three inches long are selected for this purpose. These are stuck in the sand about half their length and all leaves removed except the upper two.

Extreme care is necessary in the care and management of these cuttings. They may be planted in nursery rows during the spring, summer or autumn. Well-rooted and vigorous trees result from this method, some of which have yielded fruit four years from the time the little twigs were planted in the sand.

It is an established fact that millions of olive twigs are now rooted annually by this process and it has so largely superseded all other methods that probably three-fourths of the olive trees in the United States are now rooted by this system.

The advantageous use of dry hillsides for olive groves is rapidly growing in interest to a large number of California growers. It would be of large moneyed importance if ranges of these hills extending from north to south could be used, as at present they are barren of any kind of crops. Foreign conditions seem to point that the scheme would be advisable, at least that it would pay to give it a fair trial, as through Southern Europe the fact is generally conceded that the quality of oil produced from hillside groves is far superior to that produced from groves in valleys. Also a writer of oil culture states the fact that "many varieties of olives bear larger fruits when planted in our virgin soil than they do when grown in the Old World. A few varieties of olives are known that bear sweet fruits which, when ripe, may be eaten from the tree and when dried are very good, Piru Sweet One and Piru Sweet Two. In these two imported varieties of unknown origin California has acquired two very valuable additions to the olive varieties now on the coast."

In the New World growers of olives, unlike the ancients, have usually but two things in view, oil and

pickles, the former requiring the olive to be picked when ripe, which in California for the most varieties will be in January and December, the latter being gathered while green.

A good deal of uncertainty is apparent in regard to the California varieties which are the best for oil. Those which are generally conceded to be the best are Morinello, Infrantofo (Grossafo), Leccino, Rozza, Ob-longa, Uvaria of Mr. Loop, Rubra, Morafolo, Correggiolo, Frantojo, Piru No. 1, Nevadillo, Blanco and Mission.

In the previous pages the manner of obtaining the oil from and the pressing of the olives has been discussed at some length, but it may be well to give a few moments' consideration to the clarification of the oil.

This process varies. "The clearest and most brilliant oil, however, is generally obtained by passing it through some compact filter, such as is used for filtering spirituous liquids or the gray filter paper usually sold in circular sheets by druggists. More porous filters will evolve a less brilliant oil. It is even probable that oil bottled without filtration, if thoroughly cleared by standing at a proper temperature for a sufficient length of time, will be of a finer flavor than that passed through filters of any description."

Probably the olive has reached its greatest perfection at the Helix Farms, ten miles southeasterly from the city of San Diego. Here the setting out of the olive was begun in 1885. The soil was found peculiarly adapted, and the venture met with great success.

Wherever olives grow they will be eaten. Thus at the present time California probably consumes more olives than all the rest of the United States. As yet the domestic production of olive oil has not been sufficient to meet the demand of this country, so a large portion of the consumption is supplied by the imported article. The number of importers of olive oil are each year increasing, hence the great need and the unlimited possibilities that attend the culture and cultivation of the olive in the United States can readily be seen.

THE OIL OF THE OLIVE

The term oil, oleum, from olea (because the oil of olives was first distinguished by this name) is of very ancient origin.

Oil is a product of great utility, the symbolic signification of which harmonizes with its natural uses: It serves to strengthen, sweeten, and to render supple.

Olive oil figured very prominently in the Mosaic law and ordinances, hence in Exodus it is written, "And thou shalt command the children of Israel, that they bring the pure olive oil beaten for the light, to cause the lamp to burn always"; then again, "Thou shalt anoint Aaron and his sons and consecrate them." In the Psalms of David it is spoken of "as oil to make his face shine." In the New Testament it is mentioned several times, as in Hebrews, "Therefore God, even thy God, hath anointed thee with the oil of gladness above thy fellows."

In the History of Chemistry, by Dr. Fred Hoefer (1842), he says: "The idea of crushing fruits to obtain from them either fecula (a starch) or juice, gave rise to the discovery of oil." It is rational to admit that oil, fecula and unfermented wine were discovered at the same time: for the man who first thought of crushing the fruit of the wine had no reason not to proceed with his experiment. He should try to treat in the same way all the dry fruits or fleshy parts of the plants which he had at hand.

As has been previously noted, the olive tree was of all trees the most valued, at the same time most useful. For this reason the ancient races dedicated to it a sort of worship. The oil which the olive tree furnishes, with the aid of a simple mechanical operation, had a much more widespread use in ancient times than it enjoys today.

Omphacium oil, oil of unripe olives, was the most valued. It was extracted from olives before they were perfectly ripe. Also by some writers it is known as "Virgin Oil." Now a question of great importance to

be considered is the term "sweet," as applies to olive oil; as olive oil, according to the technical term, is not sweet. It was found the oil made from the pure fruit pulp as in the Hebrew treading process was better than the oil made when the pulp seeds were crushed, as under the great stones; the oil from the pure pulp being sweet, while that from the seed was bitter.

It was the practice of the Greeks and Romans to distil oil from the olive at various stages of maturity. The oil produced by the early berries being bitter, while that which was made toward Christmas was fragrant and mellow, the latter being called "sweet oil" in order to distinguish it from the earlier product, which was called "summer," or "bitter oil."

Doubtless it would be the former which would be generally used for culinary or medical purposes, hence the term "sweet oil" would be generally applied to all ordinary olive oil. Then, too, when there was practically only the one sort of oil and that oil meant almost as a matter of course the juice pressed from the olive, there was no need of any distinguishing prefix.

Later on when an empirical and barbaric system of medicine began to employ all sorts of oils made from dead animals (decomposed fish may be cited as an instance), very naturally the qualifying epithet of "sweet" attached itself to the oil of the olive.

Some idea of the gruesome substances used in the apothecary shops of that age, the sixteenth century, can be found in the witches' opening chorus, in act four, of "Macbeth."

From the various processes of manufacturing the oil, because of the great value of olive oil, also the wonderful demand for it, soon adulterants came into use. Oil was squeezed or extracted from nuts, plants, and various other sources. This oil was used to increase the quantity of oil sold under the name of olive oil. The adulterated and false oils were bitter to the taste; soon the trade began to demand "sweet olive oil" and "sweet oil" in preference to the adulterated varieties.

It must be carefully noted that the word "sweet" was used in relation to olive oil because olive oil was *smooth*, not in the same sense that applies to sugar. Olive oil is not sweet as sugar is sweet, but it is pleasant and agreeable to the taste, as spring water is said to be "sweet" while the waters of the sea are called "bitter waters."

In this connection it is worth explaining that long before the Christian era olive oil was perfumed with flowers, various spices and balsams. The first perfume was made by dipping flowers into the oil, resulting in "precious ointment," of which such frequent mention is made in both the Old and New Testaments.

Here also olive oil was associated with "sweet" in the sense of fragrant and smooth.

It was burned at the Jewish altar with the unidentified frankincense; the perfumed and resined oil burning with a sweet odor.

The next point which we must consider is the question as to who gave the name "sweet oil," in what age, and the reason for so naming this product.

By the accident of language, it not infrequently happens that certain phrases, though common enough in trade, or even on the lips of people, yet find but little expression in literature. No doubt had there been a popular press in the sixteenth century, we should discover the word there; but as there was none, and as furthermore most of the popular literature of that time has perished beyond chance of recall, it becomes very difficult to find instances of a vernacular phrase.

Not once in "Piers the Plowman" (Chaucer), or in his contemporary, Grover; not even in Shakespeare or Milton does the phrase occur.

The following are practically the only instances discovered: In 1531 Sir Thomas Elyot in the "Boke" called the "Governour," speaks of "the sweet oyle of remembrance," but one can feel by no means sure that he referred to olive oil. In 1571 Richard Mulcaster, head-master of Merchant Taylor's School, speaks of the ancient athletes who were "oynted with sweet oyle so

neatly and with such cunning as it might sooke into their bodies and search everie joynt."

The next instance to be quoted is when we find W. Halifax, a scientist of the late Stuart period, who affirms in one of his manuscripts, "perhaps he distributed among them sweet oyle, to be used in or after bathing."

Sweet oil, so-called, is described in the *Pharmacœpia Bateana*, published in 1720, the scientific name, "*Oleum Sacchari Simplex*," or "oil or sugar simple," is thus described: "This is no oil, but a syrup, and receives its denomination only from its form, body and consistency. It is made of sugar candy and spirits of wine, mixed and dissolved with heat, the spirit being burned away."

William Salmon, author of this book, is very definite in his description, for he classes the "sweet oil" under distilled oils, but called it a syrup; and under "Oyls" describes various olive preparations, including "*Oil of Toads*," which should be made of live toads boiled in olive oil to obtain a cure for cancer. Also he says, "Le mort makes an oil of sugar after this manner, certain proportions of sugar, sand, or washed ashes being given; mix them, put them into a glass retort, distil with a gentel fire in sand, at least increasing the fire to a red-hot heat so you have oil and spirit which you may separate."

In *Materia Medica* (1810), the term olive oil and sweet oil is used synonymously: "The olive tree . . . is cultivated to a very considerable extent, on account of its fruit, from which the sweet or salad oil is extracted. . . . As an article of food, olive oil is preferable to animal fat, but it ought to be mild, fresh, and of sweet nature."

Sweet fennel oil, anise oil, the oil of sesame, and various other oils, literally sweet, and even mere sugar syrup, became "sweet oil."

After a chemical analysis of these oils, the fact became apparent that while sweet fennel oil and anise oil are sweet to the taste, the oil of sesame is not sweet, but bears a pronounced likeness to olive oil.

In the Chemical Technology of oils by Dr. J. Lenkowitzsch (1909), he says: "The taste of olive oil in its purest state is bland and pleasant. It varies, however, with the locality where the fruit has been grown. Thus the oils obtained from Tuscan fruits possess a decidedly more agreeable taste than those of Ligurian olives."

"Also as to the oil called 'Olive Kennel Oil,' the taste of the expressed oil is sweetish, somewhat resembling that of almond oil, without, however, possessing the characteristic bland taste of olive oil."

Still, in a Technology of less recent date (1895), W. T. Dent affirms: "The tree bears a stone fruit, the fleshy integument of which contains the *sweetest of all vegetable oils*."

It is to be noted that the earliest Greek literature, the Homeric Poems, make no reference to olive oil as a food. Its sole purpose at that time was to give suppleness to the limbs of the athlete.

However, in Hesiod's writings, whose date, though uncertain, cannot be so much later than the Homeric era, we find olive oil used alike for both purposes.

The oil of the olive is furnished by the pulp, which is a characteristic almost peculiar to this fruit; in other oleaginous vegetables it is extracted from the seed. The oil of the pulp is rich, of a delicious flavor, that of the stone dark, cloudy; that of the seed contains essential and resinous oil in small quantities. These oils of stone, seed and skin, instead of adding to the oil obtained from the pulp, would be a great injury if they did not exist in such small quantities. It can easily be seen that in selecting a variety for olive culture, the varieties containing much pulp and small seeds should be chosen. Different varieties of olives ripen at different periods and in order that the best oil should be made the berry should be gathered at the time of its maturity and at no other. No time can be set when an olive crop should be harvested. It may vary by weeks from one season to another, and it is better by far to anticipate than to defer the harvest.

Pascannus, a Grecian writer, recommends "the proper season for the preparation of the common oil

is when more than half of the fruit appears to be getting black. But it is necessary to accelerate the gathering before the frosts set in, for the trees will afford a less laborious and a more abundant crop. But it is necessary to gather the fruit when it is fine weather and not rainy. . . . It is proper to wash the olives with warm water, for besides the cleaning of them we shall likewise find more oil."

Again from Apuleius the following method of harvesting is given: "When you then see the olives beginning to exhibit signs of maturity, order the boys to gather them with their hands, observing that none of them may fall on the ground. . . . It is necessary that the wheel (of the mill) may be turned around briskly and lightly that the flesh and the skin of the olive may be only pressed; after the grinding, carry what is ground in small trays to the press and lay in frails made of willow, for the willow contributes much to the beauty of the oil; then lay on a light weight, not a burdensome one, for what flows from light pressure is very sweet and very thin, which when you have drawn it into clean vessels, orders to be kept by itself; press again with a heavier weight the olives that are left . . . and keep this, too, by itself, for it will be a little inferior, and so on."

"Then, too, it is not with olive oil as it is with wine, for by age it acquires a bad flavor and at the end of a year it is already old."

Several writers of ancient days speak most highly of the Licinian olive, which is grown in the territory of Venafrum; it is said to produce the finest quality of oil, also it is an established fact that the birds will never destroy the berries of the Licinian olives.

Fabianus tells us "the first olive to be gathered after the autumn is that known as the Posia, the berry of which has the most flesh upon it; next to this is the Orchitis, which contains the greatest quantity of oil; then after that the Radius."

The varieties known as the Licinian, the Comenian, the Conlian, and the Sergian do not turn black before the west winds prevail, *i. e.*, prior to the sixth day before

the Ides of February. At this period it is generally thought the most excellent oil is extracted from them.

The size of the olive does not govern the yield of oil; often the largest olive contains the least oil, while an abundant harvest of oil is gathered from small ones. The Egyptian olive is very meaty but yields an inferior quality of oil, while the olives of Decapolis and Syria are extremely small, yet yield in proportion more oil; again, the olives that are preferred for table use are inferior for making oil.

The ancient people used salt to prevent the oil turning rancid, and often by making incisions in the bark of the tree imparted an aromatic odor to the oil.

Here it may be stated that in the fine oil the odor is penetrating, but even in the very best it is short lived.

In the writings of Pliny he enumerated forty-five varieties of artificial oils, speaking of them in this manner: "We will first mention those which are produced from the trees, and among them more particularly the wild olive." This olive is small, much more bitter than the cultivated one, hence its oil is used only in medicinal preparations. The oil from Oleasters is thinner than ordinary oil and has a stronger odor.

Old olive oil is thought to be of great use in the preservation of ivory. So much credence was given to the idea that at one time the statue of Saturn in Rome was kept filled with it.

Before we turn to the consideration of modern methods of obtaining the oil from olives, it is interesting to note Cato's rules regarding the Overseer's duties in the manufacture of the oil. He says: "The Overseer must frequently drain off the oil and deliver each time what he gets to the oil pressers in pint vessels, as well as what is required for the lamp. The dregs must be daily removed and the watery lees must constantly be taken out, till the bottom of the vat in the pressing chamber is reached. The baskets must be wiped out with a sponge. Every day the oil must be removed from the vat till it has all been placed in jars."

Previously it has been mentioned that the immediate extraction of oil from the olive, as soon as possible after the gathering, is conducive to the greatest yield of oil; a fact which is acknowledged by all writers regarding olive culture as well as by those interested in the manufacture of oil.

Conditions may arise that will render the immediate use of the olive impossible. In fact some statistics affirm that when the olive is partly dried the oil is much better.

In the drying of the olive the Italians spread them on brick floors, being careful to have the bricks porous in quality. The olives are so placed as to allow the air free circulation. During the day they are carefully turned by wooden rakes, the greatest caution being exercised not to bruise them. The process is repeated three or four times each day. This is considered a simple and safe method of drying the fruit.

It is easily seen in the drying process that the water will evaporate to a considerable extent. Care must be taken that the fruit is not allowed to soften, as that will be the first symptom of decay, which will tend to impair the flavor and odor of the oil.

Many different systems are employed in the preparation of olive oil — each in a way peculiar to the climate in which it is used.

In Sicily, where large quantities of olive oil are used and produced, the operation is performed in a primitive fashion.

The olives are first placed on a circular flat form of masonry, about seven feet in diameter, upon which a heavy millstone is turned by a pole or a donkey. The mass, which has been thoroughly pulped by this process, is now placed in soft rush baskets and put under a press, which is compressed by means of a wooden screw worked by five or six men. By this means the cold oil is expressed, heat being used to extract the remainder. The oil is allowed to settle and clarify before it is ready for use.

The objection found to this process is that the crushing of the kernels with the pulp renders the oil extracted

bitter or of a peculiar taste, thus injuring the flavor and keeping quality of the oil obtained from the pulp.

Modern crushers, therefore, do not break the stones. In California old-fashioned stone mills are used to crush the fruit, although bronze crushers are being tried with good results. The ground mass is then pressed to extract the liquid portion, which contains water plant juices in addition to the oil.

Various devices are used to separate the oil and purify it. Since the separation of the oil from the juice by gravity is hazardous on account of liability to ferment, the impurities are quickly washed out by special apparatus in which a current of cool water comes in contact with a small quantity of the juice, mixes with it, separates the larger particles of pulp, allowing the oil to rise through a tall column of water, which further washes the oil globules as they arise.

After being allowed to stand for a time in a cool room this oil is racked off and sold as "new oil," or may be again allowed to stand for further clarification.

However, the American market demands a clear oil, hence much of the domestic oil is filtered through bone charcoal, a process which, especially if often repeated, impairs the flavor, making the oil seem greasy.

Whatever the process of obtaining the oil may be, scrupulous cleanliness is necessary, as olive oil is pale yellow, inodorous, and has a specific gravity of .918 at a temperature of fifteen (15) degrees Centigrade (C).

OLIVE OIL IN CHEMISTRY AND MEDICINE

Olive oil also plays a prominent part in chemistry and medicine. In the history of "The Oleates," by John V. Showmaker, he says: "The use of fatty vehicles in applying medicinal substances to the cutaneous covering of the body is probably as old as medicine itself. There is scarcely a doubt that innunctions performed a most important part in the early history of medicine. The fatty bodies then used were oils expressed from the seeds and fruits of plants, as well as fats from domestic and wild animals."

In a translation of "History of Chemistry From the Earliest Times to the Present Day" by Ernest V. Meyer he gives us the following facts: "The use of artificially prepared products in medicines also extend to a period very far back, even though in referring to this one can only speak of the first beginning of a pharmaceutical chemistry. But a connection between the chemical arts and pharmacy very early established itself. For example, the Egyptians, who were doubtless the first to employ actual chemical preparations for medicinal purposes."

As, for instance, the preparation of lead plaister from litharge and oil was much practiced in the time of Deosconides.

Other fatty compounds then known were fatty oils (from the seeds of fruits), olive, castor, and almond oils were largely used as medicinal remedies.

In the earlier London and Edinburgh Pharmacœpias a strange and interesting fact regarding olive oil is given: A preparation called Oil of Bricks, among its synonyms were "oleum sanctum" and "oleum benedictum," was highly thought of and extensively used.

By some of the early writers of the 1740's the process for making oil of bricks is given as follows: Heat the bricks red hot, then quench them in olive oil until they have soaked up all of the olive oil possible, then break very small pieces in a retort and by means of a sand bath with gradually increased heat a distillate of

oil and so-called spirit is obtained. It was deemed especially valuable as an application for gouty and rheumatic pains, and much thought of for deafness.

Also in the 1740's balsam of sulphur was one of the uses into which olive oil entered. It was made by boiling the flowers of sulphur with four times their weight in olive oil until the sulphur was dissolved and a thick dark balsamic substance was obtained. This in a medicinal point of view was valuable for coughs and asthma.

At the present day olive oil is used as a laxative, as enemas, also as an antidote in cases of acid poisoning, as a local neutral protection from the atmosphere, as an inunction to increase the fat of the body or to reduce the heat of the skin. In lead factories workmen use it as a laxative to prevent the absorptions of lead. Combined with camphor, morphine, etc., it is applied to wounds, burns and bruises. It also forms the basis of many liniments.

It allays the pain of insect bites, and warmed will aid in expelling foreign substances from the ear. Often it is applied to swollen parts of the body. It is used as a lubricant for surgical instruments, etc.

Some physicians believe if given in large doses it will hasten the discharge of gallstones, apparently softening them.

It may be well to add that in the Pharmacopœias of America, the first volume of which was published in 1820, that with the exception of the first volume olive oil is mentioned as follows in each subsequent edition:

1830—Olive oleum: Olea Europea. 1840—Olive oleum: The fruit of the olea Europea. 1850—Olive oil: The oil of the fruit of olea Europea. 1860—Oleum oil: The oil obtained from the fruit of olea Europea. 1870—Oleum olive: The fixed oil obtained from the fruit Olea Europea. 1880—Oleum olive: The fixed oil expressed from the ripe fruit of olea Europea. 1890—Oleum olive: A fixed oil expressed from the ripe fruit of olea Europea. It should be kept in well-stoppered bottles in a cool place. 1900—Oleum olive: Olive oil: A fixed oil expressed from the ripe fruit of olea Europea. 1910—Oleum olive: A fixed oil obtained from the ripe fruit of olea Europea.

THE ECCLESIASTICAL USE OF OLIVE OIL

From the earliest ages to the present time the olive tree, its fruit with its uses, have been carefully considered; now brief mention should be made of olive oil as used in ecclesiastical ceremonies, both in primitive and modern times. As is generally known, the liturgical blessing of oil is very ancient. It is met with in the fourth century in the "Prayer Book of Serapion" and in the Apostolic Constitution, also in a Syriac document of the fifth and sixth centuries entitled "*Testamentum Domini Nostri Jesu Christi*." The aforesaid book of Bishop Serapion (A. D. 362) contains the formula for the blessing of the oil and chrism for those who had just received baptism, which was in those days followed by confirmation in such a manner that the administration of both sacraments constituted a single ceremony. In the same book is found a separate form of blessing for the oil, of the sick, for water, and for bread. It is an invocation to Christ to give His creatures power to cure the sick, to purify the soul, to drive away impure spirits, and to wipe out sin. In the Old Testament oil was used for the consecration of priests and kings, also in all great liturgical functions, *e. g.*, sacrifices, legal purifications, and the consecration of altars.

In the primitive church the oils to be used in the initiation of catechumens were consecrated on Holy Thursday in the Missa Chrismalis. Two different ampullæ were used, one containing pure oil, the other oil mixed with balsam. This mixture was made by the Pope himself before the mass in the sacristy. During the mass two clerics of lesser rank stood before the altar holding the ampullæ. Toward the end of the canon the faithful offered for benediction small ampullæ of oil: these contained oil of the sick which the faithful were allowed to make use of themselves, but the same oil also served for extreme unction. The vessels holding it were placed on the railing surrounding the space reserved for the clergy. The deacons brought some of

these vessels to the altar to receive the blessing of the Pope. The Pope continued the mass while the deacons returned the ampullæ to the place whence they had brought them, and a certain number of bishops and priests repeated over those which had not been brought to the altar the formula pronounced by the Pope. The consecration of the large ampullæ took place immediately after the communion of the Pope, before the communion of the clergy and the faithful. The deacons covered the chalice and paten while the subdeacons carried the ampullæ to the archdeacon and one of his assistants. The archdeacon presented to the Pope the ampullæ of perfumed oil, the Pope breathed on it three times, made the sign of the cross, and recited a prayer which bears a certain resemblance to the preface of the mass. The ampullæ of pure oil was next presented to the Pope and was consecrated with less solemnity. The consecration and benediction of the Holy oil now take place on Holy Thursday at a very solemn ceremony reserved for the bishop. He blesses the oil which is to serve at the anointing of catechumens previous to baptism, next the oil with which the sick are anointed in the Sacrament of Extreme Unction, finally the chrism, which is a mixture of oil and balsam, and which is used in the administration of the Sacrament of Confirmation.

The use of oil in Christian antiquity was not, as has been maintained, a medical prescription adopted by the church. In apostolic times St. James directed the priests or ancients of the community to pray for the sick man, and to anoint him with oil in the name of Jesus. And shortly afterwards, probably in the second century, a gold leaf found at Beyroul in Syria, contains an exorcism "pronounced in the dwelling of him whom I anointed." This is after the text of St. James, the earliest evidence of the use of oil accompanied by a formula in the administration of a sacrament. The oil of the sick might be blessed not only by priests but also by laymen of high repute for virtue, and even by women. In the sixth century St. Monegundus on his death-bed blessed oil and salt, which were afterwards

used for the sick. A similar instance is met with in the life of St. Redegund. In the West, however, the tendency was early manifested to confine the blessing of the oil of the sick to bishops only. About 730 St. Boniface ordered all priests to have recourse to the bishop. In 744 the tendency was not so pronounced in France, but the Council of Chalons, 813, imposed on priests the obligation of anointing the sick with oil blessed by the bishop. In the East the priests retained the right to consecrate the oil. The custom even became established, and has lasted to the present time, of having the oil blessed in the house of the sick person, or in the church by a priest, or, if possible, by seven priests.

During the time of the catechumenate those who were about to become Christians received one or more anointings with holy oil. The oil used on this occasion was that which had received the blessing mentioned in the Apostolic Constitution. This anointing of the catechumens is explained by the fact that they were regarded to a certain extent as being possessed by the devil until Christ should enter into them through baptism. The oil of catechumens is also used in the ordination of priests and the coronation of kings and queens.

The oil of chrism is used in the West immediately after baptism. Both in the East and West it was used very early for the Sacrament of Confirmation.

The "*Ordo Romanus*" shows that in Rome on Holy Thursday the archdeacon went very early to St. John Lateran, where he mixed wax and oil in a large vase, this mixture being used to make the Agnus Dei. The same document shows that in the suburban churches wax was used while Pseudo-Alcium says that both wax and oil were used.

In the Liturgy of the Nestorians and the Syrian Jacobites, the elements present at the Eucharistic Consecration have been prepared with oil. Among the Nestorians a special rubric prescribes the use of flour, salt, olive oil and water.

From the second century the custom was established of administering baptism with water specially blessed for this purpose. Nevertheless, the sacrament was valid if ordinary water was used. We are not well informed as to the nature of the consecration of this baptismal water, but it must be said that the most ancient indications and descriptions say nothing of the use of oil in this consecration. The first witness, Pseudo-Dionysius, does not go beyond the first half of the sixth century; he tells us that the bishop pours oil on the water of the fonts in the form of a cross. There is no doubt that this rite was introduced at a comparatively late period.

The maintenance of more or less numerous lamps in the churches was a source of expense which the faithful in their generosity hastened to meet by establishing a fund to purchase oil. The Council of Braga (572) decided that a third of the offerings made to the church should be used for purchasing oil for the light. The quality of oil thus consumed was greater when a lamp burned before a famous tomb or shrine, in which case it was daily distributed to pilgrims, who venerated it as a relic.

Chrism is a mixture of olives and balsam, blessed by a bishop in a special manner, and used in the administration of certain sacraments and in the performance of certain ecclesiastical functions. That chrism may serve as valid matter for the Sacrament of Confirmation it must consist of pure oil of olives and it must be blessed by a Bishop, or at least by a priest delegated by the Holy See. These two conditions are certainly necessary for validity; moreover, it is probable that there should be an admixture of balsam and that the blessing of the chrism should be special, in the sense that it ought to be different from that which is given to the oil of the sick or the oil of catechumens. If either of the last two conditions is wanting the sacrament will be doubtfully valid. To deal with the subject in a sufficiently exhaustive manner, it will be enough

to touch on (1) the origin and antiquity of chrism, (2) its constituent nature, (3) its blessing, and (4) its use and symbolic significance.

In its primitive meaning the word chrism, like the Greek *chriona*, was used to designate any and every substance that served the purpose of smearing or anointing, such as the various kinds of oils, unguents and pigments. This was its ordinary signification in profane literature, and even in the early patristic writings. Gradually, however, in the writings of the fathers at all events, the term came to be restricted to that special kind of oil that was used in religious ceremonies and functions, especially in the administration of the Sacrament of Baptism and Confirmation. Thus origin refers to the visible chrism in which we have all been baptized. St. Ambrose venerates in the chrism the oil of grace which makes kings and priests; and St. Cyril of Jerusalem celebrates the praises of the mystic chrism. The early councils of the church have also references to chrism as something set apart for sacred purposes and making for the sanctification of men. Thus the Council of Constantinople held in 381 and the Council of Toledo, 398. Regarding the institution of chrism, or its introduction into the sacramental and ceremonial system of the church, some theologians, among them St. Thomas and Susrex, hold that it was instituted immediately by Christ, while others contend that it is altogether of ecclesiastical origin. Eugene IV in his famous "Instruction for the Armenians" asserts that chrism is the matter of the Sacrament of Confirmation, and, indeed, this opinion is so certain that it may not be denied without incurring some note of the Council of Trent has defined in this connection is that they who attribute a certain spiritual and salutary efficacy to holy chrism do not in any way derogate from the respect and reverence due to the Holy Ghost.

(2) Two elements enter into the constitution of legitimate chrism, viz., olive oil and balsam. The former is indeed the predominating, as well as the principal ingredient, but the latter must be added in greater

or lesser quantity, if not for reasons of validity, at all events in obedience to a grave ecclesiastical precept. Frequent reference is made in the Old Testament to the use of oil in religious ceremonies. It was employed in the coronation of kings, in the consecration of the high priests, and in the ordination of the Levites, and, indeed, it figured very prominently in the Mosaic ordinances generally, as can be abundantly gathered from Exodus, Leviticus and Deuteronomy. Such being the prevailing usage of the Old Testament in adopting olive oil for religious ceremonies, it is no cause for wonder that it also came to receive under the New Dispensation a certain religious recognition and approval. The second element that enters into the constitution of genuine chrism is balsam. This is an aromatic, resinous substance that is extracted from the wood of certain trees or plants, especially those belonging to the terebinthine group or family. In the manufacture of this sweet-smelling unguent the early Greek-Christians were wont to employ as many as forty different perfumed species or essences. In the beginning of the Christian era balsam was obtained from Judea and from Arabia, but in modern times it is also produced, and in superior quality, in the West Indies. The first mention of balsam as an ingredient in the composition of chrism seems to be found in the "Gregorian Sacramentary," as work belonging to the sixth century. Now, however, according to existing legislation, the additional balsam is requisite for lawful chrism, but whether it is necessary for the validity of the sacrament, assuming that chrism is the matter of confirmation, is a matter about which theologians do not agree. The modern view appears to be that it is not so required. But owing to the uncertainty mere olive oil alone would be doubtful matter and could not therefore be employed apart from very grave necessity.

(3) For proper and legitimate chrism the blessing by a bishop is necessary, and probably, too, such a blessing as is peculiar to it alone. That the bishop is the ordinary minister of this blessing is certain. So much is amply recognized in all the writings of the early

centuries, by the early councils; the Second Council of Carthage of 390, and the Third Council of Braga, 572 and by all modern theologians. But whether a priest may be the extraordinary minister of this blessing, and if so, in what circumstances—this is a question that is more or less freely discussed. It seems agreed that the Pope may delegate a priest for this purpose, but it is not so clear that bishops can bestow the same delegated authority *ex jure ordinario*. They exercised, it seems, this prerogative in former times in the East, but the power of delegating priests to bless chrism is now strictly reserved to the Holy See in the Western church. The rites employed in consecrating the sacred chrism go to show that it is a ceremony of the highest importance. Formerly it could be blessed on any day of the year, according as necessity arose. Now, however, it must be blessed during the solemn mass on Holy Thursday. For the full solemn ceremonial the consecrating prelate should be assisted by twelve priests, seven deacons, and seven subdeacons. The oil and balsam, being prepared in the sacristy beforehand, are carried in solemn procession to the sanctuary after the communion, and placed on a table. Then the balsam, held on a silver salver, is blessed, and similarly the olive oil, which is reserved in a silver jar. After this the balsam is mixed with the oil. Then the chrism, being perfected with a final prayer, receives the homage of all the sacred ministers present, each making a triple genuflection toward it, and each time saying the words, "*Ave sanctum chrism.*" After the ceremony it is taken back to the sacristy and distributed among the priests, who take it away in silver vessels commonly called oil-stocks, that which remains being securely and reverently guarded under lock and key.

(4) Chrism is used in the administration of the Sacraments of Baptism, Confirmation and Holy Orders, in the consecration of churches, chalices, patens, altars, and altar stones, and in the solemn blessing of bells and baptismal water. The head of the newly baptized is anointed with chrism, the forehead of the person confirmed, the head and hands of a bishop at

his consecration, and the hands of a priest at his ordination. So are the walls of churches, which are solemnly consecrated, anointed with the same holy oil, and the parts of the sacred vessels used in the mass which come in contact with the Sacred Species, as the paten and chalice. If it be asked why chrism has been introduced into the functions of the church liturgy, a reason is found in its special fitness for this purpose by reason of its symbolic significance. For olive oil being of its own nature rich, diffusive, and abiding, is fitted to represent the copious outpouring of sacramental grace, while balsam, which gives forth most agreeable and fragrant odors, typifies the innate sweetness of Christian virtue. Oil also gives strength and suppleness to the limbs, while balsam preserves from corruption. Thus, anointing with chrism aptly signifies that fulness of grace and spiritual strength by which we are enabled to resist the contagion of sin and produce the sweet flowers of virtue. "For we are the good odor of Christ unto God."

In conclusion it readily can be seen that the olive tree and its fruit have played a wonderful and conspicuous part in the history of the human race.

From the ancient crowning of rulers and athletes with garlands made from its leaves, the placing of the boughs about the beloved dead, the race of primitive man that by its nourishing fruit and oil was kept from starvation and death, to the opening up of avenues of trade where otherwise there would have been no commerce, until the present days, the olive is famous and always will continue to be.

Few substances have had the same fame, the same varied history, the same uplifting value that olive oil has had. It contributes not only to the nourishment of health, but also to the suppleness and beauty of the body; it has served as an anointing oil with which priests were elevated to the privilege of performing the sacred rights of the temple, using at their discretion both then and now the blessed oil in the solemn rites of the church. Kings and rulers were anointed with it, that the blessing of God might rest upon them, giving

them grace to rule wisely the people under them. Great indeed would be the calamity to us, these people of modern times, if the olive orchards should become barren, the trees cease to yield their fruit, and the cruse of oil become empty. ,

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