

Lectures on Roman husbandry : delivered before the University of Oxford; comprehending such an account of the system of agriculture, the treatment of domestic animals, the horticulture &c.;, pursued in ancient times, as may be collected from the Scriptorum rei rusticae, the Georgics of Virgil, and other classical authorities, with notices of the plants mentioned in Columella and Virgil / by Charles Daubeny.

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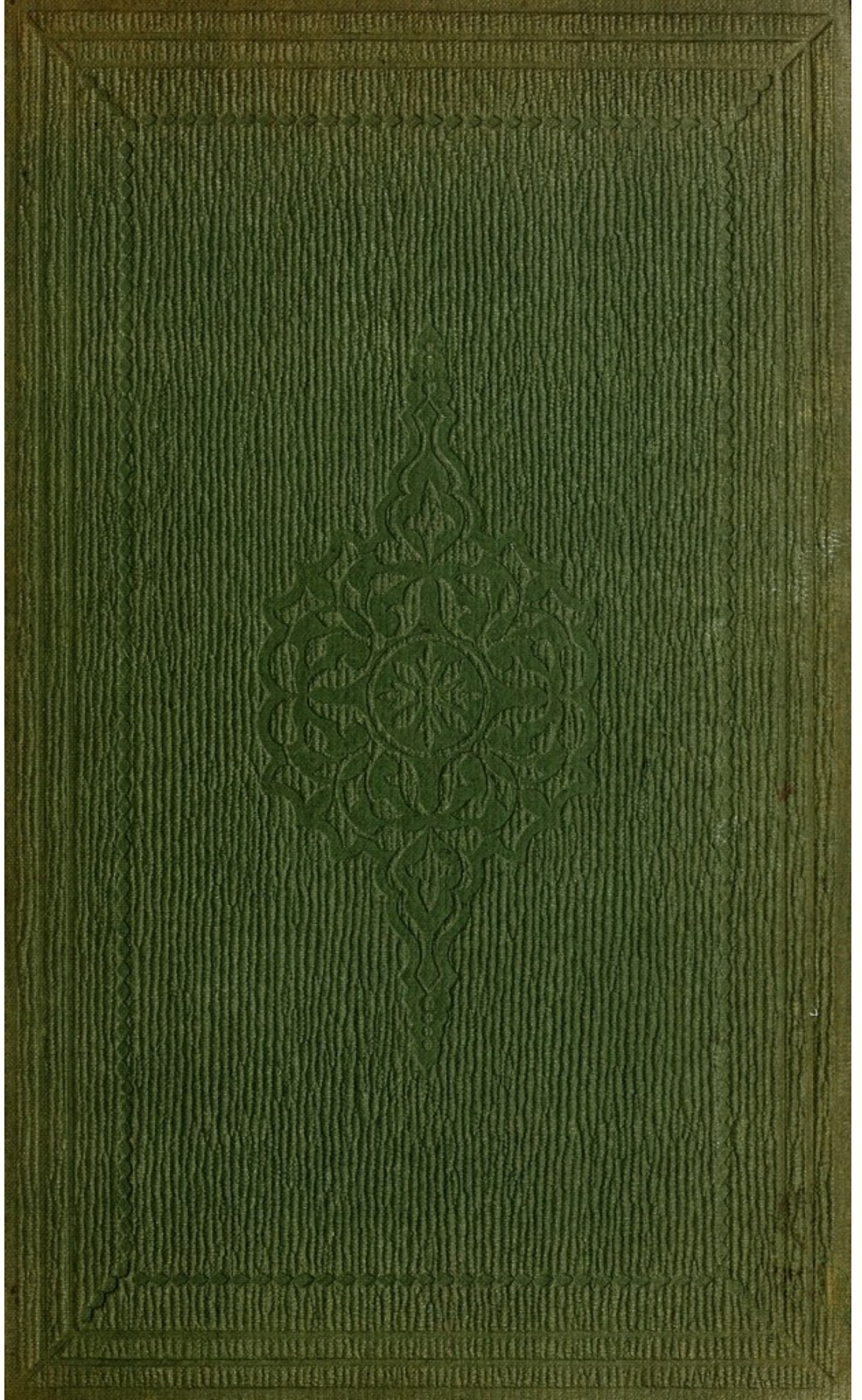
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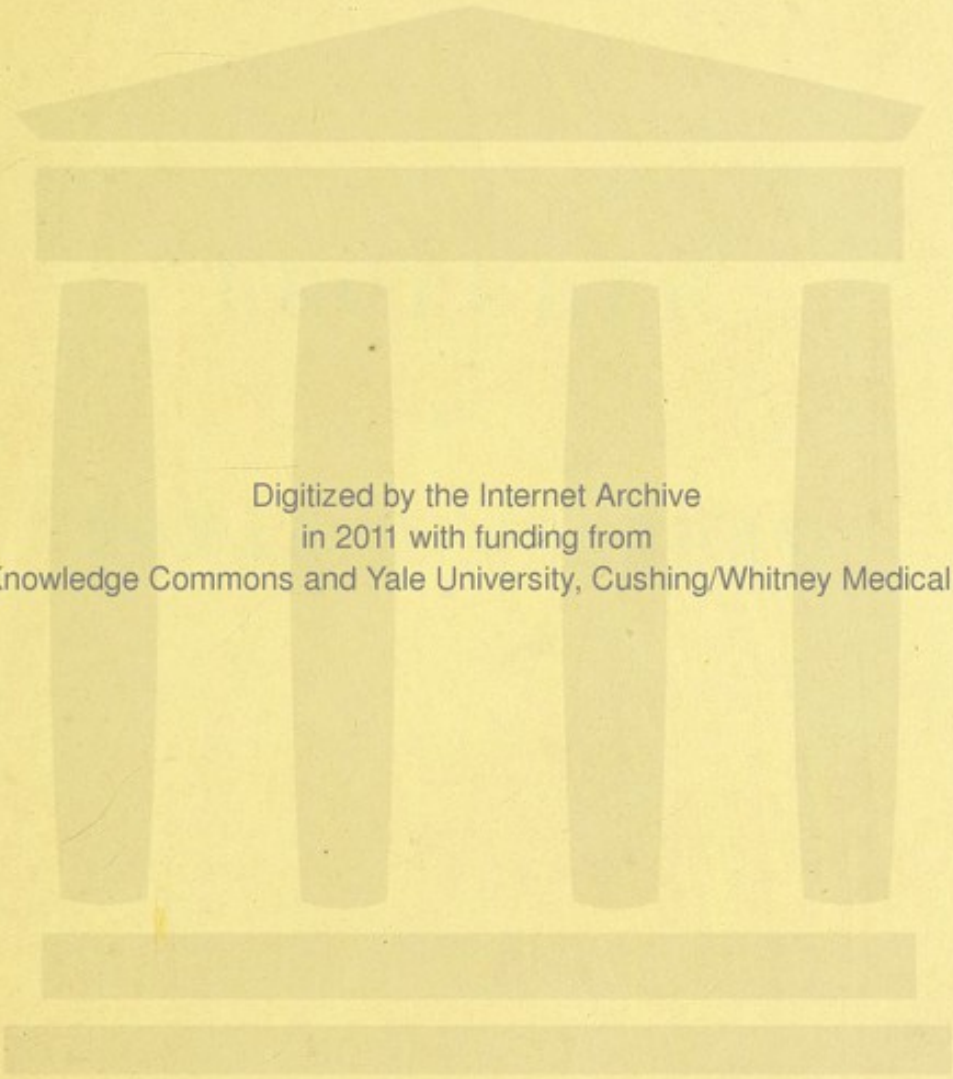
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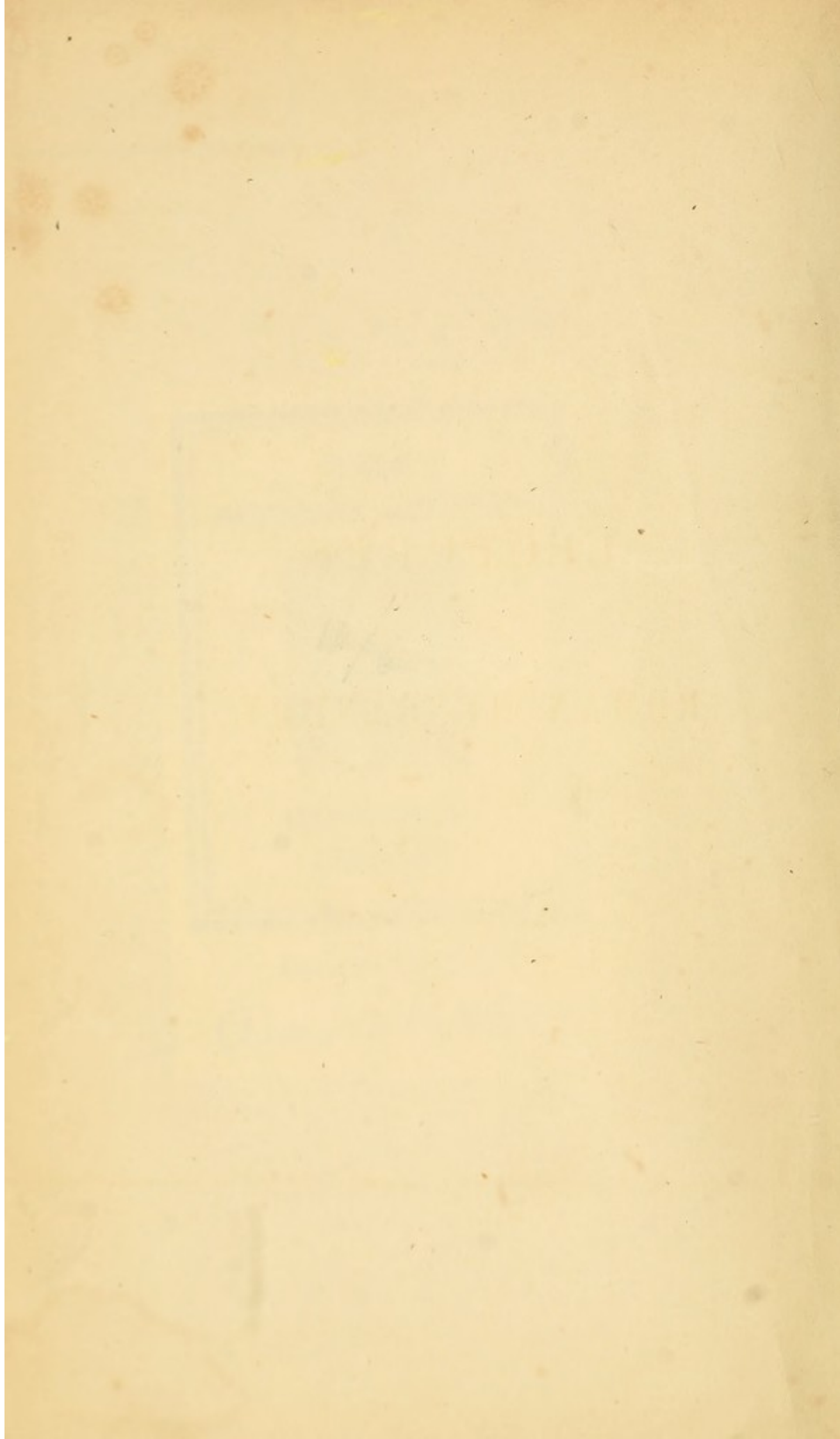
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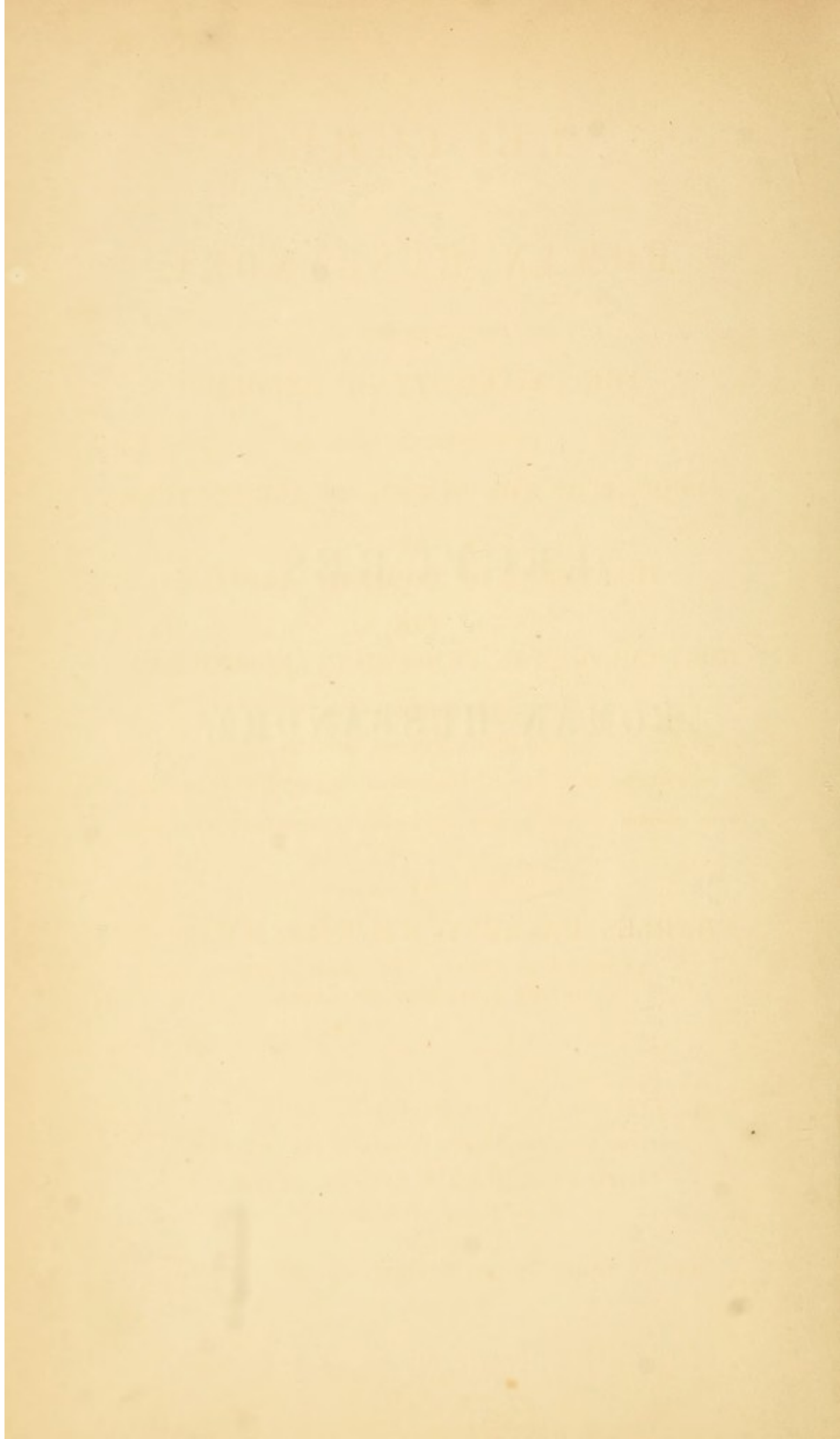
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LECTURES
ON
ROMAN HUSBANDRY.



LECTURES
ON
ROMAN HUSBANDRY,
DELIVERED BEFORE
THE UNIVERSITY OF OXFORD;
COMPREHENDING SUCH AN
ACCOUNT OF THE SYSTEM OF AGRICULTURE,
THE
TREATMENT OF DOMESTIC ANIMALS,
THE
HORTICULTURE &c., PURSUED IN ANCIENT TIMES,
As may be collected from
THE SCRIPTORES REI RUSTICÆ,
THE GEORGICS OF VIRGIL, AND OTHER CLASSICAL AUTHORITIES,
WITH NOTICES OF THE PLANTS MENTIONED IN COLUMELLA AND VIRGIL;
BY
CHARLES DAUBENY, M.D., F.R.S., M.R.I.A., &c.
PROFESSOR OF BOTANY, AND RURAL ECONOMY,
IN THE UNIVERSITY OF OXFORD.

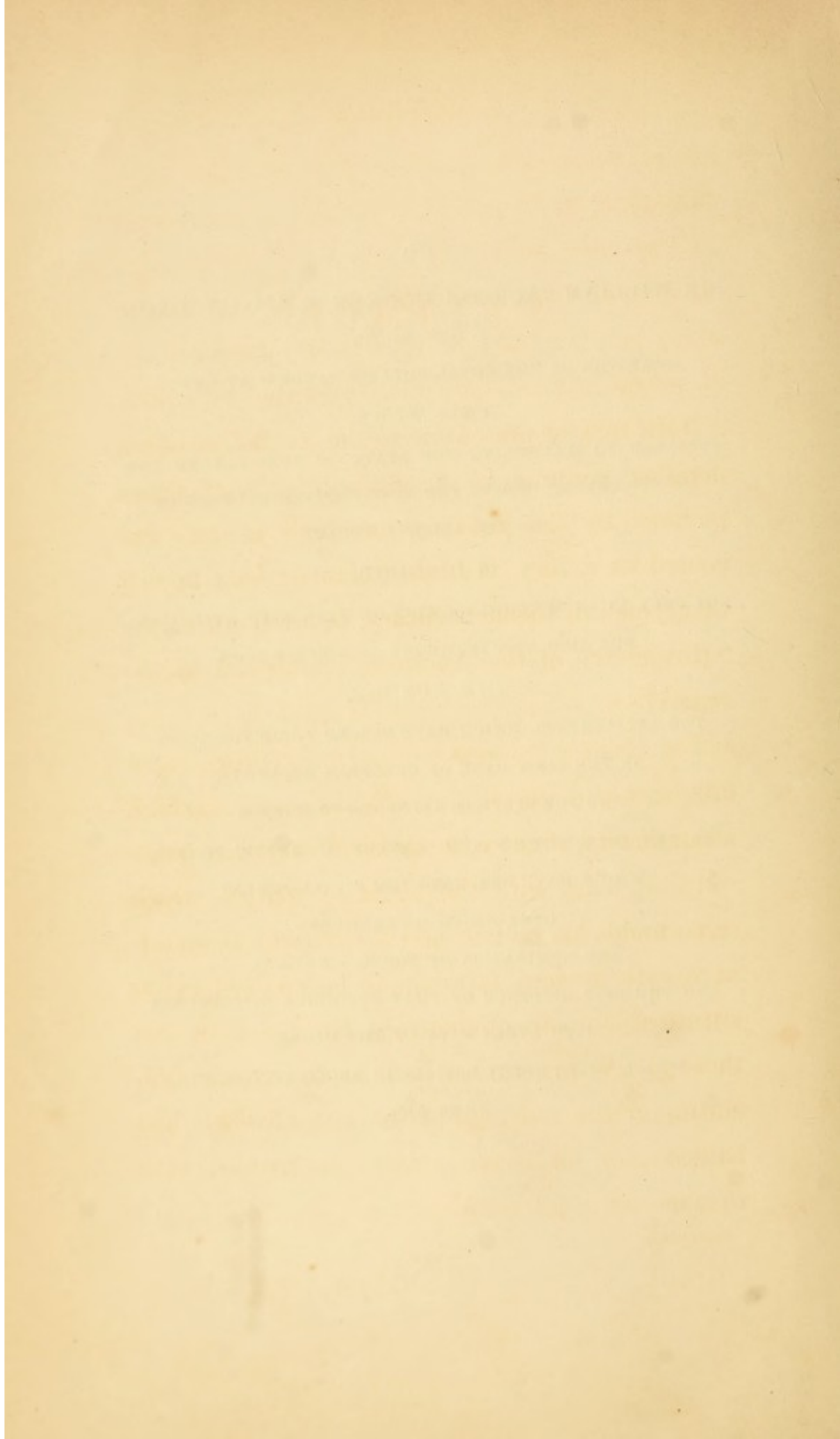
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TO
SIR WILLIAM JACKSON HOOKER, K. H. D. C. L. OXON.
F. R. S. &c. &c.
DIRECTOR OF THE ROYAL BOTANIC GARDENS AT KEW,
THIS WORK,
INTENDED TO ILLUSTRATE THE STATE OF AGRICULTURE AND
HORTICULTURE DURING THE MOST FLOURISHING PERIODS
OF THE ANCIENT WORLD,
IS INSCRIBED,
NOT ONLY AS AN ACKNOWLEDGMENT OF MANY KIND ATTENTIONS,
BUT ALSO AS A TESTIMONY OF RESPECT FROM
THE AUTHOR,
FOR ATTAINMENTS, WHICH HAVE PLACED THEIR POSSESSOR
IN THE FIRST RANK OF EUROPEAN BOTANISTS,
AND FOR SERVICES AFFORDED TO SCIENCE
BY THE INTRODUCTION AND CULTURE OF EXOTIC PLANTS,
WHICH HAVE RENDERED THE ESTABLISHMENT
OVER WHICH HE PRESIDES,
THE ADMIRATION OF FOREIGN NATIONS,
AND THE BEST EVIDENCE OF THAT EXTENSIVE INTERCOURSE
WITH EVERY PART OF THE GLOBE,
WHICH BINDS GREAT BRITAIN IN FRIENDLY TIES TO
THEM ALL.



P R E F A C E.

THE task of presenting to the English reader a detailed account of the System of Agriculture pursued by the Romans, has been already executed in a very creditable manner by a Scotch Clergyman of the last century, in his Work on the "Husbandry of the Ancients," published in the year 1788.

The Author brought to his undertaking, great diligence of research, a clear and sound judgment, a familiarity, if not with classical literature generally, at least with the series of writers which came under his review, and a sufficient acquaintance with modern farming, to be enabled to institute a comparison between our practices and those of the ancients, as well as to explain difficulties in the writings of the latter, which had baffled previous commentators unprovided with this species of information.

Nevertheless, in spite of these recommendations, experience has shewn that there was something unattractive in his mode of handling the subject, arising in a great degree from a want of due condensation; for the work in question has never reached a second edition, and is chiefly kept to be appealed to in cases of difficulty or doubt, rather than to be taken up as an agreeable companion to occupy a vacant hour.

And yet the subject which he discusses is by no means devoid of interest, presenting to us, as it does, not merely the results of the sagacity, and practical experience of the Romans with reference to the most important of the practical arts of life, but also glimpses of the manners, sentiments, and social condition, of the most powerful and civilised people of the ancient world.

Accordingly, the Lectures now offered to the Public have, on several occasions, attracted in the University a greater number of Auditors, than could be calculated upon, in the case of any not belonging to those classes of subjects, out of which the Undergraduates are compelled to make their selection, as a preliminary to

offering themselves as Candidates for the B. A. Degree.

Whilst therefore freely owning my obligations to Mr. Dickson for much valuable information, I am induced at the same time to hope, that the subject-matter admits of being presented in a somewhat more inviting form, so as to contribute to a better understanding, not only of the *Scriptores Rei Rusticæ* themselves, but also of works which, like the *Georgics* of Virgil, fall within the compass of ordinary reading.

Moreover, the present work embraces a wider range than Mr. Dickson's professes to do, embodying more completely the idea which the Roman writers entertained of Rural Economy, or *Res Rustica*, which comprehended, not merely tillage, but also the culture of the vineyard and orchard, the treatment of Domestic Animals of all kinds, the cultivation of a Garden, and other collateral subjects.

On all these several topics therefore I have entered in the course of these Lectures, and have thus endeavoured to supply the blank which exists in these respects in Mr. Dickson's work;

whilst it has been my endeavour from time to time to throw some additional light upon the condition of Roman Society, by availing myself of the notices respecting it scattered over the Works under my consideration.

I have also thought it incumbent upon me to point out, what is known with respect to the nature of the plants mentioned in the Roman writers; although I have been in general more disposed to bring forward what has been suggested by others, than to add any thing of my own; under a sense of the uncertainty which prevails upon this subject, owing to the conflicting statements of ancient authors, and the general vagueness of their descriptions.

In appending an Index to so small a Work, my principal motive has been, to enable the Classical Student to acquaint himself more readily with the meaning of those technical terms, which are employed by the Latin Writers in connexion with Agriculture, and other branches of Rural Economy.

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LECTURES

ON ROMAN HUSBANDRY.

LECTURE I.

IN the Lectures which I have hitherto delivered on the subject of Rural Economy in this place, it has been my intention to put you in possession of so much of the practical rules of farming as appeared capable of receiving elucidation from the principles of modern science—explaining by means of the latter the *rationale* of those methods which experience had shewn to be successful, and suggesting such improvements as the Art might appear to admit of, when these principles were followed out into their proper and legitimate consequences.

Such are the subjects that seem to fall in general within the province of a Scientific Lecturer on Agriculture: but in addressing an Academic Audience, there is a branch of the inquiry of a nature distinct from the rest, which requires at some time or other to be adverted to, especially by one, like myself, desirous of acting

in the spirit of the distinguished Founder of the professorship which I have enjoyed, and of carrying out, so far as I am able, the enlightened views, which led that eminent individual to devote a portion of his property to the advancement of the general interests of learning in this place.

Those views had reference to the elucidation of the writings of the Ancients by means of the discoveries of the Moderns, in furtherance of which design Professor Sibthorp occupied a considerable part of his life, and at last prematurely sacrificed it, in distant and laborious herborisations, undertaken for the purpose of determining the plants noticed by ancient Greek writers, and more especially by Dioscorides.

To these labours we are indebted for that unrivalled botanical work, the *Flora Græca*, as well as for his other posthumous Publication, the *Prodromus* to the same, in which are preserved some of the fruits of his two arduous journeys in the Levant, undertaken, be it recollected, before steam navigation and the ascendancy of European ideas had so freely opened the regions of the East to scientific investigation.

In the same spirit, although not in the least pretending to an equal acquaintance with the principles of modern husbandry, as that which my eminent predecessor might fairly claim with the botanical science of the period in which he flourished, and moreover fully aware, that there are many in this University well able to set me

right with respect to the economy of an ancient farm, as well as to all other subjects connected with ancient literature, I deem it incumbent upon me nevertheless to lay before you such fragments of information, as I may have gathered from a cursory perusal of the Treatises on Roman Agriculture which have come down to us.

The prose writers on this subject are Cato, Varro, Columella, and Palladius, to which must be added Pliny, who in the course of his 17th, 18th and 19th books enters upon many questions connected with agriculture and forestry.

I do not include in my enumeration Vegetius, as his treatise relates merely to the veterinary art, but must by no means forget the most perfect didactic poem extant in any language, or that which Addison has somewhere styled the most complete, elaborate, and finished piece of all antiquity.

I allude of course to the Georgics of Virgil, a poet whose directions, concise as they may be, and limited as it might seem to subjects that admitted of some embellishment from language and imagery, are nevertheless so sagacious and exact, so indicative of that happy balance of mental endowments which is more conspicuous in his writings than perhaps in those of any other person eminently gifted with genius and imagination, that we are almost inclined to grudge the large proportion of the poem diverted to episodes,

which, although scarcely ever inappropriate, and always calculated to afford the most refined pleasure which poetry can impart, do not nevertheless contribute to the professed design of imparting agricultural instruction.

All that can be said in their justification, regarding the whole in an utilitarian point of view merely, is, that the correct taste displayed in this portion of it is as remarkable as the good sense shewn in the other; and that as the confidence which the Roman farmer must have entertained in the soundness of the author's remarks in matters of husbandry may have often induced him to refine and recreate his mind with the beauties of the poetry, so the latter may have often inspired the mere amateur with an interest in the pursuit from its being presented to him in so attractive a form^a.

^a " Still let us do no wrong to the memory of him, who, as he bore the sacred vessels of the Muses, thrilled with an immeasurable love, and who has received so unequivocally the seal of that approbation of mankind, prolonged throughout ages, which comes near to an infallible award. It is but fair to admit, that we must not measure the relative ranks of Homer and Virgil simply by the comparative merits of their epic works. Homer lived in the genial and joyous youth of a poetic nation and a poetic religion, and amidst the influences of the soul of freedom; Virgil amongst a people always matter of fact rather than poetical, in an age, and in a court, where the heart and its emotions were chilled, where liberty was dead, where religion was a mockery, and the whole higher material of his art had passed from freshness into the sear and yellow leaf. Whether Virgil, if he had lived the life of Homer, in Homer's country, and Homer's time, could have composed the Iliad and Odyssey, may be doubtful; but it is pretty clear that

Well indeed may Columella speak of the oracular precepts of this great poet, "hæc autem consequemur, si verissimo Vati, velut oraculo, crediderimus,"—well might he regard it as the strongest confirmation of the correctness of the rules he lays down, when he is able to quote some lines from Virgil of a similar import.

Nor must we forget those vivid pictures of rural scenery which the Georgics contain, calculated as they are to draw his more refined countrymen to the enjoyments and pursuits of agriculture, in which, by the way, a profound feeling of nature often speaks forth, such as affords an exception to the truth of the remark of Schiller's, quoted

Homer could not have produced them, if it had been his misfortune to live at the date and in the sphere of Virgil."

Such are the concluding sentences of a critique on the comparative merits of Homer and Virgil contained in an article of the Quarterly, attributed to the masterly pen of Mr. Gladstone; and I am the more anxious to bring them forward, because a superficial reader on glancing over the preceding portions of the Essay, in which the defects and inaccuracies of the Mantuan bard are dwelt upon at considerable length, might rise from them under an impression, that the reviewer had taken a lower estimate of this great poet's genius than the context warrants. Doubtless in the *Æneid* the wings of his Pegasus were weighed down by the leaden influence of an unromantic hero, and were but feebly sustained by faith in the mythology which he borrowed from his Greek model.

But if his epic poetry be inferior to that of the great original in whose footsteps he attempted to tread, the same cannot be said of his *Eclogues*, or of his *Georgics*, in the former of which he will by most persons be allowed to have surpassed Theocritus, while the latter is beyond all dispute immeasurably superior to the *Works and Days* of Hesiod.

by Humboldt in his *Kosmos*, that the classical writers exhibit but little trace of that sentimental interest with which we moderns attach ourselves to natural scenes and objects.

I appeal, for instance, to the well known passage, beginning

“ O fortunatos nimium, sua si bona norint
Agrícolas ! quibus ipsa, procul discordibus armis,
Fundit humo facilem victum justissima tellus.”

When, after describing the

“ latis otia fundis,
Speluncæ, vivique lacus ;”

after reminding us, that the

“ frigida Tempe,
Mugitusque boum, mollesque sub arbore somni,
Non absunt,” &c.,

he goes on to say, that if unable to soar to the higher walks of philosophy,

“ Rura mihi et rigui placeant in vallibus amnes ;
Flumina amem, silvasque inglorius,”

and then exclaims, in a burst of poetical enthusiasm,

“ O ubi campi,
Sperchiusque, et virginibus bacchata Lacænis,
Taygeta ! o qui me gelidis in vallibus Hæmi
Sistat, et ingenti ramorum protegat umbra !”

Surely this is not a picture of natural scenery, so cold and unimpassioned, as Schiller will have it to be common amongst the writers of antiquity, but rather that deep affection for its beauties which he represents as characteristic of the moderns.

But indeed it would not be difficult to point out in other classical authors passages of a similar description, as Humboldt himself is compelled to acknowledge.

With regard to the five Treatises comprehended under the title of the "*Rei Rusticæ Scriptores*," it might be expected from their bulk that they would include many distinct systems of agriculture, and that we might have to detail one routine of operations as in vogue at the time of Cato, another at that of Varro, and a third during the period in which Pliny and Columella flourished.

Such undoubtedly would be the case, if in some future age, amidst the wreck of the agricultural literature of Great Britain, three works, as distant one from the other, in point of date, as those above alluded to, were to float down the stream of time; as, for instance, the Treatise of Old Tusser, of the age of Henry VIII; that of sir John Sinclair, who belongs to the last century; and any of those compendiums of recent date, which are designed to convey to their readers an abstract of the principles of Liebig or of Boussingault.

But the Roman writers alluded to were not theorists; the practical good sense which they possessed made them feel, that their systems of philosophy were much too crude to justify their deducing from them any conclusions which might be useful in Husbandry, so that, barring

a few usages founded on superstitious rites and observances, agriculture with them was simply an empirical art, founded upon long continued observation and experience.

Knowledge indeed is at all times a tree of slow growth, and late in arriving at maturity; in the early stage of its existence it may produce flowers, delightful to the eye, refreshing to the senses, and containing the germs of future development; but what fruits it then affords are sure to disappoint, and prove abortive; nor until it has become fairly established in the soil, and until its branches have become widely expanded, does the period arrive, at which it can be expected to bring forth any thing substantially serviceable, or can vindicate its pretensions to be regarded as useful as well as ornamental to society.

Thus long as chemistry has been known to us as a branch of philosophical inquiry, forty years have not elapsed since sir Humphry Davy accomplished the first great practical application of its principles to the purposes of humanity by his invention of the Miner's Lamp; and it was only the other day that Liebig made the first successful attempt to improve agriculture by the aid of the same science, when he suggested, on theoretical grounds alone, the addition of sulphuric acid to bones, as a means of rendering them, when used as a manure, more soluble in the juices of plants.

No wonder then that in the backward condition in which the physical sciences existed at the period to which I allude, no aid could be obtained from them towards the improvement of the arts of life; and hence that the most modern treatises on Roman agriculture which have come down to us should be in the main little more than the mere developments of the system recommended in the older ones, whilst, though much may have been added, nothing is to be found contradictory, to the plan inculcated by the former.

It seems to me therefore that it would be an unnecessary waste of time, were I to present you with a separate abstract of the precepts contained in the treatises of Cato and of Varro. Without meaning to institute any comparison between the intrinsic merits of these several treatises, or pretending to say which is the most original or the most accurate, I deem it best to take as my text-book the book which had the advantage at least of being the latest, and therefore of embodying in itself what was most worthy of note in the writings that had preceded it. I shall therefore bring before you principally the system of agriculture recommended in the treatise of Columella, only proposing to point out such differences in detail as may exist between him and the other authors who can be appealed to, together with so much of the subject-matter of each as is calculated to

convey to you some idea of the general tenor of their respective productions.

The oldest of the writers on Husbandry whose works have survived to the present day is Marcus Portius Cato the Censor, who flourished during the period of the second Punic war, and died in the first or second year of the third, at the age of 85.^b

He is often represented to us as the *beau idéal* of the old Roman; and he certainly may be regarded as a type, of the virtues which that nation prized most highly, as well as of the defects which clouded their great qualities in the estimation of all except themselves.

Lamartine, in his work on the French Revolution, has happily remarked—"Les poètes disent, que les nuages prennent la forme des pays qu'ils ont traversés, et se moulant sur les vallées, sur les plaines, ou sur les montagnes, en gardent l'empreinte, et la promènent dans les cieux. C'est l'image de certains hommes, dont le génie pour ainsi dire collectif se modèle sur leur époque, et incarne en eux toute l'individualité d'une nation."—"That, as the poets say, the clouds assume the form of the countries which they have traversed; and that, modelling themselves upon its valleys, plains, or mountains, they preserve the impression of each, and display it in the skies. This may be regarded as the type of certain men, whose genius is modelled upon the age in which

^b He flourished from 234 to 149 B. C.

they live, and embodies in itself all the national peculiarities.”

Now these are precisely the persons who hold the highest place in the estimate of their respective nations, or, at least, most completely command their sympathies.

Thus Alcibiades or Alexander in Greece; Cato in Rome; Henry IV. or Louis XIV. in the monarchical days of France; Cardinal Ximenes in Spain; Dr. Johnson in the literary, or Wellington in the military line in England; were objects of hero-worship amongst their countrymen; not only on account of their great talents, and the services they have rendered; but likewise as embodying those national characteristics which each member of the community takes a personal pride in seeing associated with acknowledged excellence, and which, he is willing to flatter himself, are connected with its possession.

The levity of the Greek—the Frenchman’s fondness for pleasure and display—the superstition and austerity of the Spaniard—the contempt of theory, and exclusive attention to practical objects which distinguish the Englishman—and the aversion or indifference to all beyond the narrow pale of his native city, which rendered Roman patriotism only a somewhat more expanded form of selfishness—are each exemplified in the individuals I have mentioned, who may be regarded as amongst the most generally renowned, at least, in their respective countries.

Hence it may have been *in consequence* rather than *in spite of* these defects in his character that Cato became the idol of popular admiration; since, as we have already seen, the popular hero in each country is the individual who most completely bears the impress of the national character.

Nevertheless, with respect to the personage alluded to, it must, I think, be admitted, that his chief virtue was a love of his country; and that even this did not prevent him from thwarting Scipio in his career of glory; whilst amongst his vices must be reckoned, avarice, selfishness, meanness, and want of humanity.

Even Plutarch condemns as barbarous his conduct in selling off his old and diseased slaves, to save the cost of maintaining them; and his inveterate hostility to Carthage indicated less perhaps the depth of his patriotism, than the moroseness and implacability of his temper.

Nor, with all deference to persons of higher authority upon such matters, who have expressed an opposite opinion, can I bring myself to admit, that the catastrophe which Cato's persevering enmity to Carthage mainly tended to produce, or at least to accelerate, was one calculated, so far as we can see, to promote the advancement of civilization, or that, by the destruction of that great commercial emporium, a benefit, as some have contended, was conferred on the human race.

Let us consider for a moment what would have

been the condition of the ancient world, if Carthage and Rome in ancient times, like France and England at the present, had each preserved for a longer period their separate existence.

Under such circumstances the very differences of national character belonging to the two leading people of the ancient world might have been expected to contribute to the mutual well being of each. The commercial genius of the one would have tempered the harsh military propensities of the other; and the other European states, instead of becoming the slaves of the conqueror, would have been, as circumstances or inclination prompted, the allies of one or other of the two rival powers, retaining their freedom and self-respect, and holding on their own independent course in the career of improvement.

Without therefore presuming to deny, that the destruction of Carthage was ordained or permitted for purposes which may have ultimately promoted the great ends of Providence, I cannot trace, in the establishment of an universal empire which followed as its consequence, a condition of things favourable in itself to humanity, or regard the narrow and exclusive policy which many admire in Cato, as one which can be justified by considering the state of civil society which it tended to bring about.

As to the work on rural and domestic economy which this remarkable man has left to posterity,

it is in truth of a most miscellaneous description, very unmethodical, and altogether fragmentary. The greater part indeed is taken up by a collection of receipts, some of them medicinal, others culinary; and the purely agricultural portion is comprised within the smallest compass of any.

Agriculture, Cato begins by remarking, is preferable to merchandise, as being a less hazardous, and to usury, as being a more honourable occupation.

Whilst our ancestors regarded a usurer as more degraded even than a robber, they considered it the highest honour that could be paid to a citizen to call him a good farmer, and indeed the best soldiers and the bravest citizens have ever been taken from the cultivators of the soil.

In no other profession are the profits attended with so little risk, or so little liable to excite jealousy; and nowhere is there such an absence of evil thoughts and dispositions as amongst those engaged in this pursuit.

He then proceeds to consider the qualities that are to be looked for in the selection of a farm.

It should combine the advantages of healthfulness and of fertility—be situated, if possible, at the foot of a mountain, pointing to the south—with land and water communication contiguous—with an abundant supply of labourers, and with good water. It should lie in a country which is not apt to change its masters, and from which those who have migrated are apt to regret the change.

“Beware,” he says, “of rashly contemning the usages adopted by others. Take care to adapt the number of your implements to the extent of your property; and recollect that the same rule applies to a farm as to a man, namely, that if it costs us a great deal, it will bring us but a small balance of profit, however much it may produce for us.”

The extent of the farm may be about 100 jugera^c; and here, if it produce good wine, the vineyard stands first in the scale of importance; next, the garden; then, the osier-bed; fourthly, the olive plantation; fifthly, the meadow-land; sixthly, the arable; seventhly, the timber; eighthly, the shrubbery; and ninthly, the oaks, on account of the acorns they yield for the sustenance of the swine.

It may appear at first remarkable, that Cato should rank so low in his estimate the culture of corn; for whether we interpret the passage alluded to as I have done, or adopt the meaning ascribed to it by Varro, who supposes Cato to have meant, that a farm is to be prized highest when it possesses a vineyard in a good soil, next when it has a garden which can be irrigated, and so on, the inference is still the same, namely, that the cultivation of the *cerealia* was placed by Cato lower in the scale of im-

^c The jugerum comprehended 28,800 square feet, whilst an English acre contains 43,560. Hence a jugerum was about two-thirds of an English acre.

portance than either that of the vine, the olive, domestic vegetables, or the rearing of cattle.

Undoubtedly such is not the opinion of farmers in modern times. Wine countries, except in a few favoured spots, where the superior sorts can be obtained, are generally poor; the olive is for the most part confined to districts not remarkable for their fertility; and we generally consider the conversion of pasture land into arable, where the nature of the soil is such as to secure abundant crops of corn, as a profitable speculation.

But two circumstances must be taken into account, which might alter materially the relative value of these several productions of the soil in the estimation of the Romans at the time of Cato.

In all countries exposed to predatory excursions from hostile neighbours the prospects of the corn harvest are most precarious. On the first approach of danger the sheep and cattle can be hurried off, and placed under the protection of the walls of some fortress, until the invading force is repelled; in many cases indeed, as in the ancient city of the Aurunci which I have described in my Memoir on Rocca Monfina^d, the site was selected by the first founders with evident reference to its proximity to a rich pas-

^d Transactions of the Ashmolean Society. See also my Work on Volcanos, page 175. et seq.

turage into which their livestock might find a safe retreat; nor was it so easy for the enemy in the midst of the hurry of their advance to find time for destroying the olive plantations, or the vineyards that lay on their way.

But the corn-fields, even if not intentionally destroyed, would be trampled over both by friend and foe during the continuance of a campaign, and being for the most part in plains, would be just the spots most likely to be ravaged by an invading force.

Xenophon, in his *Anabasis*, has drawn a picture of the insecure life of a husbandman in Thessaly, when describing the entertainment given by the officers of the army of Cyrus, during their encampment near Cotyora, to the ministers of Corylas, prince of Paphlagonia^e.

After the meal was concluded, some Ænians and Magnesians, people from the Thessalian borders, stepped forwards, and in the full armour of the phalanx exhibited the dance called the Carpæan. The manner of it, says Xenophon, was this. "While the pantomimic dance was proceeding to the music of the flute, one of the performers advances as a husbandman. Grounding his arms, he sows and drives his oxen, often looking around as if in fear. Another next approaches as a robber. The husbandman seeing him runs to his arms, and a combat ensues. The robber prevails, binds the farmer, and drives off the

^e *Anabasis*, lib. vi. c. 1.

cattle. Then the dance is varied, the husbandman now is victorious, binds the robber's hands behind him, yokes him with the oxen, and drives them off all together."

No doubt the condition of Italy in the time of Cato was less insecure than that of certain parts of Greece at the period alluded to; yet even here, what with foreign invasions and domestic strife, the agriculturist hardly obtained an interval of repose sufficiently long to give him confidence in the security of his crops; and in these stirring times, as Virgil feelingly laments:

"non ullus aratro
Dignus honos; squalent abductis arva colonis,
Et curvæ rigidum falces conflantur in ensem."

Another circumstance which might contribute to render vineyards a more profitable kind of culture than it is thought to be at present, was the employment of slaves, which, as will be shewn in a subsequent Lecture, would be unfavourable to the culture of the Cerealia; whilst that of vineyards was more under the control of a task-master, and required a more uniform routine of operations, such as could be superintended by a single individual, and executed by constrained labour.

Cato next proceeds to point out what the proprietor ought to inquire into when he visits his country domain.

Having paid his respects to the household gods,

he should go over the farm, if possible, on the day of his arrival, or at least on the one subsequent.

He should then demand of his bailiff, or villicus, a strict report of all that has been done and expended during his absence, and if the result does not turn out satisfactory, should compare the work performed with the number of days spent upon it.

The bailiff may say, that he has been very diligent, that the weather has been bad, that some of the slaves have been sick, or have absconded, or been taken off to public works; but having listened to these excuses, he should bring his superintendent to book, by going into the actual details of the work done.

If for instance the badness of the weather be alleged, he should ascertain how many days the rain lasted, and what other tasks suitable for wet weather, of which a long string is enumerated, were executed during its continuance. If the illness of the slaves be pleaded for neglect of work, he ought to examine whether the usual allowance of food had been reduced in proportion. When these matters have been gone into, let him take effectual care that the work which remains to be done, *shall be done*.

Next he should go into the money account, and the corn account; inquire into what has been bought in the way of food, and what amount of wine and oil has been brought into store or been sold.

Let him also look over the cattle with a view

to a sale; and as a thrifty farmer ought to be fonder of selling than of buying, he should dispose of all useless articles, such as decayed implements, aged oxen, *diseased or superannuated slaves*.

Amongst those who in succeeding times have commented upon the work of Cato, no one, I believe, before Plutarch, has reflected upon the inhumanity displayed in the latter injunction, the more startling to our minds, because unaccompanied on the part of the author, with any apology, or any apparent consciousness of having suggested what was at variance with sentiments of humanity; and even the amiable writer just alluded to, seems to have revolted as much from the idea of disposing of a horse that had become worn out in his master's service, as of getting rid of an aged slave.

How much more benevolent, and, considered on the large scale, how much more wise, are the remarks of Xenophon in his *Economics* on this subject ^f.

After remarking that a generous spirit in the master creates a hearty good will on the part of his servants, he concludes, that the talent for thus conciliating the affections of the persons under his authority, which is of equal importance in agriculture, as in every other profession, seems to be a special gift of the gods, conferred as the reward of diligent training, and of a good natural disposition.

^f Cap. XXI. sub fin.

For to rule over those who are willing to obey, is rather a divine than an earthly blessing; whereas, to tyrannize over unwilling subjects, is the punishment inflicted by the gods upon those, whom they regard as deserving the fate of Tantalus, as suffering under the continual dread of impending destruction.

Few, if any, remarks of this tenor are to be found in the works of Cato, who seems, from this and other passages, to have been, what is called, a hard master, and to have treated his slaves with as little consideration, as the beasts of burden, or inanimate machines, with which he associates them.

After these instructions as to the duties of the proprietor, Cato next points out the land fitted for each kind of culture, and gives an inventory of whatever he considers necessary for an olive plantation and for a vineyard. He enumerates the necessary parts of a wine press, and the requisites for erecting a country house, and for constructing an oil press.

He gives directions also for making wine, for sowing, and for manuring. He recommends that a large manure heap should be got together, that the dung should be carefully preserved, and that it be spread over the fields in autumn.

Nevertheless, in estimating the value of manuring, he places it in the scale of importance far below ploughing.

“If I am asked,” he says, “what is the first point in good husbandry, I answer, good ploughing; what the second, ploughing of any kind; what the third, manuring;” thus placing the advantage of manuring below that of even ordinary ploughing.

Now if by this is merely intended, that ploughing is the foundation of all agriculture; that without stirring up the soil all other modes of improving it are thrown away; there is nothing to which the modern farmer would not assent; but perhaps we may collect from his mode of expression indications, that in the time of Cato the land of Italy had not arrived at that condition, in which the addition to it of manure may be regarded as essential.

Much indeed with regard to the density of the population, and the length of time during which it has supported an agricultural peasantry, may be learnt by this simple circumstance, whether manure was held in estimation, or not.

In the newly settled states of America, where, as in the golden age described by Hesiod,

*κάρπον ἔφερε ζείδωρος ἄρουρα
Αὐτομάτη πολλόν τε καὶ ἄφθονον,*

as well as at present in some of the inland parts of Russia, we know that the farmer is only too glad to get rid of it by committing it to the nearest stream; and the story of king Ægeas, which is quoted by Pliny as a proof that the Greeks of that epoch valued manure, is to me rather an

evidence that they were then anxious to free themselves from the incumbrance of it.

Hercules, according to the fable, cleared the Augean stable by turning into it a river. A modern mythologist would have represented him employing his superhuman power in spreading the fertilising material over the whole extent of the royal domain; and a farmer at the present day would have known too well the value of manure to have allowed it to accumulate, until it required a Hercules to eject it from the premises.

No notice, it is also observed by Cicero, is taken of manuring by Hesiod, although it is mentioned in the *Odyssey*, since Homer describes the faithful dog, who alone recognises his master on his return to Ithaca, lying neglected on a heap of dung, with which the labourers were about to manure the farm.

*Δὴ τότε κείτ' ἀπόθεστος ἀποιχομένοιο ἄνακτος,
'Εν πολλῇ κόπρῳ, ἣ οἱ προπάροιθε θυράων
'Ημιόνων τε βοῶν τε ἄλις κέχυτ', ὄφρ' ἂν ἄγοιεν
Δμῶες Ὀδυσσῆος τέμενος μέγα κοπήσαντες.*

Theophrastus also cursorily alludes to the value of manure, confounding however under the same general term applications of various mixtures of earths to soils, with the use of stable dung, and not appearing to distinguish the characteristic uses of each.

But for full instructions with respect to applying manure we must refer to writers of the age

of Augustus or of Claudius, and especially to Varro and Columella.

Virgil indeed notices it but very slightly, merely saying,

“ arida tantum
Ne saturare fimo pingui pudeat sola :”

but this omission may be attributed to the rich alluvial soil near Mantua where he passed his early years, and the still more luxuriant and fertile country about Naples where he resided at a later period, both of which may therefore be regarded as exceptional cases.

If indeed, as Varro boasts, of all the countries which he had visited none was so universally brought under cultivation as Italy, the time for the advantageous application of manure had surely by that time arrived, and accordingly we shall find it sufficiently insisted upon in Columella.

Such then are the principal contents of that portion of Cato's treatise which relates to agriculture, for the rest of it, and indeed the largest part, is taken up with receipts and prescriptions: as for oxen when ill; for making sweet-cakes, cheese-cakes, &c.^f; for preserving garments from the moth; for pickling legs of pork; and for sundry other homely purposes.

^f Libum, a cake made of cheese, flour, eggs, and oil; placenta, one made of these same ingredients with the addition of honey; spira, scriblita, globi, encytum, erneum, &c., were other kinds of cake composed chiefly of the same ingredients.

He places great faith in cabbage as a medicine both raw and cooked, and although he does not appear to be aware of the mode of converting it into *sour kraut*, which the Germans value so highly, yet recommends it to be eaten raw with vinegar before a feast as a sovereign remedy; for if you wish to eat and drink freely, it removes, he says, all the evil consequences of excess.

Such appears to have been the general opinion of the ancients. Thus Galen tells us, that there is a natural antipathy between wine and cabbage, so that the one will die in places where the other has grown.

Boiled in water, it acts, Cato says, as a purgative, and macerated in the same, alone if there be fever, or with wine if there be none, it is a cure for the colic. Similar statements may be found amongst the writings of the old herbalists, although we moderns do not attach much importance to it as a remedy.

He then details the several rites to be observed on various occasions, as at a banquet, before harvest, &c.; and seems to have had great faith in charms, recommending for a broken limb a kind of incantation, namely, the saying over and over again the words "*daries, dardaries, astataries, dis-sunapiter,*" till the parts are united; or the using another form of gibberish equally nonsensical.

But why should we be surprised at this, when we find within two centuries from the present time persons of high reputation for philosophy,

like sir Kenelm Digby, professing a belief in the virtues of the sympathetic powder, by which wounds were to be cured by applying it to the weapons which occasioned them; or when "the ingeniously learned and excellent herbalist Mr. William Coles" appropriates to each part of the body its respective herbs or plants, according to the theory of signatures then so much in vogue. (See Southey's Doctor, Chap. 24, p. 7.)

Cato, although in common with others of his own epoch given to superstitious observances, discountenanced them nevertheless amongst his household, not permitting religious ceremonies to be practised by any one but the master, from a feeling in which I have myself found the slaveholders of the United States also to partake, and in both cases serving to shew, that the slaves were looked upon as the mere goods and chattels of the proprietor.

Perhaps too, in the case of the Roman, it was a precaution against similar influences, to those which the Obi enchanters are said to exert upon the minds of the negroes in the West Indies.

The extracts that I have given may serve to convey to you a sufficient idea of the work of Cato, the oldest of the Roman writers on husbandry that has come down to us, and one who has treated much more fully of other branches of rural and domestic economy than of agriculture properly so called.

I perceive in it no reference to the rotation of crops, such as occurs in Virgil or in later authors, although at the same time some discrimination is shewn in destining particular kinds of soil to certain vegetables.

Its chief interest indeed appears to consist in the picture it conveys of the manners and usages of the times, as well as of the sentiments of an old senator of the age of the second and third Punic war; who, as already observed, is often brought forward as the *beau idéal* of his race and order, before the genuine Roman character had become modified through the introduction of foreign manners.

V A R R O.

The next writer on agriculture in the order of time is Varro, who died three years after the battle of Actium, and twenty-eight years B.C., at the advanced age of eighty-eight^s. He distinguished himself in early life under Pompey, and gained a naval victory over the Pirates, which is commemorated on the obverse of the only medal extant, on which his features are preserved.

After the fall of his Chief, he devoted himself to literature, and was reputed the most learned man of his time, having written on an incredible variety of subjects, according to the testimony of

^s According to Scaliger, born 118 B. C., died 26 B. C., and therefore lived 91 years.

Aulus Gellius. The only productions of his pen, however, that have actually come down to us, are, that *De Linguâ Romanâ*, a Grammatical Treatise, of which six books only out of twenty-four have been preserved; and that *De Re Rusticâ*, which I am about to notice.

This latter work, written, as he says, in his 80th year, is addressed to his wife Fundania, with the professed object of enabling her, after his death, to cultivate with profit the estate she had purchased, but had hitherto confided to the care of her husband.

The treatise, however, is drawn up in the form of a dialogue between Varro and some of his friends; but nevertheless is far more methodical and systematic than the work of Cato which preceded it; whilst the directions given appear to have been, in many instances, the result of actual experience and sound reflection.

He begins by pointing out the absurdity of including in a treatise on Agriculture those various topics which had been introduced by former writers, as, for instance, by Cato, on no better plea than because they relate to subjects which interest the farmer.

For the same reason he objects to including amongst books on Agriculture such writings as those of Theophrastus, which relate to the history and physiology of plants merely. "*Isti quidam libri,*" he says, "*non tam idonei sunt iis qui*

agrum colere volunt, quam qui scholas philosophorum.”

The science of Husbandry, properly so called, is limited to instructions as to the nature of the crops to be sown, and the things to be done on each of the several kinds of soil; together with rules for determining what description of land will yield the largest amount of produce for the longest period of time.

Hence the science of Agriculture may be divided into the four following departments: the 1st, a knowledge of the nature of a farm, both with regard to its soil, and all its other parts: the 2nd, an acquaintance with what things are necessary to be procured for the purpose of cultivating it; which may be distinguished into animate and inanimate; the first including slaves and cattle; the second, implements and machines of various sorts; the 3rd, relating to the various operations required for extracting the greatest amount of nourishment from the soil; and the 4th, having reference to the period of the year when each operation is best performed.

Now with regard to the first of these departments, namely, the nature of the farm itself, the two material points to be inquired into relate to its powers of productiveness, and its salubrity.

If either of these be found wanting, the person who fixes upon the land for cultivation is a madman, and “ad agnatos et gentiles est deducendus.” For whilst no sane person would spend money

upon a farm which would bring him no return, it would be an equal mark of folly to invest it upon one, however productive, where the former occupants have been observed to be carried off by disease.

“Where the air is bad, husbandry, indeed, is nothing better than a species of gambling, in which the life of the tenant is the stake.”

But what am I to do (says one of the speakers in the work) if I already possess a farm in an unhealthy situation? “Vendas quot assibus possis (replies another of the interlocutors), vel si nequeas, relinquas.”

These remarks, together with others of a similar kind which occur in Cato, and all the other Roman writers on Husbandry, tend to shew that malaria was an object of dread in ancient times, as it is in modern, throughout Italy; and that many spots otherwise eligible were even then condemned in consequence of its prevalence.

But can it be supposed that the insalubrity of the climate was then so general or so well marked as it is found to be at present? The desolate condition of the Pontine marshes, once the seat of numerous and flourishing towns, seems to shew the reverse; and although Strabo admits that a few spots near the coast of Latium were marshy and unhealthy, he speaks of the country in general as being flourishing and productive.

The truth of the matter I take to be, that although certain local changes have taken place

since the period alluded to, from the cutting down of woods, or the removal, by war or other political causes, of the population, by which tracts of land have become neglected and marshy; yet that the general character of the climate has not materially changed.

Livy describes the Campagna of Rome as “a parched and pestilential soil;” a character very applicable to it at present. Horace alludes to the month of July as a period, which

“Adducit febres, et testamenta resignat;”

and speaks of his country seat as preserving him in health during the sickly season of September,

“Hæ latebræ dulces, etiam (si credis) amœnæ
Incolumem tibi me præstant Septembribus horis:”

whilst other writers, such as Cicero and Pliny, state that Romulus selected for the site of Rome an healthy spot in an unwholesome country.

We must also not forget the mode in which the land was cultivated, namely, by large families of slaves, whose lives were probably only valued in proportion to the difficulty of replacing them, which, in the flourishing periods of the Republic, amidst continual wars, does not appear to have been great.

Nor, as Dr. Arnold observes, does an unhealthy climate necessarily cause a country to be uninhabited, when the land is sufficiently rich to support a numerous population; although this very description of soil, if abandoned for some time to

itself, may acquire such malignant properties, as to induce the almost inevitable death of those who attempt to settle on it afterwards, and thus may continue untenanted.

Situations, says Varro, may be distinguished into those on a champaign, a hilly, and a mountainous country, each best adapted for certain kinds of culture; corn being most suited for the plain, vines for the hills, and trees for the mountains.

In opposition to Cato, he considers pasturage more profitable than vineyards, and instances the rich meadow land in Umbria, called the Campi Roseæ, watered by the Velino; where it is said that a pole put into the ground one day would be concealed by the herbage on the next.

Various descriptions of soil may be distinguished according to the predominance of one or other of the ingredients which compose the earth.

Of these he enumerates the following—*lapis*, *marmor*, *rudus*, *arena*, *sabulo*, *argilla*, *rubrica*, *pulvis*, *creta*, *glarea*, *carbunculus*; which I venture to interpret, stone, marble, rubble, sand, gravel, clay, red-ochre, dust, chalk, grit, and *puzzolana*^h. Accordingly, a calcareous soil (*cretosa*) will be one in which lime predominates, a gritty one (*glariosa*) where grit or gravel.

^h The meaning of some of these terms has much puzzled the commentators: *glarea* would seem to be applied to the sand or minute pebbles of the shore or of rivers; *sabulo* to gravel;

These may be again subdivided according to the degree in which the ingredient in question is found; as into very stony, moderately so, and not at all. Also with reference to its affinity for moisture the soil may be distinguished into dry, moist, and intermediate. Wheat (*far adorem*), he considers best fitted for moist land, barley for dry.

Sandy soils again admit of a subdivision into white, red, and black, according to the prevailing colour.

Soils again are distinguished into fat, lean, and intermediate, of which properties the test is the manner in which particular plants thrive in them.

Thus in lean or shallow soil the meadows are parched and mossy, the trees stunted, the vines unproductive. In fat soil the reverse of this holds good in all respects, and in the intermediate description of soil the appearance of the crops will fluctuate between the two former.

As Schübler's classification of soils bears some analogy to this of Varro's, I give it in the next pages, although not adopting his theory of *soluble humus*, against which I have protested in another place.

carbunculus to the puzzolana or tuff, with which the volcanic districts of Rome and Campania rendered the Italians so familiar. See Schneider's Note on the passage in Varro, lib. i. cap. ix. Rubrica would seem to have been a red kind of clay, perhaps ochre; and creta seems not to have been always distinguished from clay, as bricks are said to be made of it. Pliny 35 C 49.

CLASSIFICATION OF SOILS

BY

PROFESSOR SCHÜBLER OF TÜBINGEN,

FROM HIS

GRUNDSATZE DER AGRICULTUR-CHEMIE, 1838.

Names of the different descriptions of Soil.			Proportions of ingredients in every 100 parts.			
CLASSES.	ORDERS.	SPECIES.	CLAY.	LIME.	HUMUS.	SAND.
1. ARGILLACEOUS SOILS. — Above 50 per cent. of Clay. More than 5 per cent. of Lime.	Without Lime	Poor	Above 50	0	0. to 0.5	The remainder ..
		Intermediate	50	0	0.5 to 1.5	
		Rich	.. 50	0	1.5 to 5.0	
	With Lime	Poor	Above 50	0.5 to 5.0	0. to 0.5	..
		Intermediate	.. 50	0.5 to 5.0	0.5 to 1.5	..
		Rich	.. 50	0.5 to 5.0	1.5 to 5.0	..
2. LOAMY SOILS. — Not more than 50 nor less than 30 per cent. of Clay. Not more than 5 of Lime.	Without Lime	Poor	30 to 50	0	0. to 0.5	..
		Intermediate	30 to 50	0	0.5 to 1.5	..
		Rich	30 to 50	0	1.5 to 5.0	..
	With Lime	Poor	30 to 50	0.5 to 5.0	0. to 0.5	..
		Intermediate	30 to 50	0.5 to 5.0	0.5 to 1.5	..
		Rich	30 to 50	0.5 to 5.0	1.5 to 5.0	..
3. SANDY LOAMS. — Not more than 30 nor less than 20 per cent. of Clay. Not more than 5 of Lime.	Without Lime	Poor	20 to 30	0	0. to 0.5	..
		Intermediate	20 to 30	0	0.5 to 1.5	..
		Rich	20 to 30	0	1.5 to 5.0	..
	With Lime	Poor	20 to 30	0.5 to 5.0	0. to 0.5	..
		Intermediate	20 to 30	0.5 to 5.0	0.5 to 1.5	..
		Rich	20 to 30	0.5 to 5.0	1.5 to 5.0	..
4. LOAMY SANDS. — Not more than 20 nor less than 10 per cent. of Clay. Less than 5 per cent of Lime.	Without Lime	Poor	10 to 20	0	0. to 0.5	..
		Intermediate	10 to 20	0	0.5 to 1.5	..
		Rich	10 to 20	0	1.5 to 5.0	..
	With Lime	Poor	10 to 20	0.5 to 5.0	0. to 0.5	..
		Intermediate	10 to 20	0.5 to 5.0	0.5 to 1.5	..
		Rich	10 to 20	0.5 to 5.0	1.5 to 5.0	..
5. SANDY SOILS. — Not more than 10 per cent. of Clay. Less than 5 per cent. of Lime.	Without Lime	Poor	0. to 10	0	0. to 0.5	..
		Intermediate	0. to 10	0	0.5 to 1.5	..
		Rich	0. to 10	0	1.5 to 5.0	..
	With Lime	Poor	0. to 10	0.5 to 5.0	0. to 0.5	..
		Intermediate	0. to 10	0.5 to 5.0	0.5 to 1.5	..
		Rich	0. to 10	0.5 to 5.0	1.5 to 5.0	..

Names of the different descriptions of Soil			Proportions of ingredients in every 100 parts.				
CLASSES.	ORDERS.	SPECIES.	CLAY.	LIME.	HUMUS.	SAND.	
6. MARLY SOILS. — More than 5, not more than 20 per cent. of Lime.	Argillaceous	Poor	Above 50	5 to 20	0. to 0.5	The remainder	
		Intermediate	.. 50	5 to 20	0.5 to 1.5		
		Rich	.. 50	5 to 20	1.5 to 5.0		
	Loamy	Poor	30 to 50	5 to 20	0. to 0.5	..	
		Intermediate	30 to 50	5 to 20	0.5 to 1.5	..	
		Rich	30 to 50	5 to 20	1.5 to 5.0	..	
	Belonging to the Sandy Loams.	Poor	20 to 30	5 to 20	0. to 0.5	..	
		Intermediate	20 to 30	5 to 20	0.5 to 1.5	..	
		Rich	20 to 30	5 to 20	1.5 to 5.0	..	
	Belonging to the Loamy Sands.	Poor	10 to 20	5 to 20	0. to 0.5	..	
		Intermediate	10 to 20	5 to 20	0.5 to 1.5	..	
		Rich	10 to 20	5 to 20	1.5 to 5.0	..	
	Clayey Loamy Sandy	Humous.	Poor	Above 50	5 to 20	Above 5.0	..
			Intermediate	30 to 50	5 to 20	.. 5.0	..
			Rich	20 to 30	5 to 20	.. 5.0	..
7. CALCAREOUS SOILS. — Containing more than 20 per cent. of Lime.	Argillaceous	Poor	Above 50	Above 20	0. to 0.5	..	
		Intermediate	.. 50	.. 20	0.5 to 1.5	..	
		Rich	.. 50	.. 20	1.5 to 5.0	..	
	Loamy	Poor	30 to 50	.. 20	0. to 0.5	..	
		Intermediate	30 to 50	.. 20	0.5 to 1.5	..	
		Rich	30 to 50	.. 20	1.5 to 5.0	..	
	Belonging to the Sandy Loams	Poor	20 to 30	.. 20	0. to 0.5	..	
		Intermediate	20 to 30	.. 20	0.5 to 1.5	..	
		Rich	20 to 30	.. 20	1.5 to 5.0	..	
	Belonging to the Loamy Sands	Poor	10 to 20	.. 20	0. to 0.5	..	
		Intermediate	10 to 20	.. 20	0.5 to 1.5	..	
		Rich	10 to 20	.. 20	1.5 to 5.0	..	
	Sandy	Poor	0 to 10	.. 20	0. to 0.5	Any portion less than 80 per cent.	
		Intermediate	0 to 10	.. 20	0.5 to 1.5		
		Rich	0 to 10	.. 20	1.5 to 5.0		
Pure	Poor	0	.. 99	0. to 0.5	None		
	Intermediate	0	.. 98	0.5 to 1.5	..		
	Rich	0	.. 94	1.5 to 5.0	..		
Humous	Clayey Loamy Sandy	Poor	Above 50	.. 20	Above 5.0	..	
		Intermediate	30 to 50	.. 20	.. 5.0	..	
		Rich	20 to 30	.. 20	.. 5.0	..	
8. HUMOUS SOILS. — Containing more than 5 per cent. of Lime.	Soluble mild Humus	Clayey	Above 50	With or without Lime	.. 5.0	..	
		Loamy	30 to 50		.. 5.0	..	
		Sandy	20 to 30		.. 5.0	:	
	Insoluble carbonized or acid Humus	Clayey	Above 50	With or without Lime	.. 5.0	..	
		Loamy	30 to 50		.. 5.0	..	
		Sandy	20 to 30		.. 5.0	..	
Insoluble fibrous Vegetable Matter	Bog and Peat Earth	With	Lime	.. 5.0	..		
		Without	Lime	.. 5.0	..		

Varro then describes the proper arrangement of a farm-house, or villa.

As the healthiness of the situation is the first point to be attended to, it should have an eastern aspect, be placed at the foot of a mountain, but a little elevated, rather than lying in the hollow, not look towards any spot from which an unwholesome wind is wont to blow, and not border upon a marsh, a locality which not only is unwholesome, but is apt to abound with insects.

In short, his directions agree with the account which Horace gives of his villaⁱ, for Varro also lays great stress upon its being warmed the whole day by the sun.

The directions for the farm-house itself are given so much more circumstantially by Columella, that I shall merely say, our author protests against the luxury of those built in his time, which had more reference to the comfort of the proprietor, than to their convenience and efficiency for agricultural purposes.

Amongst the arrangements connected with the farm-buildings, he particularises two manure heaps, the one for the fresh, the other for the old or rotten dung, or if two distinct ones cannot be made, at least one with a partition, so that the old and recent dung may be kept distinct,—directions which imply a greater attention to this

ⁱ Continui montes, nisi dissociantur opaca
Valle : sed ut veniens dextrum latus adspiciat sol ;
Lævum discedens curru fugiente vaporet.

important part of husbandry than existed in the time of Cato.

He distinguishes three different kinds of dung, 1st, that of birds, of which pigeons' dung is the most efficacious, but requires to be scattered over the ground as seed is. He excepts curiously enough the dung of sea-birds, which we are accustomed to regard, under the name of guano, the most fertilising of any.

Next to the dung of birds is that of man, and thirdly, that of goats, sheep, and asses. Horse-dung stands last in the order with reference to corn crops, for on meadows this, as well as the dung of other beasts of burden fed on barley, produces much grass.

In speaking of granaries, he remarks that wheat can be preserved in them for 50, and millet for 100 years.

Beans and legumes are kept safely for a long time in oil-jars, if the latter are besmeared with oil.

There are also glimpses in his work of the doctrine now admitted as to the rotation of crops.

“Certain things,” he says, “are to be sown, not with the hope of any immediate profit being derived from them, but with a view to the following year, because being ploughed in and then left in the ground, they render the soil afterwards more fruitful.” For this reason, if the land be unproductive, it is customary to plough in for manure lupine, before it begins to ripen its seed, and sometimes even beans, care being taken that

the pods are not far enough advanced to be fitted for food. In the same spirit Virgil remarks :

Aut ibi flava seres, mutato sidere, farra,
Unde prius lætum siliqua quassante, legumen,
Aut tenuis fœtus viciæ, tristisque lupini
Sustuleris fragiles calamos, sylvamque sonantem.

These are all the remarks appertaining especially to agriculture which I have gleaned from a cursory perusal of the first Book of Varro's Work.

The second is taken up with a description of the live-stock kept upon the farm, including oxen, sheep, goats, swine, asses, dogs, and hares.

The third and last Book, entitled "De villaticis pastionibus," relates to the management of the various kinds of poultry and domestic fowls which a well-stocked Roman villa usually comprehended within its precincts, together with the wild animals destined for the chase which were kept within its parks or inclosures.

Even snails and dormice, which ministered to the gratification of Roman luxury, find a place in this enumeration ; and fish-ponds, both of fresh and salt water, are noticed as a common appendage ; the former formed and maintained at a moderate cost, and with a view to profit : but the latter chiefly made for ostentation, being both constructed and stocked at an immense expense, and the sea often admitted through sluices or canals, so as to replenish the reservoir with a constant supply of salt water. Equally elaborate and extensive were the houses for the reception of birds, "ornithones," which Varro alludes to ;

but, to avoid repetition, it will be better to postpone any notice of these, until we come to refer to the buildings for the same purpose which are described by Columella.

Indeed, as the Rural Economy of the ancients can be collected more fully from the works of this latter writer, than from others of an earlier date, it seems unnecessary to detain you by any further mention of an author, whose contributions to our knowledge are chiefly valuable, as exhibiting the progress which the Art had made since the first rude attempts at cultivation, which we see pictured in the writings of the oldest author on such subjects extant—I mean Cato.

I must not however omit to notice the fondness for tracing etymologies with which Varro's literary habits appear to have inspired him.

Many indeed of these attempts are truly miserable, and have served to excite as much ridicule in the minds of subsequent authors, as the opinions of Cato with regard to the virtues of cabbage, &c. did in Varro's.

Thus "arista" is so called "quod arescit primum"—*spica* or *speca*, *a spe*, from the hope it holds out of a future harvest—and *villa* (*vella*) from "*veho*," because things are carried to it; and so on.

Passing over these puerilities, I shall proceed to lay before you in my succeeding Lectures an account of Roman Husbandry in its most improved state, as we find it exhibited to us in the Works of Columella.

LECTURE II.

IN the last Lecture I brought before you what may be regarded rather as the antiquities of Roman farming, than the results of that matured experience which were collected by those writers of later date, who enjoyed the advantage of a period of greater civilisation, and more continued tranquillity.

In the present, it is my intention to report to you some of the precepts of that author, who is at once the most full and the most comprehensive of them all; introducing, at the same time, some notices from the Roman bard, who has so embellished the subject of Agriculture, by making it the theme of his most finished poem; as well as from that great Encyclopedist, whose work, "as varied as nature itself," to use the expression by which his nephew, the younger Pliny, has happily described it, stands forth unrivalled for the extent of the information which it affords, and for the number of curious particulars it has transmitted to us, on this as well as on all other subjects connected with the arts of the ancient world.

It is indeed a pleasant thing, to pass from the difficult and crabbed style of Cato and Varro to

the eloquent flow of Latinity poured forth by Columella.

Of this writer we know nothing, except what may be gleaned from his own works, and from the mention made of him by the elder Pliny. From thence it appears, that he wrote about the time of Seneca and Celsus, both of whom he names as his cotemporaries; that he resided at Rome, but had an estate called Ceretanum, which some commentators place in Sardinia, others in Spain; that his birthplace was Gades in Spain; and that he appears to have died at Tarentum, from an inscription found in that place.

His Treatise is divided into thirteen books, which, however, include every topic connected with rural economy; such as bees, fish-ponds, gardens, wine-making, &c.; and therefore embraces a much wider field than any modern Treatise on Agriculture.

The Preface is an eloquent eulogium of Agriculture, and an announcement of the various acquirements which its pursuit demands.

It is remarkable, perhaps, as the first recognition of the importance of Science to Agriculture; for the author sums up his remarks by observing, that Agriculture “*potest nec subtilissimâ, nec rursus, quod aiunt, pingui Minervâ administrari;*” since, as he states, it is far from true, as most people believe, that husbandry is a very easy art, and one requiring no acuteness.

On the contrary, as Cicero said of the perfect Orator, so we may say of the perfect Farmer, that all the Sciences and Arts minister to his improvement: "Nam qui se in hac scientia perfectum volet profiteri, sit oportet rerum naturæ sagacissimus, declinationum mundi non ignarus: ut exploratum habeat, quid cuique plagæ conveniat, quid repugnet: siderum ortus et occasus memoria repetat, ne imbribus ventisque imminentibus opera inchoet, laboremque frustretur. Cæli et anni præsentis mores intueatur, neque enim semper eundem velut ex præscripto habitum gerunt: nec omnibus annis eodem vultu venit æstas aut hiems: nec pluvium semper est ver, aut humidus autumnus. Quæ prænoscere sine lumine animi et sine exquisitissimis disciplinis non quemquam posse crediderim."

C O L U M E L L A.

BOOK I.

In his first Book, he treats of the choice of a farm, the duties of the master, the position of the country-house (villa), and the management of the domestic servants.

For successful farming three conditions are required; viz. knowledge, capital, and fondness for the pursuit.

To attain the first of these requisites, the husbandman should be attentive to the instructions of those who have gone before him.

Amongst the Greek writers, there is a large number who have made Agriculture their subject matter; the earliest of whom was the poet Hesiod.

Columella enumerates a long list of these, noticing, as the most voluminous, the Greek who translated and abridged the Treatise composed by Mago the Carthaginian, which, even when so epitomised, filled six volumes^a.

Amongst the Latin writers upon this Art, he enumerates, as the most distinguished, Cato; the two Sasernæ, father and son; Tremellius Scrofa, who, he says, rendered it even eloquent; Terentius Varro, who made it refined; and Virgil, who imparted to it the charms of poetry.

These then are to be the counsellors whose advice the farmer has to solicit; not however with the disposition to adhere servilely to their precepts, since the monuments of such writers serve rather to initiate the workman in his task, than to render him expert in it.

For experience is the cardinal point in all practical matters, and in this, as in other cases, knowledge is to be acquired even by our very failures. “*Usus et experientia dominatur in artibus, neque est ulla disciplina in qua non peccando discatur.*”

^a The entire Treatise, we read, consisted of twenty-eight books, and was considered so valuable, that on the destruction of Carthage, it was excepted from the general fate which attended the books which the city contained, and was conveyed to Rome, to be translated at the public expense.

But after all, the main thing necessary is the actual presence of the master, whose duties, like those of a general in the army, can never be well performed by deputy. Hence those citizens whose affairs detain them in town should only purchase a suburban farm, for they who acquire a distant one might as well make over their patrimony at once to their heirs, if not to their slaves, since the latter, for want of due superintendence, are sure to pillage, rather than to cultivate it.

The other requisites for a farm, besides contiguity, are a healthy situation, fertile soil, partly champaign, partly hilly, the hills inclined to the east or south, and not far distant from the sea or from some navigable river.

The buildings should stand in the midst of meadows, cornfields, osier beds, and reeds. Some of the hills should be free from trees, so as to produce nothing but corn, for which purpose however they ought not to be very steep.

Other hills should be clothed with olives and vines, and ought to afford building stones in case of need, as well as rivulets, which can be directed at pleasure over the meadows, gardens and osierbeds; nor should there be wanting pasturage for herds of oxen and for flocks of sheep.

These qualities can indeed be seldom found all united, but Cato justly remarked that the two points of the greatest moment were healthiness of situation and fertility of soil, without which

two requisites the purchase is nothing less than an act of madness.

To these requisites he added, good roads, good water, and a good neighbour.

It is moreover of great importance not to buy a larger farm than you have capital to cultivate, for as the Carthaginians said, "imbecillio rem agrum, quam agricolam esse debere." Hence the wise old Roman rule limited the possessions of each citizen to seven jugera; and even after the power of the state had been advanced by conquests, C. Licinius was condemned by a law which he had himself originated, for appropriating more than fifty to his own share.

Whilst however great circumspection is necessary in purchasing a farm, it may be well to encourage those who possess one which is either unhealthy or barren, to try what can be done towards remedying such defects. There are expedients for mitigating the noxious qualities of the air, and skill and diligence may do much to conquer the defects of the soil.

We must attend to the oracular precepts of the great Georgical poet, where he says:

*"Ventos et proprium cœli prædiscere morem
Cura sit, ac patrios cultusque habitusque locorum,
Et quid quæque ferat regio, et quid quæque recuset:"*

and accordingly we should persevere in our experiments on culture, until we have ascertained for what our land is most fit.

Columella attaches great importance also to

the position of the country-house, as well as to its size with reference to the extent of the property, as it ought not to be too large, so as to involve useless expense, nor yet too small, so as to be deficient in room for stowing away the produce of the farm.

It should be built also with an eye to elegance and comfort as well as utility, in order to hold out inducements not only to the owner himself, but also to his wife, for passing her time there.

“*Quamobrem amœnitate aliqua demerenda erit, uti patientius moretur cum viro.*”

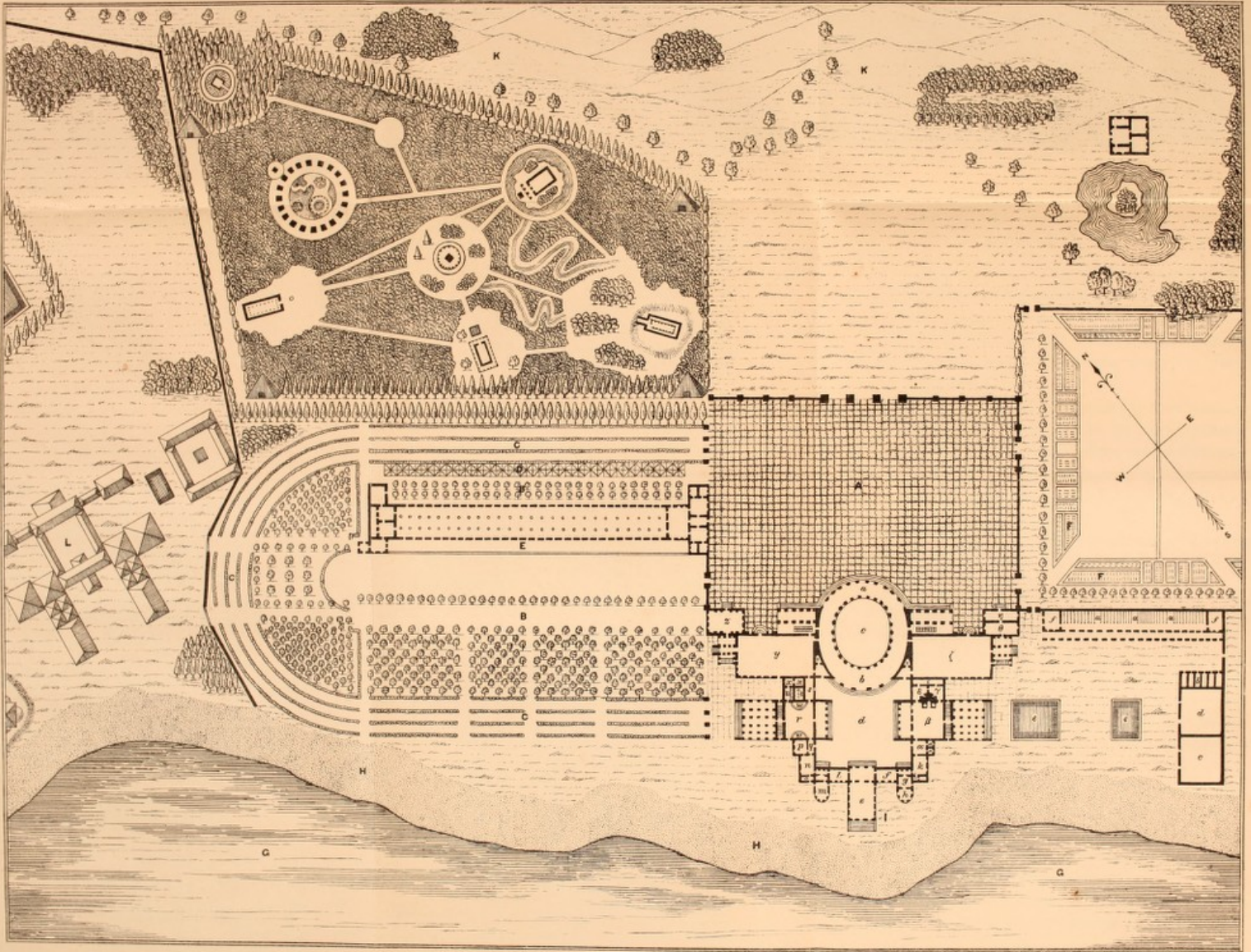
What the Romans understood by these expressions, may be in some degree gathered from the descriptions which other writers have given us of the country-houses about the same period.

In the time of Valerius Maximus, the mansions themselves are said to have covered more ground than was on the estates of some of the ancient Patricians. “In the present age,” that writer says, “men think themselves cramped for room, whose houses are not more extensive than the whole property of Cincinnatus.”

Lucullus, Pliny informs us, fell under the chastisement of the censors, because the amplitude of his villa was such, as, compared with the size of the estate annexed, “that he had more ground to sweep than to plough.”

And Pliny the younger, in describing his Laurentine villa^b, which he praises as being well

^b Lib. 2. Ep. xvii.



PLAN OF PLINY'S LAURENTINE VILLA. *Pliny, Lib. 2, Cap. 17*

From Costello's Villas of the Ancients

adapted for all purposes of use and convenience, but, according to the ideas of that period, as neither sumptuous nor extravagant, details a suite of apartments of such extent as impresses us with an exalted notion of Roman luxury in this respect.

The following are a few of the principal details.

On entering, he says, you find yourself in a plain but not a mean hall (Atrium); and from this you proceed through ranges of porticos of an oval form inclosing a small but cheerful court (area), which affords a pleasant retreat in bad weather, being screened by windows of tale or glass (*specularibus*), and still more effectually by the projection of the roof.

In the centre is a pleasant inner-court (*cavædium*); beyond which is a handsome banqueting room (*triclinium*) that advances out upon the shore, so that when the wind blows from the S. W. it is gently washed by the spent waves.

Having windows or doors on all its sides, it affords a view of the inner court, the portico, and the area, with the woods and distant mountains beyond.

To the left of this room is a large cubiculum, or sleeping-room, with a smaller one beyond, having one window looking to the rising, and another to the setting sun.

The angle which the projection of the hall makes with this apartment causes the warmth

of the sun to be retained, so that it constitutes in winter the retreat of the family, and their place of exercise (gymnasium), being sheltered from all winds except the south.

To this angle of the building there is annexed a cubiculum of an elliptic form, with the windows so placed as to receive the sun throughout the day, and furnished with cases containing those books which are of constant reference.

Contiguous to this lies the sleeping-room^c (dormitorium membrum), with a passage to it, which is suspended over a stove by means of which it is warmed. The remainder of this side of the house was set apart for the slaves and freedmen.

On the opposite wing he tells us is a very elegant cubiculum, having adjoining it a room which, though small for a dining-room (cœnatio), would be spacious for a cubiculum, and which is lighted up both by the sun and by the reflection from the sea.

Beyond it is a cubiculum with an ante-chamber (procœton), lofty enough for summer use, but so sheltered as to serve also for a winter apartment. Adjoining it is another of the same description.

Thence you enter the bathing-room, containing provisions both for hot and for cold baths; and amongst the rest two basons of water (baptisteria duo) large enough to swim in.

^c The Romans appear to have had separate sleeping-rooms for the night and day; the former were called dormitoria.

At a short distance off is the tennis court (sphæristerium), which lies open to the warmth of the afternoon sun.

On this side of the house also were two turrets for catching a view of the country, and a kind of museum where curiosities were laid up. Under this was a banqueting-room (triclinium), where the roaring of the sea was heard but faintly; adjoining to which was the garden and exercise ground (gestatio), surrounded by box or rosemary.

Within this garden was a summer-house, consisting of a banqueting-room, two suits of apartments, or diætæ, and an enclosed portico (cryptoporticus), with a range of windows on each side, which could be thrown open in fair weather and close in cold.

Before this portico was a terrace (xystus), perfumed with violets, and warmed by the reflection of the sun from the portico, whilst on the upper end was a detached building, in which the proprietor could enjoy privacy and quiet, even amidst the noise and tumult of the saturnalia^c.

^c The ingenious Mr. Castel, in his Treatise on the Villas of the Ancients, has given designs of what he imagines to have been the arrangement of Pliny's Laurentine Villa, collected from the description above given, which may be seen in a reduced form represented on the opposite plate. The following are the apartments to which the letters refer:—

A. Atrium,	Entrance hall.
B. Hortus,	Flower-garden.

A deep feeling for nature breaks forth in the concluding sentences of a letter to his friend

<i>C.</i> Gestatio,	Airing ground.
<i>D.</i> Vineæ,	Vineyard.
<i>E.</i> Xystus	Terrace.
<i>F.</i> Hortus pinguis et rusticus,	Kitchen-garden.
<i>G.</i> Mare,	Sea.
<i>H.</i> Littus,	Shore.
<i>I.</i> Gymnasium,	Room for athletic exercises.
<i>K.</i> Sylva et montes,	Wood and mountains.
<i>L.</i> Villa vicina,	A neighbouring country house.
<i>a.</i> Equilia,	Stables.
<i>b.</i> Tecta vehiculis,	Coach houses.
<i>c.</i> Lignarium,	Wood-house.
<i>d.</i> Fœnile,	Hayloft.
<i>e.</i> Piscinæ duæ,	Fishponds.
<i>f.</i> Cellæ servorum,	Slaves' apartments.
<hr/>	
<i>a.</i> Cellæ libertorum,	Freedmen's apartments.
<i>β.</i> Culina,	Kitchen.
<i>γ.</i> Cortinale,	Scullery.
<i>δ.</i> Furnus,	Bakehouse.
<i>ε.</i> Carnarium,	Larder.
<i>ζ.</i> Ergastulum,	House of correction.
<i>η.</i> Cella vinaria,	Wine-cellar.
<i>θ.</i> Cella olearia,	Oil-cellar.
<hr/>	
<i>a.</i> Vestibulum,	Vestible.
<i>b.</i> Porticus,	Porch.
<i>c.</i> Area,	Court.
<i>d.</i> Cavædium,	Hall.
<i>e.</i> Triclinium,	Dining-room.
<i>f.</i> Cubiculum amplum,	Spacious sleeping-room.
<i>g.</i> Cubiculum minus,	Smaller ditto.
<i>h.</i> Cubiculum in aspide cur- vatum,	Semicircular ditto.
<i>i.</i> Transitus,	Passage.

Minutius Fundanus, in which Pliny describes this his favourite retreat.

“Mecum tantum et cum libellis loquor. O rectam sinceramque vitam : o dulce otium, honestumque, ac pene omni negotio pulcrius : o mare, o littus, verum secretumque *μουσείον*, quam multa invenitis, quam multa dictatis !” Ep. lib. i. 9.

Such were the personal conveniences of a wealthy Roman at the most flourishing period of the empire, as reported by Pliny, whose description will serve to supply what was wanting in the Treatise of Columella, as this author contents himself with merely pointing out what the position of the villa ought to be, and what are its requisites with a view to the proper cultivation of the farm of which it constitutes a part.

<i>k.</i> Dormitorium,	Dormitory.
<i>l.</i> Cubiculum politissimum,	Sleeping-room, very elegantly fitted up.
<i>m.</i> Cœnatio,	Supper room.
<i>n.</i> Cubiculum,	Sleeping-room.
<i>o.</i> Procœton,	Antechamber.
<i>p.</i> Cubiculum aliud,	Another sleeping-room.
<i>q.</i> Procœton,	Antechamber.
<i>r.</i> Cella frigidaria,	Cooling-room.
<i>s.</i> Uinctuarium,	Perfuming room.
<i>t.</i> Hypocauston,	Sweating room.
<i>u.</i> Propnigeon,	Furnace to heat the baths.
<i>w.</i> Baptisteria duo,	Basons large enough to swim in.
<i>x.</i> Cellæ duæ,	Bathing rooms.
<i>y.</i> Sphæristerium,	Tennis-court.
<i>z.</i> Triclinium,	Dining room.

With regard to position, it should be situated in the midst of, or embosomed in hills, so as to be sheltered from the winds, but it should at the same time be itself placed upon a little eminence.

There ought to be a perennial spring somewhere within the compass of the domain, or if not, water must be brought from a distance, and there should be wood, and pasturage near.

Stagnant water above all things is to be avoided, but running brooks are of great efficacy in moderating the heats of summer, and in rendering the locality more agreeable.

In healthful situations, the country-house should face the east or the south, in cloudy climates the north. The vicinity of a marsh should be avoided, both on account of the pestilential vapours it exhales in hot weather, and from the swarms of insects and other pests which it engenders.

Such is the general advice which Columella gives us as to the proper site of a country residence, many particulars of which accord very well with the account given by Horace of his own summer retreat.

“ Continui montes, nisi dissocientur opaca
 Valle : sed ut veniens dextrum latus adspiciat sol ;
 Lævum decedens curru fugiente vaporet.
 Temperiem laudes. Quid, si rubicunda benigni
 Corna vepres et pruna ferant ? si quercus et ilex
 Multa fruge pecus, multa dominum juvet umbra ?
 Dicas adductum propius frondere Tarentum.

Fons etiam rivo dare nomen idoneus, ut nec
Frigidior Thracam nec purior ambiat Hebrus,
Infirmo capiti fluit utilis, utilis alvo^d."

But it is time to proceed to the description which Columella gives us of the several parts combined under a complete or well appointed villa^e.

^d The farm-house which Sismondi describes as his dwelling-place in his work on Tuscan Agriculture, seems to have borne in many respects a resemblance to this retreat of Horace's.

He represents it as placed in a hollow, in which meanders a brook which the heats of summer never dry up, and the most violent rains never render dangerous. The deep bank to the right of the rivulet is exposed full to the north, and thus affords a refreshing breeze every evening. It is clothed with olives, vines, cherry-trees, and fig-trees.

The opposite bank having a southern aspect is at least a month earlier in its vegetation, violets and anemones blowing in January, and winter being scarcely felt.

It is on the slope of this hillock that the humble dwelling of the proprietor was situated, sheltered above by an olive plantation which extended to the summit, and having in front three terraces, at three several elevations, on which lemon-trees, jujubes, acacias, and other garden shrubs were crowded together.

From these the eye discovered a succession of thick orchards, the commencement of the great plain of Lombardy, the smiling gardens of Pescia, and its various public edifices.

^e Here also I have borrowed from Mr. Castel the annexed plate, which may convey an idea of the probable disposition of the apartments, in the villa urbana, rustica, et fructuaria of a wealthy Roman.

The following letters and numbers indicate the several parts of the country house and its appendages—

A.—THE VILLA URBANA.

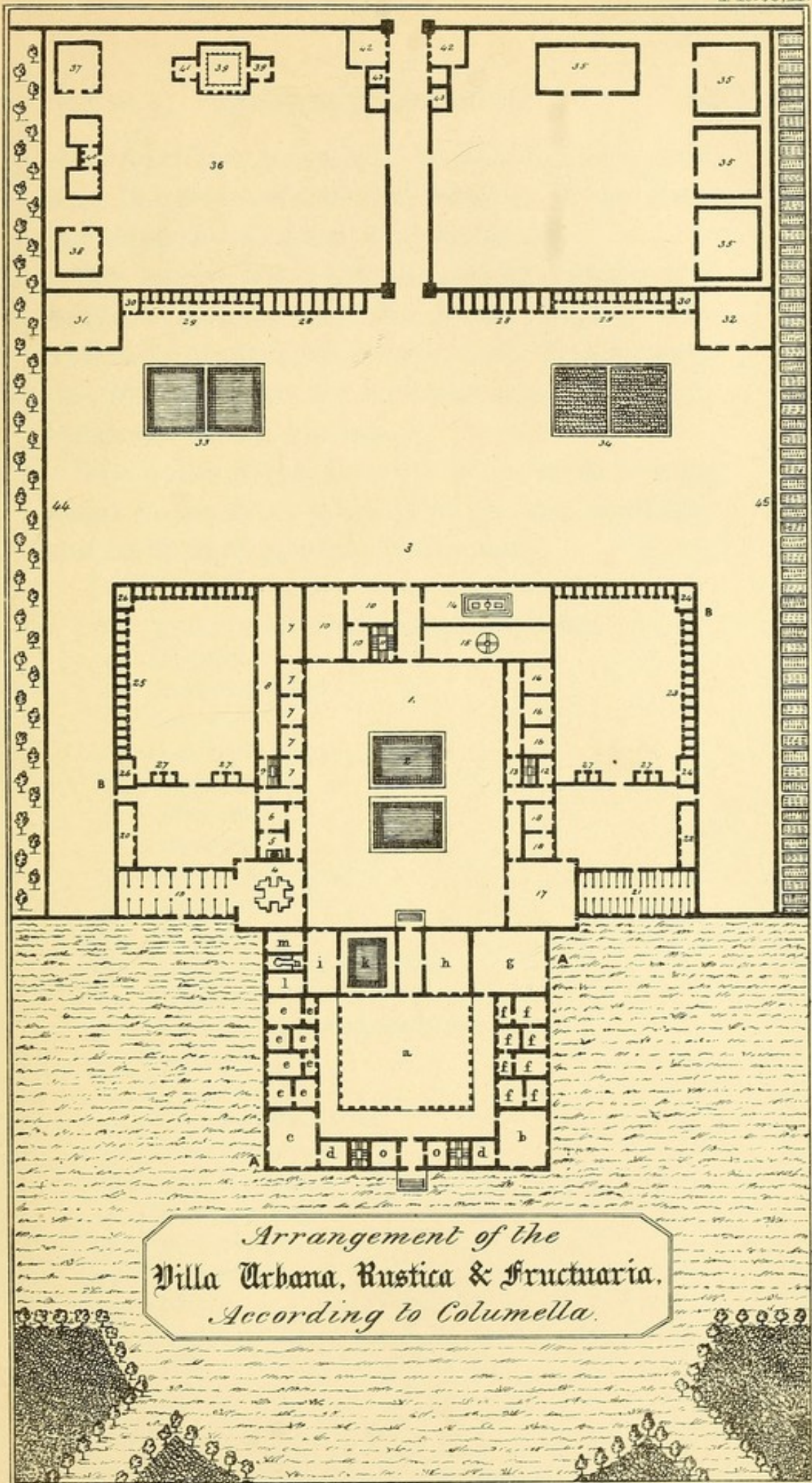
- a. The inner court of the master's part.
- b. The summer dining room.

It may be divided, he says, into three parts, viz. the *urbana*, containing the apartments for

- c. The winter dining room.
- d. Withdrawing rooms.
- e. Winter apartments.
- f. Summer apartments.
- g. The library.
- h. The servants' hall.
- i. Undressing room of the baths.
- k. The bathing room.
- l. The warm cell.
- m. The sweating room.
- n. The furnace.
- o. The porter's lodges.

B.—THE VILLA RUSTICA AND FRUCTUARIA.

- 1. The inner farm yard.
- 2. The pond in the yard.
- 3. The outer farm yard.
- 4. The kitchen.
- 5. The room to put new wines in.
- 6. The cellar for old wine.
- 7. Housekeepers' lodge.
- 8. Spinning room.
- 9. Stairs to the infirmary.
- 10. Husbandman's lodge and three rooms.
- 11. Stairs to the bailiffs' and meedman's lodgings.
- 12. Room for the keeper of the stoves.
- 13. Stairs leading to the workhouse and some of the granaries.
- 14. Wine-press and cellar.
- 15. Oil-press and cellar.
- 16. Granaries.
- 17. Oporotheca or fruit-chamber.
- 18. Room for the master of the cattle.
- 19. Oxstalls.
- 20. Herdsmen's rooms.
- 21. Stables.



*Arrangement of the
Villa Urbana, Rustica & Fructuaria,
According to Columella.*

From Castelli's Villas of the Ancients.

the proprietor; the *rustica*, for the field labourers, &c.; the *fructuaria*, for the produce of the farm, including the oil-press, wine-cellar, &c.

The *urbana* should be divided into winter and summer apartments; the winter having their bedrooms fronting the east, their dining-rooms the west; whilst the summer ones have their bedrooms to the south-east.

The walks should face the south, so as to command as much as possible of the sun in winter, and as little as possible in summer.

22. Rooms for servants belonging to the stables.
23. Sheepfold.
24. Shepherds' lodges.
25. Goat pens.
26. Goat-herds' lodges.
27. Dog kennels.
28. Carthouses.
29. Hogstyes.
30. Swineherds' lodges.
31. Bakehouse.
32. The mill.
33. Pond in the outer farm yard.
34. Dunghills.
35. Storehouses for wood, reeds, and fodder.
36. Hen yard.
37. Dove-houses.
38. House for turtle-doves.
39. House for thrushes.
40. House for poultry.
41. Poulterer's lodge.
42. Porter's lodges.
43. Dog-kennels.
44. Orchard.
45. Kitchen-garden.

Dickson explains this by supposing that the walk was covered over, so that the sun, being in summer high, did not shine into it.

The *pars rustica* consisted, first, of a kitchen, which, being the general resort of the slaves, must be spacious, and likewise, as a security against fire, should be lofty.

The necessity for this latter injunction will be perceived from the absence of chimneys from Roman houses; for, according to Beckman, who has displayed much learning on this subject, the smoke ascended through apertures in the sides of the rooms, and was not carried off by any contrivance analogous to the modern chimney. Hence the lines in Horace—

“ nisi nos vicina Trivici
Villa recepisset, lacrymoso non sine fumo,
Udos cum foliis ramos urente camino,”

(Sat. i. 5. 79)—

seem to imply, that, the hearth being without a chimney, the room at the inn where he lodged became filled with wood smoke, proceeding from the moist fagots and leaves used for fuel.

Owing to the lowness of the kitchen, Horace's landlord at Beneventum nearly set fire to the house in roasting some birds for supper :

“ ubi sedulus hospes
Penè arsit, macros dum turdos versat in igne :
Nam vaga per veterem dilapso flamma culinam
Volcano, summum properabat lambere tectum.”

(Sat. i. 4. 71.)

The slaves who are at liberty should have their respective cells looking towards the south; those who are kept chained ought to be provided for their prison (*ergastulum*) with a room as healthy as possible, underground, and with numerous but narrow windows, so high above the floor as to be out of reach.

The cattle are to be kept in stalls protected alike from cold and heat. Those intended for field labour should have distinct ones for summer and winter. The rest should be either in covered stalls, or in enclosures so constructed that beasts of prey cannot enter.

The *villicus*, or bailiff, should have his dwelling near the gate leading into the house, the procurator above it. In this manner, the *villicus* will be able to overlook the common slaves, and the procurator to be a check upon the *villicus*.

It would appear from this, that the procurator was a kind of steward or general overseer of the property. The term however does not again occur in Columella; and consequently it may be inferred, that he was not one of the constant and permanent officers of a farm, but only occasionally and in particular cases employed on it.

The storehouse, in which are to be placed all the implements of farming, should be contiguous to the apartments of the *villicus*.

As for the cells of the ploughmen and shepherds, they should be situated near their respective cattle.

The *pars fructuaria* contains the granary for corn, the wine-press, the oil-press, the wine-cellar, the place for boiling down the wine (*defructarium*), &c.

Here too is the *fumarium*, where the wood is dried by the smoke conducted over it from the fires of the building; and the baths for the slaves, who, however, are only to use them on holy-days, as the frequent use of the bath is apt to render them effeminate.

Storehouses for the new wine are likewise to be placed in the upper stories, so that the liquor may receive the influence of the smoke issuing from the dwelling.—All this tends to shew that there were no chimneys.

Outside the premises should be the bakehouse and mill; together with at least two ponds—one for geese and cattle,—the other for steeping osiers, lupines, &c.

Two manure heaps—one for the fresh dung, the other for the old—both paved and covered over, so as to be dried up by the wind, are required. Here also is the threshing-floor; here the orchards and gardens; the two latter so placed as to receive the refuse from the farm-yard, oil-press, &c., by which their fertilising quality will be much enhanced.

The next point to be attended to relates to the treatment of the persons employed upon the farm.

Columella distinguishes two modes of cultivat-

ing land as in use in his time; namely, that by means of *coloni* or tenants, and that by the proprietor himself. In both cases it is probable that slaves were commonly the operatives; for although Cicero and others mention *mercenarii*, or hired servants, yet, from the omission of all allusion to them in Columella, it would seem that they were rarely resorted to.

This employment of slaves, with all the repulsive features associated in our minds with such a system, may indeed strike us as being but little in harmony with the picture of rural felicity so beautifully portrayed by Virgil:

“ Illic saltus ac lustra ferarum,
Et patiens operum, parvoque assueta Juventus,
Sacra Deum, sanctique patres: extrema per illos
Justitia excedens terris vestigia fecit^f.”

But the poet contemplated a state of things, when, as in the times of Cincinnatus and of Curius Dentatus, each father of a family cultivated with his own hands his paternal estate, and gave at once dignity and importance to the occupation.

“ sic fortis Etruria crevit
Scilicet, et rerum facta est pulcherrima Roma.”

No doubt too the more opulent and more refined Romans endeavoured as much as possible to banish from their estates the most repulsive features of slavery—the clanking of chains, the underground prison or ergastulum, the lash, and the brand.

^f Georg. ii. 471.

Pliny, in writing to a friend respecting the purchase of an estate, says, that as the former possessor had greatly diminished the stock, “*instruendi sunt complures frugi mancipes, nam nec ipse usquam vinctos habeo, nec ibi quisquam superest.*” Nevertheless it is certain, that wherever slave labour is introduced, free citizens deem it dishonourable to engage in similar tasks for hire; and to such an extent, as is well known, does this prejudice extend in America, that in the slave states the whites will endure the most abject poverty rather than undertake those labours in which negroes are employed. Hence the term “a poor white” is used to express the most irremediable state of destitution that can exist in the southern parts of the United States.

A similar feeling must have prevailed in ancient times, and hence from the moment that the land was cultivated by slaves, the labours of husbandry ceased to be honourable amongst the free citizens of Rome. Thus Pliny, in describing the decline of agriculture, complains, “*at nunc eadem illa,*” (that is, these same labours of husbandry,) “*vincti pedes, damnati manus, inscriptique vultus exercent;*” and remarks in another place, “*coli rura ab ergastulis* § *pessimum est, et quidquid agitur a desperantibus.*”

§ See in Apuleius, *Metamorph.* lib. ix. c. 12, a vivid picture of the horrid condition of the unhappy inmates of these ergastula: “*Dii boni! quales illic homunculi vibicibus lividis totam cutem depicti, dorsumque plagosum scissili centunculo magis inumbrati*

The same writer eloquently describes the contrary case of a Roman, who obtained so much ampler returns from a small farm than his neighbours did from their large ones, that he was accused of witchcraft; when being cited before the tribunal, he brought forwards his whole stock of implements, his thriving, well clothed, and well fed family of menials, his vigorous stock of oxen, &c., and observed to the judges, These are my weapons of enchantment, “*Veneficia mea, Quirites, hæc sunt,*” but these are not all, for I cannot bring before you my watches, my labours, and my nocturnal calculations. He was thus unanimously acquitted.

Now the necessity which existed in the later periods of the Republic, and probably throughout that of the empire, of employing slaves for the performance of the acts of husbandry, must have increased the difficulty of finding tenants for large tracts of land, since in addition to the capital required for stocking a farm, a large sum would have to be expended in the purchase of slaves to cultivate it.

Hence it seems probable, that the *coloni* of whom Columella speaks were for the most part small holders, perhaps little better than the Irish cottiers, renting small plots of land which they could cultivate by their own labour, and that of

quam obtecti, nonnulli exiguo tegili tantummodo pubem injecti, cuncti tamen sic tunicati, ut essent per pannulos manifesti, frontes litterati, et capillum semirasi, et pedes annulati,” &c.

a few household slaves; whilst the larger farms were usually in the hands of the landlord, tended by means of a bailiff or villicus.

There is however a different system of cultivation alluded to by Cato, of which we find no mention in Columella, namely, that by means of a *politor*, or *partiarius*, who, as his name implies, appears to have entered into a kind of co-partnership with the landlord, and to have received, in return for the labour he performed or got done, a part of the produce of the farm.

This proportion however was so small, that it can hardly be imagined that the *politor* could have purchased or hired slaves to perform the acts of husbandry, although he may perhaps have maintained them; and it is probable that the system came into disuse, in proportion as the number of slaves used in rustic occupations increased, and that of free labourers diminished.

The remuneration of the *politor* is said to have varied with the goodness of the land. In land of the first quality, as at Casinum and Venefrum, he received every eighth or ninth basket; in that of the second quality, the seventh; and on the third, the sixth, as his share. This small proportion of the produce received by the *politor*, shews that he was at no expense in cultivating the land, and may make us suspect, that he is to be regarded as a kind of bailiff, who obtained his wages in kind instead of money.

But the *coloni* to whom Columella alludes seem

to have paid rent like modern tenants, and hence were probably upon the same footing in this respect with the farmers of our own country; whilst the *politores* of Cato resembled, in some points, the *metayers* of France and Italy, excepting that the latter obtain a larger proportion of the produce, in return for a greater amount of labour and capital expended.

The metairie system, as it is called, was in use in France before the Revolution, and is continued in Italy even to the present time.

In France, the landlord usually found half the cattle and half the seed, and the *metayer*, labour, implements, and taxes; but in some instances the landlord himself bore a share of these charges.

In Tuscany, according to Sismondi, the *metayer* contracts, to perform all the labours of the farm; to furnish props for the vines; to supply half the seed and half the manure; to hand over to the landlord half of all the crops; to share with him in the profit from the cattle; to make over to him a portion of the eggs, pullets, and capons; and to wash a part of his linen: whilst the landlord engages to supply the other half of the manure, and to be at all the expense of repairs.

Arthur Young with reason condemns this system as injurious both to the landlord and the tenant—to the landlord, because the class of persons to whom he intrusts the management of his property are poor, ignorant, and often

careless and improvident—to the tenant, because the competition which it occasions lowers the rate of profits to the lowest possible scale at which subsistence can be obtained, and produces a slovenly mode of farming, from the want of method arising from the low condition and intelligence of the cultivators. Hence in France, before the revolution, as in the north of Italy now, the *metayers* were poor, and generally in debt to the landlord, although the latter received but little rent. In Tuscany alone the system seems to work well, but this arises from various counteracting causes, one of the principal of which is the thriftiness of the people, and the practice of only the elder brother who holds the farm marrying, so that population is kept down, and excessive competition prevented.

Nevertheless, it must be admitted, that in a country, not abounding in capital like England, and not subdivided into minute portions as France has become since the revolution, but in the hands generally of large proprietors, and these proprietors too indolent or unpractised in husbandry to take the land into their own hands, the *metairie* system is the only feasible one; since in such a state of things it would be impossible to find responsible tenants, possessing capital to stock the land, and credit sufficient to enable them to take the lease of an extensive property¹.

¹ Lullin de Chateaufieux, in his Letters on the Agriculture of

But in ancient Rome, the metairie system could hardly have prevailed from the time the labour of the farm began to be executed by slaves, because the *metayer* could never have had the capital requisite for bringing the number needed, and the landlord would not have chosen to place those belonging to him under the control and management of a stranger.

Hence, as I observed before, it is probable that the modification of the metairie system, which Cato described under the name of *politio*, died out, as estates become larger, and slaves became more numerous.

In Columella's time the two intermediate functionaries, or middlemen, from whom the landlord was to look for his rent, were either the *colonus* or the *villicus*.

With respect to the *coloni*, he directs that they are to be treated with courtesy, and that the landlord should be less solicitous to exact rent from them, than to require good cultivation; the latter being on the long run that which is most important to the estate.

Italy, p. 295, Eng. trans., points out the increase of industry and public wealth, which has taken place in that country since the adoption of the present system of husbandry, which he traces back to the time of the Crusades, although one part of it, the introduction of maize, now made to alternate with wheat, must have dated from a later period than this. He supposes that the mode of cultivation followed had been introduced from Palestine, where the natural fertility of the country was at that time developed by spade-husbandry, conducted by free labour, which converted the poorest soils into rich gardens.

He should not be too tenacious of his rights in small matters, although on the other hand too great lenity is unadvisable, often converting good debts into bad, as the usurer Alpheus used to say. He should be averse to a frequent change of tenants, those born and bred on the soil being the most to be depended on.

Letting farms is however a practice not to be recommended, except where the land is unwholesome or sterile. In general, it is best cultivated by the proprietor himself, or by his bailiff (*villicus*), unless the latter be remarkably indolent or knavish.

Not so however with farms so distant as to be beyond the inspection of the landlord—these should be let rather than left to a bailiff, especially if they consist in corn land, which allows more opportunities than any other for fraud and embezzlement.

As to the *villicus* or bailiff, he should be selected from the slaves, not for those personal qualifications which would recommend him in the city, but on account of his hardy and robust temperament.

He should be of middle age, and sufficiently at home in husbandry not to require constant directions. He need not be able even to read and write, provided only he has a tenacious memory, and indeed in the opinion of Cornelius Celsus he is likely to be a better servant for being wholly illiterate. He should have a wife, “*contubernalis*

mulier," assigned him, to prevent him from rambling from home; and should never mess with a fellow slave, much less with any one not attached to the farm.

He should never leave the premises but on his master's business; should never sacrifice to the Gods but at his master's order; should have nothing to do with diviners, conjurors, and other practisers of idle superstitions.

He should be attentive to the preservation of the implements, and to the clothing of the slaves, who are to be dressed in such a way as to be able to pursue their work even in the coldest weather. He should be neither negligent nor cruel in his treatment of those placed under him, feared for his severe, but not detested for his savage temper.

It was a good rule of our ancestors, says Columella, though it be now obsolete, that the villicus should have his meals with the slaves, and partake of the same fare, so as to ascertain that their food is of good quality.

He should never purchase any thing for the farm without first consulting his master, but make a rule of bringing in his entire receipts in hard cash, and not in goods.

This one thing holds good in all rustic work—to do but once what the cultivation requires; because when imprudence or negligence in working is to be set to rights, the time already spent upon it is thrown away; and the results of the improve-

ment are never sufficient to make up for the loss of labour, or to reimburse us for the expense of the time that had been wasted.

The villicus should not pretend to be more knowing than he really is, but be always seeking to acquire fresh information on the points on which he is ignorant.

By way of encouragement, the landlord should occasionally invite him to his own table on holidays, if he find him assiduous and active.

In these directions we may trace a difference between the modern and the ancient slave, the former of whom, taken from an inferior race and in a lower grade of civilisation, is only trusted to execute the tasks imposed upon him by the master; whilst in the ancient world, being drawn by the accidents of war from nations as high in intellect, and nearly as far advanced in civilisation as their conquerors, he was often quite capable of fulfilling those duties which required forethought and calculation.

In Rome and Greece abundant instances occur of freedmen, and even of slaves, who attained to the highest eminence, as poets, statesmen, and philosophers; and it was the vanity of some of the wealthy to shine vicariously, by procuring a large family of learned slaves.

Yet this very superiority of intellect may only have rendered slavery in ancient times more galling, since it would make those subject to

it feel more intensely their own humiliation, and the hardships of the lot which captivity involved.

The only attenuating circumstance in the African slave trade is the miserable and oppressed condition of the negro in his native country; but the ancient slave might have been torn from cities like Capua, as polished at least as Rome itself, or from nations like those of Gaul or Britain, which though ruder, were not less intellectual, and belonged at least to the same family of mankind.

Add to which that the slave in ancient times was more completely under the control of his master than the modern, less under the protection of the law, more distinctly recognised as a portion of the live stock of the estate, and amenable to similar treatment.

It is true, Cicero in his Offices declares, that justice is to be maintained even with the lowest of mankind, and that slaves should be treated like hired servants, fair treatment being given in return for the work exacted of them.

This however he delivers, as a moral precept to the master, not as a legal claim on the part of the slave: and to shew how little his rights and feelings were really respected, it may be sufficient to remark, that when tortured without reason, with a view of extracting from him evidence of any crime under judicial investigation, the only compensation considered due, was to the master

for the injury done to his property, not to the unfortunate slave for the pain inflicted; when old or diseased he might be abandoned or sold with as little compunction as is felt in disposing of a worn out horse or dog; and if rebellious, the most refined cruelty might be practised upon him without the interference either of the law or of public opinion.

“ O demens, ita servus homo est, nil fecerit, esto,
Hoc volo, sic jubeo, stat pro ratione voluntas.”

There was however a redeeming point in his position as compared to that of a modern slave, in the prospect that was open to him of obtaining that influence which intellect always commands, and thus of gradually acquiring, if not his manumission, at least some higher post amongst his brethren in misfortune, such as that of villicus which I have just alluded to.

Thus Plutarch mentions that the Athenian captives, after the siege of Syracuse, were released from slavery, in recompense for having taught their masters such passages as they could remember out of the plays of Euripides.

Nor must we forget the greater mildness of manners, which the influence of Christianity more especially has infused into the conduct of nations and individuals in modern days, and which would render the same conduct, as that adopted towards the slaves of antiquity, more revolting, because relatively worse, than it was at the time when it was practised.

In Apuleius we have the description of a robber's cave, and of the attempted escape of a maiden from the ruffians who inhabited it, which evidently furnished Le Sage with his model for a similar adventure in *Gil Blas*—in both probably the narration is a true picture of the manners of the times; but the modern novelist has been obliged to soften some of the worst features of the bandits he describes, which in the original are represented as too atrocious and revolting, to have borne the impress of truth even with reference to Spain two centuries ago.

Thus ancient slavery, bad as it may seem, was in keeping with the general manners of the times; whilst modern, though somewhat softened in some of its lineaments, stands out in hideous contrast with the existing civilization.

We may moreover trace in the directions given by Columella relative to the treatment of the slaves in general, some improvement in their condition since the period at which Cato wrote, unfavourable as the age of Nero may appear to the development of sentiments of humanity.

With respect to the other slaves who are under the direction of the *villicus*, the landlord, he says, will do well to treat them with more familiarity than he would do those in the town, and even allow them sometimes to joke with him, as a means of lightening their constant toil.

He should consult with some of the most intel-

ligent, and thus learn their respective genius and disposition. He should observe whether the bailiff has enforced his orders in imposing fetters on the refractory, or has taken upon himself to do so upon others without authority; and he should be more particular in inspecting this class of slaves, in order to see that they are not defrauded in their clothes and the things afforded them, inasmuch as they are subject to many masters, such as bailiffs, masters of works, and gaolers; and the more liable they are to receive injury, the more danger there is that they will find means for revenging themselves.

He should therefore taste their food, and examine their clothes, shoes, &c., in order to satisfy himself as to their being of a proper quality.

In the above directions Columella evidently had in his eye those instances of servile revenge which are common in all countries where slavery prevails, and which even the most rigorous and indiscriminate punishments could not always prevent.

Cicero mentions, rather with approbation than otherwise, the conduct of a Roman prætor, in crucifying a Sicilian slave for violating the law, by merely having a hunting spear in his possession with which he had killed a wild boar; yet these extreme punishments could not prevent such occurrences, as the murder of the Prefect of the city at Rome in the reign of Nero, revenged by the execution of the whole of his

slaves, to the number of 400, although confessedly innocent of the transaction^g.

And as it seems to have been the practice to send the worst disposed slaves to the country, a master might reasonably tremble at the effects which he would entail upon his own person, by any cruelty or ill usage practised upon them in remote places by his underlings, through his neglect or connivance.

With respect to the distribution of the labours of the farm, the foremen or masters of the works in each case should be selected not from the strongest but the steadiest. The ploughman ought to have a loud voice, and a manner calculated to terrify the oxen into obedience, without requiring the use of the whip, tallness and strength, which are of very little importance in the master of the works, being in his case valuable.

As to the *mediastinus* (the common labourer) he may be of any size, provided he is able to endure fatigue. Vineyards chiefly require strength for digging, pruning, and the other culture necessary to them. For this work the worst disposed slaves are often selected, because they are under the eye of a task-master; and hence vineyards are often cultivated by slaves in chains, not of course that these are preferable, but only that they are less objectionable than they would be in other occupations.

^g Tacitus, Ann. xiv. 42.

This may explain the epithet of "durus et invictus" applied to the vinedresser in Horace, as being notorious for his insolent and stubborn manners,

" Tum Prænestinus salso multumque fluenti
Expressa arbusto regerit convicia, durus
Vindemiator, et invictus, cui sæpe viator
Cessisset, magna compellans voce cuculum."

(SAT. lib. i. §. 7.)

What is of most importance however is, that the several departments of rural labour should be kept as much as possible distinct, so that the work done by each gang may be separately noted.

Such are the principal points that seem worthy of notice in the 1st Book of Columella's Treatise; but before I conclude this Lecture it may be worth while to consider the relative value of slave and free labour in a country like Italy, so far as can be gathered from the statements of ancient writers.

Columella states, that the ordinary price of a slave employed as a vine-dresser was 8000 sesterces, equal to £66 13s. 4d., and as it is mentioned as a proof of Cato's frugality, that he never gave more than 1500 drachmas for a slave, which is about equal to £50^h, the price of the slaves

^h According to Dr. Arbuthnot, who states the drachma to be equal to the denarius, and rates the latter at 7 $\frac{3}{4}$ d. Hussey however reckons the drachma at 9 $\frac{3}{4}$ d., so that in this case, the price

employed in rural labours may be supposed to have varied from £50 to £70, or taking the average £60.

The interest of money at Rome being as high as 6 per cent. we must calculate £3 10s. for the annual value of the original purchase money; but as a slave is a perishable commodity, this should at least be doubled.

About £7 a year must therefore be set down as the interest of the money spent.

Each slave was allowed in winter 4 pounds of bread a day, in summer 5; so that, if the Roman libra was $\frac{3}{4}$ of ours, we may reckon the first equal to 3, and the latter to about 3lb. 12 ounces avoirdupois. They were also allowed $1\frac{1}{2}$ pints of a weak wine per day, and during the vintage they had moreover an allowance of pulmentarium, made of olives that had dropt from the tree, and when this was consumed, an allowance of salt-fish and oil. To this must be added the expense of their clothes and dwelling places.

It is stated by Pliny that a modius of wheat weighed 24 lb., but that by the addition to it of other matters which cost little, such as bran, it made 32 lbs. of bread. Now Columella states that a modius of flour cost 2s. 8d., so that we may reckon the $4\frac{1}{2}$ pounds of bread which formed the average consumption of a Roman slave at $4\frac{1}{2}$ a day, or £6 17s. a year. If we add to this £3 3s.

given for a slave by Cato would be somewhat more than £60 sterling.

more for the other demands, including clothes and dwelling, each slave will have cost his master about $6\frac{1}{2}d.$ a day or $3s. 10d.$ a week. This it is true is little more than the third of an English labourer's wages; but after adding about $2s. 8d.$ a week for the interest of the cost price of the slave, and the wear and tear, together making $6s. 6d.$ per week, I suspect that the balance of economy lies on the side of free labour, especially considering that the former has to support a wife and family out of his wages.

But a more accurate mode of calculating will perhaps be to ascertain how much bread the English labourer with $10s.$ a week could command. This at present prices would purchase about $60\text{lbs. avoirdupois}$, whilst the Roman slave received on an average a quantityⁱ of bread per week equivalent to 24 of the same lb., which I have reckoned at less than half of the whole cost of his maintenance, together with the interest of money, &c. Hence the entire expense of a slave would be equivalent to the cost of 59 lbs. of bread ^k, which, as we have seen, approaches very nearly to the amount which an English labourer's wages would procure.

ⁱ $4\frac{1}{2}$ libræ on an average per day, or $31\frac{1}{2}$ libræ per week, which deducting $\frac{1}{4}d.$ for the difference between the English and Roman pound would give about $24\text{ lbs.} = 4$ shillings worth at the present prices.

^k Viz. $9s. 10d.$ at the present price.

According to this calculation then, the advantage would be much greater in favour of free labour; for the master must maintain the family of the slave, and the slave himself when ill or superannuated, unless indeed he resorted to the unfeeling practice of selling him off when he became old or diseased.

But this is only a part of the question; for it remains still to be determined, what might be the relative value of the work of the slave as compared to that of a free labourer: and in the climate of Italy, there can be but little doubt that, in this respect, the balance would be much in favour of the latter.

At any rate, the amount of produce obtained by field-labour does not seem to have been so great as it is with us; for Columella states, that 5 modii of wheat being sown, 50 was the usual return, and the largest 75, the first equal to 13 bushels, the latter to 18; the Roman acre being to ours as 32 to 48.

Hence as 32 : 48 :: 13 : 19.5, and as

$$32 : 48 :: 18 : 27.0.$$

So that 19.5 bushels to an English acre would be about the mean return, and 27 the largest.

Now I believe that 30 bushels of wheat to an acre is regarded by no means an uncommon return with us, and that the average on good land rates perhaps as high as 25 bushels¹.

¹ Fifty-six bushels to the acre have been in some cases obtained.

Hence whilst the expense of slave-labour was scarcely less, its productiveness fell considerably short of that by means of freemen; and indeed, as we have seen, the declension of Agriculture in Italy dates from the time when slaves became abundant. It is therefore perhaps not wonderful that, in spite of the fertility of the greater part of Italy, the culture of the Cerealia did not flourish, and that the Romans were accustomed to depend for their supply of corn on Sicily, Africa, and other regions; the very opposite system being pursued from that, which, till within the last changes in politics, has prevailed with us, and this staple of life being actually provided to the citizens of Rome at a lower sum than the cost of production, instead of having its price enhanced by artificial regulations.

In my two next Lectures, I shall present you with an analysis of the second Book of Columella, in which the different kinds of soil, the varieties of crop cultivated, and the modes of conducting the various acts of husbandry amongst the Romans, are severally described.

LECTURE III.

COLUMELLA.

BOOK II.

BEFORE proceeding, in his second Book, to the consideration of the different kinds of soil, and the modes of amending them, Columella takes the trouble of refuting the vulgar notion, that the ground itself is becoming effete, and worn out, like a female, from old age. The analogy, he observes, does not hold good: for in the latter case the animal does not become less prolific, but ceases to bear children altogether; whereas, in the case of the ground, complete barrenness never takes place, and the decrease in its fertility may be corrected by manuring.

“It is true,” he observes, “that the ground, after it has been brought into cultivation, seems to fall back in the scale of fertility; but the fruitfulness which it first possessed was owing to its having been fattened, as it were, by the residue from so many former crops which it had spontaneously brought forth.”

Thus Virgil, who might seem to have in his eye the clearings of a North American forest, remarks,

“ Aut, unde iratus silvam devexit arator,
 Et nemora evertit multos ignava per annos,
 Antiquasque domos avium cum stirpibus imis
 Eruit : illæ altum nidis petière relictis ;
 At rudis enituit impulso vomere campus.”

(GEORG. ii. 207.)

This store of exuberance being gradually used up by a succession of harvests, the soil becomes poor in consequence :—“ Non igitur fatigatione, quemadmodum plurimi crediderunt, sed nostra scilicet inertia, minus benigne nobis arva respondent.”

The notion of the soil being worn out by fatigue may appear to us too absurd to require the trouble of refuting, but modern farmers are guilty of a similar absurdity, when they talk of land being *tired* of a particular crop. In both instances the error is committed of attributing to inert matter properties belonging only to living substances ; and it must be admitted that of the two the modern notion is the most extravagant, inasmuch as it assigns to an inanimate body, not merely a decay in certain of its properties, which is at least conceivable, but even volition, inclinations, and affections, which are the attributes not only of organization, but even of vitality.

It may indeed appear an affront to attribute to any man of intelligence such a notion, but the degree in which our views are imperceptibly warped by the adoption of a particular phraseology, may be seen from the prevalent notion,

that as manures are said to act as stimulants to vegetation, they lose their effect by frequent repetition; a theory which implies, either that an inorganic substance, like the soil, can be affected by exciting influences, like a living or organized body, or that the crop of the succeeding year may be rendered less susceptible, by stimuli applied to that which had preceded it.

Our author next proceeds to distinguish the several kinds of land. This may in the first place be divided into champaign, hilly, and mountainous.

The first of these should not be quite level, but possess a gentle slope in one direction; the second should rise gently and gradually; the third should not consist of abrupt precipices, but be suited for trees and herbage.

In each of these kinds we may distinguish six species of soil, namely, fat and lean, loose and dense, moist and dry; and of course these properties may be combined in all manner of ways, so as to create a much greater number of subspecies. In a treatise of this kind however our business is to confine ourselves to generic distinctions, and not to bewilder the mind by stating minute differences.

By a fat soil Columella seems to express merely the fact of its yielding abundantly without much labour—a soil, in short, naturally rich and fertile.

By a lean soil the reverse is implied.

By a loose soil he intends one that is light and easily worked.

By a heavy soil, one which requires to be much worked, but which, when labour is spent upon it, produces an abundant return.

This is known to be the case with many of the stiff soils of this country. They contain all the elements of fertility, but in a state of combination, which renders it not easy to extract them by water; and hence frequent and long exposure to atmospheric agents is necessary to effect their decomposition. This is done by ploughing, and the other operations of husbandry; and when so prepared, not only is their mechanical condition improved, but their chemical constituents, their alkalies, &c., in which they are often rich, are rendered soluble, and consequently available for the uses of plants. Of this fact Columella was quite aware, although chemistry was not then sufficiently advanced to enable him to point out the reason of it.

Virgil, too, after remarking, that coldness of the soil is scarcely to be discovered but by the nature of the trees that grow upon it; the presence of the pine, the yew, and the ivy affording indications of this property; goes on to recommend, that the ground should be prepared by trenching, and the soil exposed to the north wind, before vines are planted; adding, that the looseness and fertility, which we express by the

term *putre*, is obtained by the winds, the frost, and the continued stirring up and digging of the soil.

“at sceleratum exquirere frigus
 Difficile est ; piceæ tantum, taxique nocentes
 Interdum, aut hederæ pandunt vestigia nigræ.
 His animadversis, terram multo ante memento
 Excoquere, et magnos scrobibus concidere montes ;
 Ante supinatas Aquiloni ostendere glebas,
 Quam lætum infodias vitis genus : optima putri
 Arva solo ; id venti curant, gelidæque pruinae,
 Et labefacta movens robustus jugera fossor.”

(GEORG. ii. 256.)

There is one species of soil, called *cariosa*, mentioned by Cato, Columella and Pliny, which deserves a moment's notice.

Columella describes it, as one which becomes wet with a very little rain, the latter not penetrating to the lower part of the soil.

Pliny compares it to the rottenness of wood, being arid, porous, rough, white, worm-eaten, and like pumice. Hardouin says it is the kind which the Lyonnaise farmers call by the opprobrious name of “terre pouilleuse.”

Whatever it may be, Cato regards it with great aversion, and says, that it is neither fit for arable, nor for pasture land.

The terms of *moist* and *dry*, as applied to soils, sufficiently explain themselves.

It is evident that the above nomenclature is not to be regarded as precise, or as serving to divide soils into six species. It rather corresponds with the distinctions made in them by

some modern writers on Agriculture, as may be seen by reference to Schübler's Classification of Soils, which has been laid before you in the preceding Lecture.

A soil at once fat and loose answers to the description of that which Virgil terms "putre,"

"Nigra ferè, et presso pinguis sub vomere terra,
Et cui *putre* solum (namque hoc imitamur arando),
Optima frumentis;" (GEORG. ii. 204.)

being naturally in that condition, which it is our business in other cases to bring about by art.

This kind, therefore, is the most profitable of any, because it produces most with the least labour. It is the same which Columella calls in another place "pulla" or "tenera," and which Pliny, on the authority of Cato, declares to be the best kind that can be had.

Next to this in point of value is the stiff and fat soil, which when labour is spent upon it brings an ample return.

After this is soil of any description that admits of being irrigated; for this is sure to yield a crop without expense. But when a soil is at once dry, stiff, and lean; requiring much labour to be bestowed upon it, and yielding little in return; or which, when allowed to rest, is good neither for meadow nor for pasture, it must be shunned as if it harboured a pestilence; for indeed it is as bad to die of starvation as of disease, if we believe the Greek Muses, when they exclaim *λίμῳ οἴκτιστον θανεῖν*.

Now if we possess an estate which is yet unreclaimed, we must first ascertain whether it be dry or moist, wooded or stony, covered with grass, with fern, or with rushes.

Supposing it to be wet, the water must first of all be drawn off by drainage.

The ancients do not appear to have been acquainted with tile-draining, for Cato is the only one who uses the word *tegula* in connexion with draining; and the tiles of which he speaks may have been used to prop up the sides of the drain, instead of stones, without supposing them moulded for the purpose, as in modern days is the case. Nor indeed, if it had occurred to them to use tiles for that purpose, could they have manufactured them cheaply enough for general use.

But in other respects Columella's directions accord with modern practice.

The drains, he says, may either be open or covered in: the latter kind however should be partially adopted in a loose soil, the covered ones communicating with the main drains, which may be open, and made inclined like the eaves of a house, so that they may not fall in.

It is proper, indeed, to make both the open and covered drains shelving, broad at top and narrow at bottom, like roof-tiles turned upside down; for those whose sides are perpendicular are soon damaged by the water, and are stopped up by the falling in of earth from above. Again, the covered drains are to be made three feet deep, half

filled with small stones or clear gravel, the earth that was dug out being thrown over them.

If neither stones nor gravel are to be got, he advises that twigs should be twisted like a rope, and formed to the exact thickness of the bottom of the drain, so as to be inclosed in it when pressed tightly down; and then that cypress or pine-leaves should be pressed down upon it, taking care, however, that at both ends of the drain two stones should be placed upright like pillars, having another laid over their top, to support the bank, and give a free ingress and egress to the water.

These two methods of draining, it is well known, are still extensively practised; and probably better directions could not have been given for setting about them, than those which Columella has handed down to us.

Many, remarks Columella, who have written on husbandry, consider a certain sweetness of the soil, a luxuriant growth of herbage and of trees, and a black or ashy colour, as sure indications of fertility.

Without questioning the validity of the two former, it may be fairly disputed, whether blackness is a certain indication of a rich soil, as Cornelius Celsus asserts, for many marshes and fields impregnated with salt are of this colour.

We here find a recognition of the difference between peaty and loamy soil, which, though alike in colour, possess the most opposite quali-

ties; the one preventing, the other forwarding decomposition; the former marked by the existence of the acetic fermentation, which causes it to possess antiseptic properties; the latter by that process of slow decay, which Liebig calls *eremacausis*.

The presence of much salt in the soil is also destructive to most crops, and hence salt marshes produce a rank herbage, but are not fit for growing corn.

Columella proposes the following as a test of the richness of a soil. If when dug out and exposed it shrinks into a smaller compass, it is barren; if it swells out, so that it cannot be returned into the ditch from which it was taken, it is rich.

Virgil alludes to the same experiment, stating however what is more to the point, that it is a sign whether it be loose or stiff, and that in the former case it is most proper for vines, in the latter for corn.

“Nunc, quo quamque modo possis cognoscere, dicam.
 Rara sit, an supra morem sit densa, requiras;
 Altera frumentis quoniam favet, altera Baccho;
 Densa magis Cereri, rarissima quæque Lyæo;
 Ante locum capies oculis, alteque jubebis
 In solido puteum demitti, omnemque repones
 Rursus humum, et pedibus summas æquabis arenas.
 Si deerunt; rarum, pecorique et vitibus almis
 Aptius, uber erit: sin in sua posse negabunt
 Ire loca, et scrobibus superabit terra repletis;
 Spissus ager; glebas cunctantes crassaque terga
 Expecta, et validis terram proscinde juvencis.”

(GEORG. ii. 225.)

Pliny questions the validity of this method, remarking that the earth will never fill the same space as before; nevertheless it is perhaps perfectly true, that a clayey soil when dug up will swell out by the imbibition of moisture, whilst a sandy one will shrink from the effect of evaporation. Hence although Columella's test will not shew whether the soil is rich, yet it may indicate that it contains clay, or is stiff, and stiff soils when worked are more commonly fertile.

Another indication of fatness is its glutinous quality, sticking like pitch to the hand, which Virgil also has pointed out.

“Pinguis item quæ sit tellus, hoc denique pacto
Discimus; haud unquam manibus jactata fatiscit,
Sed picis in morem ad digitos lentescit habendo.”

(Georg. ii. 248.)

This also affords an indication of the abundance of clay in the soil, and is an experiment of a similar kind to that made at present for the same purpose, in the mechanical analysis of soils conducted according to Mr. Rham's method^b.

^b This consisted in first sifting the soil through a succession of sieves of various degrees of fineness, but only collecting for examination that portion which was minute enough to pass through fine wire gauze. From this the argillaceous portion was separated from the sandy, by allowing the former to subside in a tall jar, and pouring off that remaining in suspension, which contains the clay. This method is indeed wanting in precision, but from its simplicity deserves to be recommended to farmers, as enabling them to arrive at an approximation to the true constitution of the soil. For a full account of the method, see Jour. of the Roy. Agric. Society, Vol. 1. 1840.

For the same soil, which from its plasticity sticks to the fingers, would be diffused through water, whilst the sand sinks to the bottom. But, as Pliny observes, this is no unerring indication, for pipe-clay, which is barren, will do the same.

After all, the indications which Virgil points out are the most to be relied upon.

That quality of soil, he says, which sends forth a thin stream and vapour, which easily absorbs, and as readily parts with its moisture, such land as is seen about Capua and Vesuvius, is good for all purposes of husbandry.

“ Quæ tenuem exhalat nebulam, fumosque volucres,
Et bibit humorem, et, cum vult, ex se ipsa remittit ;
Quæque suo viridi semper se gramine vestit,
Nec scabie et salsa lædit rubigine ferrum ;
Illa tibi lætis intextet vitibus ulmos ;
Illa ferax oleo est ; illam experiere colendo
Et facilem pecori, et patientem vomeris unci :
Talem dives arat Capua, et vicina Vesevo
Ora jugo, et vacuis Clanius non æquus Acerris.”

(Georg. ii. 217.)

Those who have seen the luxuriance of the Campagna near Naples will testify to the truth of this description, and allow, that the soil possesses that happy admixture of clay and sand, which renders it a rich and fertile loam, absorbent of moisture, and at the same time giving it out readily enough not to be rendered too tenacious.

Pliny is the only author who dwells upon the smell of a new turned furrow as indicative of its richness.

He is quite eloquent indeed on this subject, and says that on a calm evening, before sun-set, the soil sends forth a divine savour to which no perfume can compare.

“*Quod si admonendi sumus, qualis est terræ odor ille qui quæretur, contingit sæpe etiam quærente ea sub occasum solis, in quo arcus cælestis dejecerit capita sua; et cum a siccitate continua immaduit imbre, tunc emittit illum suum habitum divinum ex sole conceptum, cui comparare suavitas nulla possit.*”

The smell of newly turned soil is indeed very perceptible, and if it depend upon a slow vegetable fermentation going on within its substance, it is probable that those soils which are richest may possess it in the most eminent degree.

The sweetness of a soil is estimated by its communicating no unpleasant taste to water that has filtered through it.

The presence of this flavour would be occasioned by certain salts noxious to vegetation, such for instance as alum or sulphate of iron, which Virgil seems to allude to in the following lines of his *Georgics* :

“*Salsa autem tellus, et quæ perhibetur amara,
Frugibus infelix (ea nec mansuescit arando,
Nec Baccho genus, aut pomis sua nomina servat),
Tale dabit specimen: tu spisso vimine qualos,
Colaque prælorum fumosis deripe tectis.
Huc ager ille malus, dulcesque a fontibus undæ,
Ad plenum calcentur: aqua eluctabitur omnis
Scilicet, et grandes ibunt per vimina guttæ;*

At sapor indicium faciet manifestus, et ora
Tristia tentantum sensu torquebit amaror."

(GEORG. ii. 237.)

The presence of these latter salts would be more common in the volcanic soil of Italy than elsewhere, the sulphurous fumes rising through the ground being a constant source of sulphuric acid, which would produce alum and sulphate of iron with the bases with which it came into contact.

Columella and the other prose authors on husbandry scarcely allude to the practice of improving the soil by burning, which Virgil has so graphically described, pointing out in his subsequent lines the three principal causes, upon which the advantage of paring and burning is supposed by modern farmers to depend :

" Sæpe etiam steriles incendere profuit agros,
Atque levem stipulam crepitantibus urere flammis :
Sive inde occultas vires et pabula terræ
Pinguia concipiunt ; sive illis omne per ignem
Excoquitur vitium, atque exsudat inutilis humor ;
Seu plures calor ille vias et cæca relaxat
Spiramenta, novas veniat qua succus in herbas ;
Seu durat magis, et venas adstringit hiantes,
Ne tenues pluvix rapidive potentia solis
Acrior, aut Boreæ penetrabile frigus adurat."

(GEORG. i. 84.)

Whether, that is, it communicates rich juices to the land, or corrects bad ones ; opens the pores of the soil to allow the nutritious juices access to the young plants, or renders it more

compact; so as to prevent its being injured, either by the showers, the excessive heat of summer, or the severe cold of winter.

Now the advantages recognised at the present day as arising from the practice of burning the soil, and the plants which cover its surface, are very much of the description which Virgil has stated.

In the first place, when a large amount of slowly decomposing vegetable matter happens to be present, it accelerates the return into the body of the soil of the alkaline and earthy constituents which the plants contain, so as to render these essential ingredients immediately available for the ensuing crop.

In other words—

*Occultas vires et pabula terræ
Concipiunt.*

This is the source of the fertility imparted to the soil in America by the combustion of the timber in its extensive forests; the fire unlocking, as it were, those accumulations of potass, phosphate of lime, and other valuable matters, which the trees in their growth had gradually drawn from the soil, and restoring them at once in a condition in which they can minister to the wants of the forthcoming crops.

Secondly, when the soil is sour, or contains peaty matter, which generates acetic or other acids prejudicial to the growth of plants, the practice of burning dissipates and destroys the

injurious principle, or, as Virgil says

“ illis omne per ignem

Excoquitur vitium, atque exsudat inutilis humor.”

Burning also may do good to the soil, when it is too retentive of moisture, and too adhesive in quality. My friend Mr. Barwick Baker of Hardwick Court in Gloucestershire has by this treatment improved the soil of his garden, which was a tenacious clay, converting it into a kind of brick earth, which possesses much of the mechanical qualities of a sandstone.

For such a case it may be said in the beautiful language of the Roman Poet—

“ Plures calor ille vias et cæca relaxat

Spiramenta, novas veniat qua succus in herbas ”

Whether the process of burning can ever act in the last of the ways hinted at by Virgil, that is, by rendering loose soils more compact, is very problematical; indeed it is even generally considered by Agriculturists, that light and sandy soils are injured by the operation.

But although many of the explanations given in the Georgics may apply very well to the practice of burning away the turf, which we see adopted at the present day, yet there is no proof that the Poet contemplated any thing more, than the burning of the stubble which might lay upon the surface of the land, and the probable influence of the heat generated upon the adjacent soil.

Nor do the older Roman writers on agriculture

seem to allude to the practice, though fully aware of the fertilizing effect arising from the ashes of the timber and stubble, which they recommend to be burnt, as may be inferred from a passage of Palladius, in which he appears to direct, that when the land is covered with trees, a distinction must be made between that which is naturally good and that which is poor, as from the former the timber should be merely removed, and the land ploughed up; whereas in the latter it should be burned, in order that the soil may be enriched with the ashes left behind.

These directions seem very suitable to a country in the state that Italy was at the period when that author lived, namely, about the 5th century; a period when wood was neither so valuable as it is with us, nor yet of such little account as in the back settlements of America, and consequently where its destruction was to be avoided, except in cases where the land required to be enriched by it.

The adaptation of the soil to particular purposes, Columella remarks, will also depend upon its depth.

If it do not exceed two feet, it is most fitted for corn; but if as much as four, it will do best for trees. This is quite true, for when the subsoil is a stiff clay through which the roots cannot penetrate, the trees are stunted and unhealthy, as we know by our orchards, which therefore thrive best upon the red sandstone.

Before proceeding any further in the consideration of the various operations of husbandry which Columella notices, it may be well in the first instance to describe the implements used in their performance, seeing that the Roman writers often content themselves with merely naming them, without pointing out to their readers their form and construction.

The first of these was the plough (*aratrum*); respecting which, all we learn from the *Scriptores de Re Rustica* is, that according to Cato there were two kinds, the one called the Roman, adapted for heavy; the other called the Campanian, more suited for light soils.

It is to Virgil then that we must appeal for a detailed description of the parts of the ancient plough as employed in his time, differing, as it would seem, not very materially from that now employed in the South of France.

It may not be uninteresting, before explaining Virgil's account, to trace the history of the plough from the earliest known periods; for ancient as the art of ploughing is, certain bas-reliefs which have been brought to light by the researches of modern travellers in the East appear to have shewn, what indeed we might have anticipated to have been the case, that the plough itself is nothing more than a modification of the hoe, which was first dragged along the ground by manual labour, before the force of oxen was substituted.

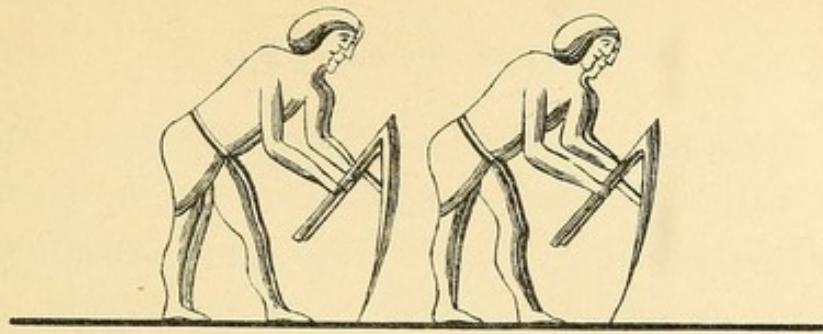
This gradual transition from the hoe to the plough may be traced in some of the painted sculptures found by monsieur Costaz, a Frenchman attached to the scientific corps under Napoleon in Egypt, which, according to sir Gardner Wilkinson, was taken from a Theban tomb of the 18th, or the beginning of the 19th Dynasty^c.

In one of these, two men are represented turning up the sod with a kind of hoe, consisting of two unequal pieces joined together at an acute angle, the shorter piece serving for the handle, the other, which is slightly curved, for turning up the soil.

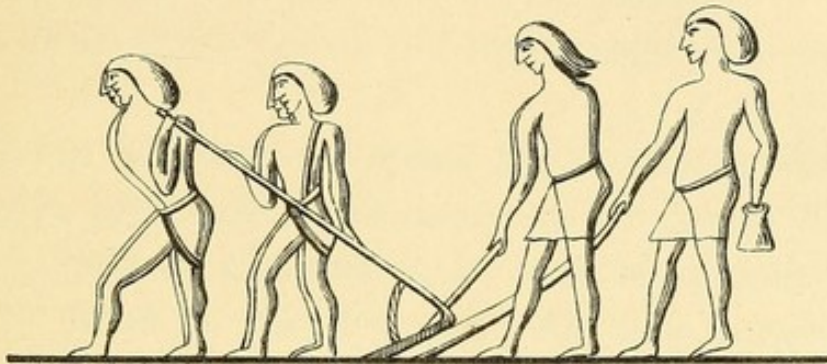
In another of these sculptures, we have a delineation of the second stage in the transmutation of this implement into the plough, in which the beak of the hoe appears to perform the part of the ploughshare, and in which, the handle being elongated is dragged along by two men. But as the tendency of the force applied in front would be to draw the share out of the ground, or to cause it merely to graze along its surface, it became necessary to apply pressure behind, by attaching a piece of wood to the ploughshare, which was weighed down by the force of two men leaning upon it. Hence in this operation four men are seen to be employed, two to drag the instrument along, and two men to thrust the point of the ploughshare into the ground.

The substitution of oxen for men to perform

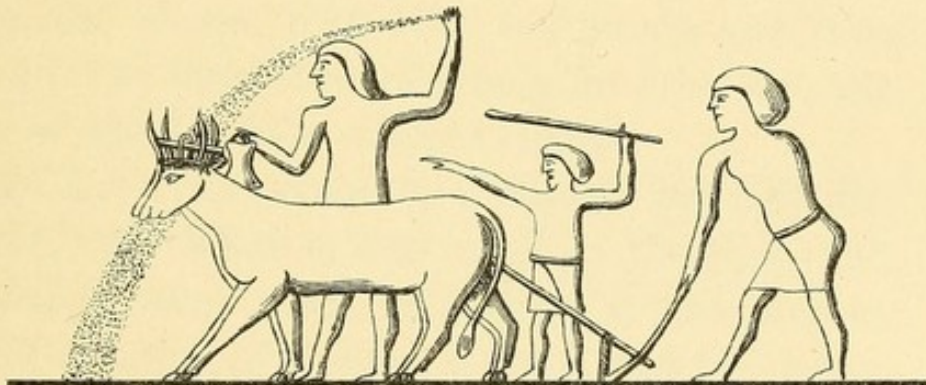
^c See Plate.



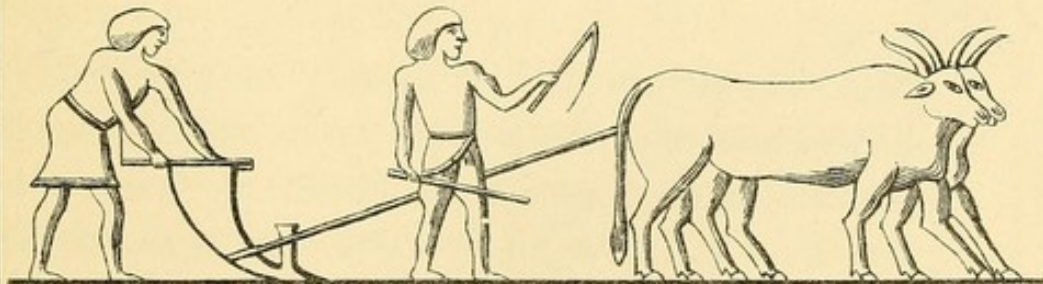
HOEING THE GROUND.



PLOUGH DRAWN BY MEN.

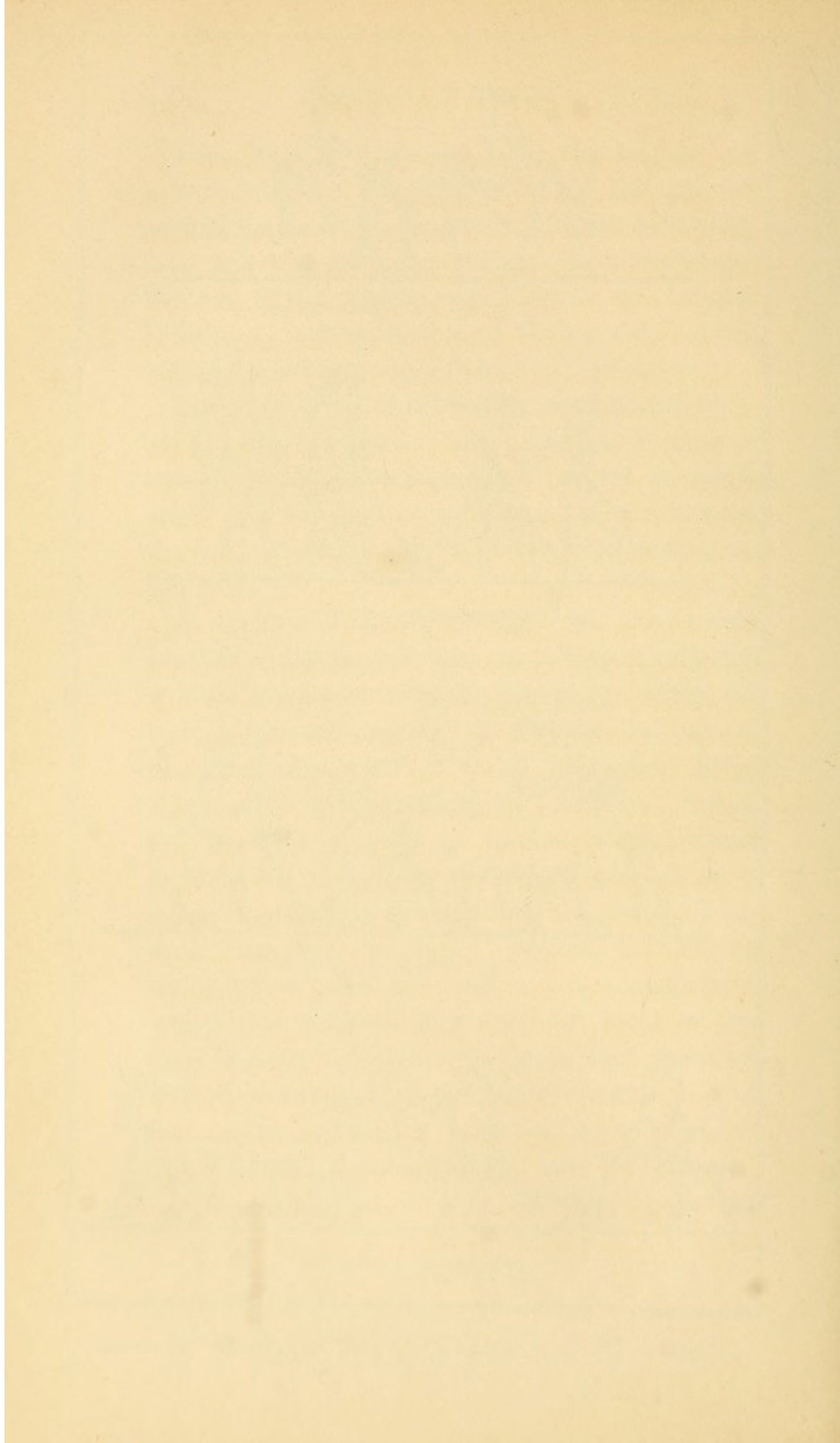


PLOUGH DRAWN BY OXEN.



TWO-HANDED PLOUGH.

From a Theban Tomb of the 18th Egyptian Dynasty.



the act of drawing was the next obvious stage in the progress of improvement, and this also we see exhibited in another of the sculptures on this grotto, where the same rude implement as before is represented, dragged along however by two oxen, whilst a man follows, whose business is to force down the point of the instrument into the soil.

The use of oxen would call for another modification in the form of the machine, for it now became necessary to direct it, as well as to keep it steadily fixed in the soil; and for this purpose the handle was first furnished with a ring, but was afterwards made double; by which latter contrivance the husbandman was enabled to act upon the plough with both his hands, and thus not only to force it more deeply into the soil, but also to direct it in a straight course.

We have thus come to a plough not very different from what is now used in the East, and indeed in some parts of Europe at the present day, consisting of a share, a team, and two horns or handles, crooked at the back, and united solidly together at the further extremity, so as to form one body with the point or beak.

The kind of plough in use among the early Greeks, so far as we can collect from the description given by Hesiod, and from certain drawings which have come down to us, was not materially different from that of the ancient Egyptians.

It appears to have consisted of three parts—the ploughshare, *ἔλνμα* of Hesiod; the draught-pole to which the horses were attached, the *ἰστοβοεὺς* of the same author; and the ploughtail which the ploughman holds in his hand, the *ἐχέτλα*.

Hesiod also distinguishes by a separate name the lower part of the plough, calling it by the name of *γύη*.

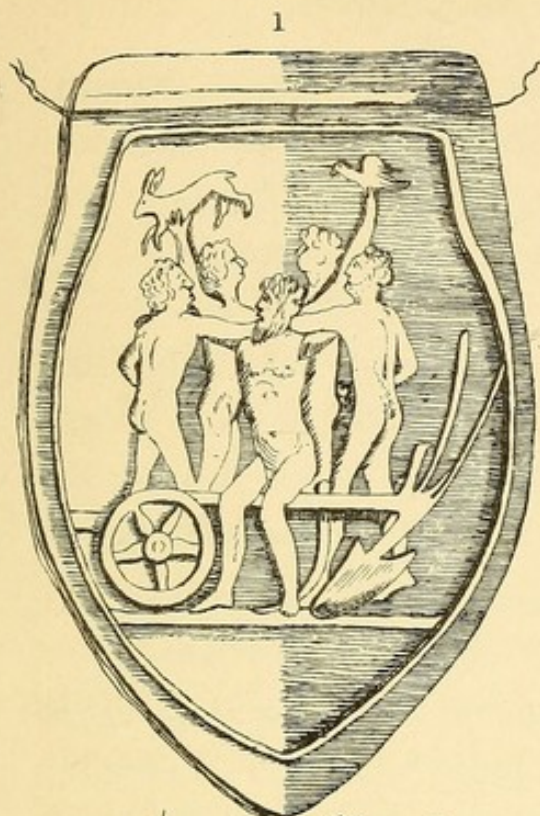
It may be interesting perhaps to a classical audience to refer to the lines in which allusion is made to these parts of the plough, translating them consistently with that view of their meaning which I have adopted, which moreover will identify the kind of plough alluded to by Hesiod with that employed in Magna Græcia and in Sicily.

Ἦμος δὴ λήγει μένος ὀξέος ἠελίοιο
 Καύματος ἰδαλίμου, μετοπωρινὸν ὀμβρήσαντος
 Ζηνὸς ἐρισθένεος— (Opera et Dies, 414.)

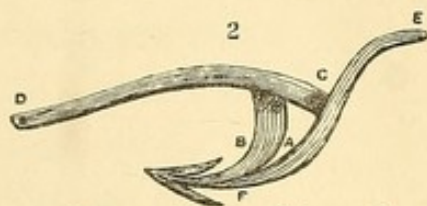
“When the force of the burning sun remits his oppressive heats, all-powerful Jove pouring down his autumnal rains”—“then” (after enumerating other labours fitted for the season he proceeds) “is the time

φέρειν δὲ γύην, ὅτ' ἂν εὕρης
 Εἰς οἶκον, κατ' ὄρος διζήμενος, ἢ κατ' ἄρουραν
 Πρίννιον· ὅς γὰρ βουσὶν ἀροῦν ὀχυρώτατός ἐστιν.
 (Ibid. 427.)

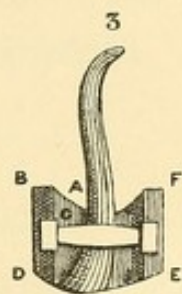
Then is the time to carry home the material for the hinder part of your ploughshare, the *γύη*, whenever you may find one fitted for the purpose, whether amongst the mountains or in the field,



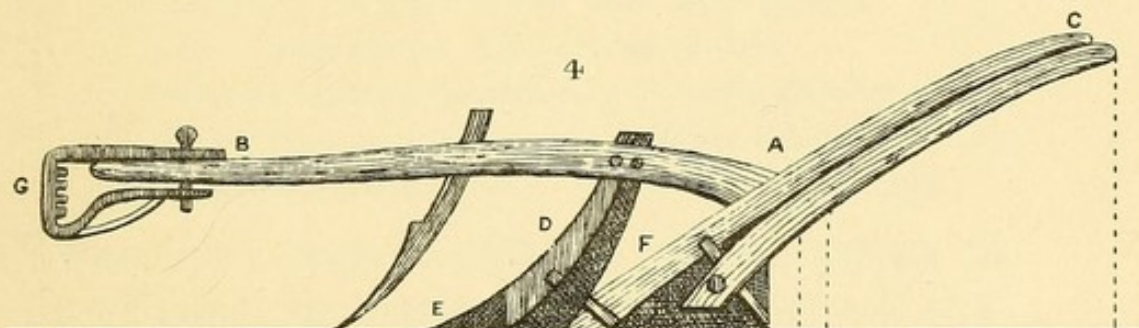
Ancient Plough.
(From Count Caylus)



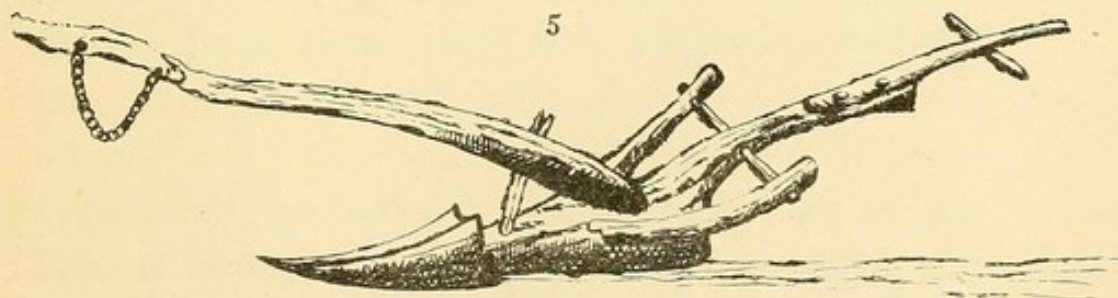
Virgilian Plough.
(From Dickson)



Mould Boards
to No. 2.



Herault Plough.



Neapolitan Plough.
(Drawn at Rocca Monfina.)

formed of the ilex, for this is the strongest wood for oxen to plough with—

Εὔτ' ἂν Ἀθηναίης δμῶος ἐν ἐλύματι πήξας,
Γόμφουσιν πελάσας προσαρήρεται ἱστοβοῆϊ—

(Ibid. 430.)

provided only that the ingenious artificer shall have fixed it skilfully to the ploughshare (ἐλύματι), and have nailed it firmly to the draught-pole (ἱστοβοῆϊ).

Δάφνης δ' ἢ πτελέης ἀκιώτατοι ἱστοβοῆες,
Δρυὸς ἔλυμα, πρίνου γύην— (Ibid. 435.)

But the strongest draught-poles are of laurel-wood or of elm, the ploughshare of oak, the hinder part of the ploughshare of ilex.

Again—

Ἀρχόμενος τὰ πρῶτ' ἀρότου, ὅταν ἄκρον ἐχέτλης
Χειρὶ λαβῶν ὄρηκα βόων ἐπὶ νῶτον ἴκηαι
Ἐνδρνον ἐλκόντων μεσάβων. ὁ δὲ τυτθὸς ὀπισθεν
Δμῶος, ἔχων μακέλην, πόνον δρυίθεσσι τιθείη,
Σπέρματα κακκρύπτων— (Ibid. 467.)

When you begin to till the ground, taking in your hand the extremity of the plough-tail (ἐχέτλης), you shall thrust the goad into the backs of the oxen, the thongs drawing along the plough; whilst the young slave who follows, holding the spade or harrow, shall baffle the birds, by concealing from them the seed scattered over the ground."

Let us now consider how far this view of the kind of plough described by Hesiod corresponds

with what we may gather to have been the form of the one mentioned by Virgil in his *Georgics* :

“ Continuo in silvis magna vi flexa domatur
 In burim, et curvi formam accipit ulmus aratri :
 Huic a stirpe pedes temo protentus in octo :
 Binæ aures, duplici aptantur dentalia dorso.
 Cæditur et tilia ante jugo levis, altaque fagus
 Stivaque, quæ currus a tergo torqueat imos.”

(I. 169.)

This passage I would translate as follows, in agreement with the sense put upon it long ago by Salmasius, and confirmed by Heynè, but from which Professor Martyn, in his notes on the *Georgics*, has chosen to depart, thus introducing great confusion, as has been pointed out by Dickson and others.—

“ In the first place, the elm is forcibly bent in the woods into the hinder portion of the pole (the *buris*, or *γύνη* of Hesiod), and receives the form of the crooked plough. To the end of this are joined, a beam (*temo*) eight feet long, two earth-boards (*aures*), and share-beams with a double back (*duplici dentalia dorso*). The light lime-tree also is cut down beforehand, and the tall beech, as a handle or plough-tail (*stiva*), which shall turn or direct the carriage from behind.”

Such seems to be the translation; unless we prefer placing the last line in a parenthesis, and regard *stiva* as one of the substances connected with the verb *aptantur*, reading, “to the end of the plough are joined the beam, the earth-boards, the share-beams, and the *stiva* or plough-tail.”

According to this interpretation, the Virgilian plough, as well as that described by Hesiod, might be identified with one still used in the south of France under the name of the Herault plough, as Seguier has suggested ^c.

In this latter implement we observe, 1st, a piece of curved wood (A) called in the country *basse*, which agrees with the *buris* of Virgil, and, as I consider it, to γύη of Hesiod: 2dly, a pole (B) eight feet in length, joined by pins to the *basse*, answering to the *temo* of Virgil, and to the ἱστοβοεὺς of Hesiod: 3dly, a bent handle (C) called *estive*, which is the *stiva* of Virgil, and the ἐχέτλα of Hesiod: 4thly, a share of wood (D), the *dentale* of Virgil, the ἔλυμα of Hesiod. It is made double by another share of iron placed above it so as to realize the double back which the *dentale* is described as possessing. And lastly, two earth-boards, or lateral appendages, *binæ aures*, which are called *expandideures*, because they spread out the earth heaved up by the operation of the share.

Professor Martyn, on the other hand, translates *buris* the plough-tail, and *stiva* the staff which di-

^c Cours d'Agriculture, article *Charrue*. Seguier, however, makes the *buris* the ἔλυμα, and the *dentale* or share to be the γύη: thus—

- A. the *basse*, *buris* of Virgil;
- B. the pole, *temo* of Virgil;
- C. the *estive*, *stiva* of Virgil;
- D. the share, *dentale* of Virgil;
- E. the earth-boards, expanded *aures* of Virgil;
- F. wedge, or tenons to bind the *basse* to the *dentale*. (See Plate annexed.)

rects the motion of the plough: in which case *buris* would be nothing more than the lower part of the *stiva*; but this, as Mr. Dickson remarks in his *Agriculture of the Ancients*, is an improbable interpretation, as Virgil distinctly mentions them as separate and independent parts of the plough.

It has also been a subject of dispute, whether the implement described by Virgil was a swing or a wheel plough.

Martyn compares it to that seen in use near Mantua, and in the Venetian territory, which is a wheel plough; no express mention however is made of wheels by Virgil, although the expression “*currus a tergo torqueat imos*” has been supposed to refer to them^a, and although we are told by Pliny (lib. xviii. c. 48) that wheels were added to the ploughs used in Cisalpine Gaul^b.

It is at least probable, that the plough described by Hesiod had no wheels, and perhaps it may be concluded, that this was the commoner form even in Italy at the time when Virgil wrote, since Pliny describes the addition of wheels to have been but recently introduced.

But of whichever description the Roman or Grecian plough is considered to be, little improvement in its construction seems to have been

^a See Heynè's excurs. on this passage.

^b Count Caylus, *Rec. d'Ant.* vol. 5. pl. 82. No. 6, has given us a drawing of an ancient gem, on which a wheeled plough is engraved, very similar to that now used at Mantua, and depicted in Martyn's *Georgics*.

effected since that remote period, till a very recent epoch; for when we examine the implements employed for ploughing in most nations of modern Europe, we still find them of a construction as rude and clumsy, as those represented in the sculptures and models, that have come down to us, or are described by the writers of antiquity^c.

I must now briefly notice the other implements employed in the various operations of farming by the Romans.

The *Urpex*, or *Irpex* according to Varro, was a kind of harrow with many teeth, dragged along the soil by oxen, in order to dislodge the roots that might remain entangled in the ground.

The word does not occur in Columella, who however directs, that a sort of wicker work, or hurdle armed with iron teeth, called *crates*, should be dragged over the ground, for the purpose of breaking up the clods of earth. So also Virgil speaks of the osier *crates* which are to be dragged along the soil:

“*Vimineasque trahit crates.*”

It is probable therefore, that the harrow or rake, which followed the plough, went by the name of *irpex* in the time of Cato and Varro, and of *crates* at a later period.

The *Rastrum* which Virgil associates with

^c See in the annexed Plate a drawing of the plough which I found in use at Rocca Monfina, between Rome and Naples.

Crates in the passage of his first *Georgic*, where he says,

“Multum adeo, rastris glebas qui frangit inertes,
Vimineasque trahit crates, juvat arva,”

seems to have been a rake used in manual labour, and not a harrow drawn by cattle. It was employed for mixing dung in dunghills—that recommended by Cato having four teeth, which were probably often of iron; but when the instrument was applied to lighter work, as in the culture of *medie*, they were of wood.

Sarculus, or *Sarculum*, was an iron tool used in the mountains for stirring up the ground, instead of a plough drawn by oxen. “*Certe sine hoc animali montanæ gentes sarculis arant*^d.”

The Biscayan peasantry at the present time employ an instrument of this kind, instead of a plough, for their hilly ground. It seems to have been a heavy description of hoe, used for cleaning out drains, for cutting furrows in the ground, and other similar operations. Thus *Columella* directs that the gardener,

“*Trita solo splendentia sarcula sumat,
Angustosque foros adverso limite ducens,
Rursus in obliquum distinguat tramite parvo.*”
(*Lib. x. 91.*)

Ligo and *Pala* seem to have been used for the same purposes; for Cato mentions only the latter, and *Palladius* only the former, as used for digging or pulverizing the soil.

^d Cato, cap. x.

Columella associates Ligo with Marra, a term still retained in Italy, where it denotes at the present time a mattock :

“ bene cum glebis vivacis cespitis herbam,
Contundat marræ, vel fracti dente lignonis.”

It would therefore seem to have been rather a kind of pickaxe, than a spade, as it is more generally interpreted.

Pala on the contrary was probably a spade, which accords well enough with the description given by Columella of this instrument, where he says,

“ Tum mihi ferrato versetur robore palæ,
Dulcis humus.”

Nor does it follow, as Dickson seems to infer, that the ligo and pala, because they were applied to similar uses, were necessarily of the same construction.

The Bidens, as its name implies, was an instrument with two prongs, used, we are told, for stirring up the soil, where vineyards were planted, and where therefore the plough could not be so well employed, (Col. lib. xii.)

Thus, Virgil advises, that in the case of a vineyard,

“ Omne quotannis
Terque quaterque solum scindendum, glebaque versis,
Æternum frangenda bidentibus :”

and in another place directs,

“ Duros jactare bidentes.”

These expressions all seem to apply to a heavy mattock with two prongs, which could be em-

ployed by manual force in breaking up and stirring the soil.

The Falx simply denoted a knife with a curved edge, and hence was applied to a variety of instruments, intended for different purposes in husbandry, which had this character in common.

Thus several kinds of Falx are specified by the writers of antiquity, as for instance, *fœnaria*, *stramentaria*, *arboracea*, *vinitoria*, *messoria*.

Columella (l. iv. c. 25) describes the several parts of that used in vine-dressing, and points out the separate uses to which each is to be applied. Of course this must have been a very different instrument, from the scythe used in mowing grass, or the pruning hook employed in reaping corn, both of which went under the common name of Falx.

LECTURE IV.

COLUMELLA.

BOOK II. CONCLUDED.

IN my present Lecture I shall rather reverse the order in which Columella has treated the subjects that come before him, as it seems desirable in the first instance, before speaking of the various operations of husbandry, to settle the true meaning of the terms, by which the Roman writers denoted the crops which they were in the habit of cultivating.

Of these the first in order and in importance was *frumentum*, usually translated 'wheat,' of which however there were two distinct kinds, *semen adorem* and *triticum*. What these distinct species of grain were has been a matter of dispute, but it appears upon the whole probable, that by *triticum* was meant 'wheat;' by *semen adorem*, 'spelt.'

Pliny says, that *semen adorem* is the same with *far*, and he states that in *far* the grain is with difficulty separated from its husk, and is therefore sown along with it.

Now this is the character which distinguishes *spelt* from *wheat*, the husk being so adherent to

the grain, as to require a particular kind of millstone to grind it. *Far* too is said to be a hardier grain than *triticum*, and to do better in cold soils, which also is the case with *spelt*.

As for *farrago*, it was a mixture of various cereals sown together for pasture; a soil capable of continued cultivation, and well manured, being selected for the purpose.

Pliny makes mention also of the following kinds of grain:

1st of *arinca*, which seems to have been synonymous with *olyra*, an Egyptian wheat as it would appear, perhaps *triticum monococcum*.

2nd, of *Oryza*, which he says is much cultivated in India, and of which the inhabitants make a ptisan, as the Italians do of barley. Its leaves are fleshy, like a leek, but broader; its height is a cubit; its flower purple.

This has been supposed to be rice, but as the above description does not correspond with the characters of this plant, others have considered it the same as the *olyra* above mentioned.

3d, of *Sesamum*, which was also introduced from India into Italy. It is well known in Egypt, and in various parts of the East. Columella ranks it amongst the pulses, Theophrastus amongst grains. It produces an oil called *syris*. Tournefort observed large quantities of it growing in the isles of the Archipelago. Columella says it requires a rich and loose (*putre*) soil.

4th, of *Secale*, a very inferior sort of grain, ac-

ording to Pliny, and very ungrateful to the taste. It was, probably, rye.

5th, of *Avena*, 'oats,' of which however Pliny gives but an obscure account, confounding it with *avena fatua*, a weed which infests most kinds of corn.

6th, of *Milium*, 'millet,' of which he praises a newly introduced kind, large in the grain, which was probably the same as the Sorghum now cultivated in Italy.

7th, of *Panicum*, the *Panicum Italicum*. The two latter Columella informs us are to be regarded as species of grain, since in many countries they constitute the food of the population.

The former of these is now called *miglio*, the second *panico*, and they differ, in the former having its flowers on spikes, the second on panicles.

Both these kinds of grain are cultivated at present extensively in Italy, where they are used, as in the time of the Romans, for the nourishment of man; whereas in this country they are only employed for feeding poultry.

A kind of bread, Columella says, may be made of panicum, which is palatable whilst warm, and millet forms with milk a description of porridge not to be despised.

With regard to the varieties of these grains, beginning with *far adonum*, Pliny tells us there are four varieties of it, one of which, a spring wheat, called *halicatum*, excels the rest.

Here however there seems some confusion, for Pliny tells us that *far* is different from *alica*, a kind of meal evidently made from the halicastrum of Columella; and yet he says, that *alica* is the same with *zea*, which latter, not being known before the time of Pompey, must have been of later introduction than *far*. Moreover *zea* seems to have been the same as the $\chi\acute{o}\nu\delta\rho\omicron\varsigma$ of the Greeks, which was a species of spelt.

I may remark by the way, that to the flour of this species of corn the Romans were in the habit of adding chalk, or some other kind of white earth, in order to communicate whiteness; just as in the present day bakers are accustomed to introduce pounded felspar or alum.

Although in modern books on botany the name *zea* is applied to maize or Indian corn, it certainly could have no relation to that now well known article of food. For there can be no sort of doubt that maize is indigenous in America, and was not known in Europe till after the discovery of the New World. It is thought indeed that it is a native of Paraguay, where a variety is found differing in some respects from the cultivated kind, but not so essentially as to be regarded as a distinct species. Sir Wm. Hooker however relates a curious circumstance, namely, that some grains called mummy wheat were sent him from Egypt, which proved to be maize, and maize of that variety which comes from Paraguay. It was reported to have been taken from the inside of a mummy, on

as good authority perhaps as most of the specimens of that kind which have been brought over^a, a fact that ought to render us cautious in believing the reports of the Arabs in similar cases; for it seems next to certain, that some fraud must here have been practised, as a valuable plant like maize, if ever known in Egypt, could not fail to have become general in a country so well suited for its cultivation.

Nevertheless, it is certainly curious, that it should have been, not the commonly cultivated variety, but the one indigenous in Paraguay, which was passed off amongst the contents of an Egyptian tomb.

Of *triticum*, Columella enumerates several kinds; namely, *robus*, *siligo*, and *trimestre*; the latter of which was a kind of spring-wheat: but it is difficult to identify the others with the varieties now cultivated. That called *robus* was the best in point of weight and brightness.

Bradley considers *robus* to be the bearded red wheat of Parkinson's Herbal, *triticum aristis munitum*; and *siligo*, *triticum spicá muticá* of the same author. But Gaza supposes it to be the same as *ᾠλυρα* of the Greeks, or *olyra* of Pliny, which has been already alluded to.

In thus enumerating the kinds of grain known to the Romans, it may appear remarkable that no mention should have been hitherto made of

^a Mons. Rifault, a French traveller, reports that he obtained these grains of maize himself from an Egyptian catacomb.

barley: but the fact is, that Columella classifies this amongst pulses, for no better reason than because it served as a ptisan, barley-water being made from it.

Of this grain he enumerates two sorts, *galaticum*, and *cantherinum* or *hexastichum*. The latter is the commoner sort; and a variety of it, on account of its supposed productiveness, is called by the French *orge celeste*: but the only sort with six rows cultivated in Great Britain is that called *bere* or *bigg*, chiefly confined to Scotland, and only valued on account of its hardness.

With us the variety most in esteem is the two-rowed, *hordeum distichum*, of which kind was the *galaticum*. This mixed with wheat, Columella says, makes excellent bread; and indeed all the inferior animals thrive upon barley better than they do upon wheat, and even to man it is more nutritious than the inferior kinds of the latter.

Although Columella takes no notice of the use of barley in making beer, he mentions in one place^b *zythum*, a beverage known to be obtained from this species of grain. For *zythum* is alluded to both by Theophrastus^c and by Dioscorides, as prepared from barley, and, as we learn from Pliny, was the name by which it was known in Egypt; whilst similar liquors were called in Spain *cælia* and *ceria*, and in Gaul *cervisia*, &c.^d (Lib. xxii.)

^b Lib. x. 116. ^c In Theophrastus *Zῆθος*, from ζέω, ferveo.

^d Dioscorides mentions a sort of drink called *κοῦρμι*, made of barley. This word bears a close analogy to *cwrw*, the Welsh term for ale.

Pliny in another passage appears to regard these liquors as somewhat distinct in quality, though all inebriating, and states that in Spain they keep good for a considerable time. (Lib. xiv.)

It is a pity he does not inform us in what way this was effected, as hops do not appear to have been employed in brewing by the Ancients ^a.

The same author even alludes to the use of barm as a ferment for bread, which, he says, is rendered lighter in consequence of this addition: "Galliæ et Hispaniæ frumento in potum resoluto, quibus diximus generibus, spumâ ita concretâ pro fermento utuntur. Quâ de causâ levior illis, quam cæteris^b, panis est."

The Polenta of the ancients, mentioned by Cato and Columella, was also a preparation of barley^c, concerning which directions are given in Pliny. It seems to have formed a kind of water-gruel or porridge ^d.

The Bean mentioned by Columella was probably (Bradley says) the *faba sylvestris Græcorum*

^a According to Beckmann, we have no certain knowledge of hops being introduced into beer before the Carolingian Dynasty, but Columella, in the passage above alluded to, states, that the Egyptians infused the bitter seeds of the Lupine into their beer to moderate its sweetness. Lib. x. 116.

Jam Siser, Assyrioque venit quæ semine radix,
Sectaue præbetur madido sociata lupino :
Ut Pelusiaci proritet pocula Zythi.

^b Lib. xviii.

^c See Pliny, and also Galen.

^d Being a very strengthening food, the Gladiators were fed upon it, and therefore were called *hordearii*. (Pliny.)

of Parkinson, or *κύαμος ἄγριος* of the Greeks. The seed they compared to that of the lotus and terebinthus, which does not accord with our common garden bean, but agrees with the *faba sylvestris Græcorum*.

Modern botanists however (Dec. Prod.) recognise only one species of *faba*, the *vicia faba* of Linnæus, of which all our cultivated sorts are varieties; and the only question therefore is, whether the *faba* of Virgil and Columella corresponds with this plant, or not.

Martin and most other writers seem indeed to take this for granted; but Heynè says, that *faba* was different from our bean, having a round and smaller pod. Dickson however concludes, that, upon the whole, the description given by Theophrastus answers better to our small bean than to any other plant cultivated in our fields and gardens^e; and the present Italian name of bean, *fava*, is favourable to this supposition.

The following are amongst the directions given by Columella respecting this vegetable:

Beans require a well-manured and very rich soil. Some think that they enrich the soil like dung; but in his opinion they only do not consume the strength of the soil so much as other seeds; for it is certain, that the land is better prepared for wheat, after laying fallow, than after a bean-crop. The old husbandmen used to macerate the seed in *nitrum* (alkaline ley) and *amurca*

^e See Schneider's note to Columella, Lib. ii. cap. 10.

(the lees of oil), before sowing, as Virgil recommends :

“Grandior ut fœtus siliquis fallacibus esset ;
Et, quamvis igni exiguo properata maderent.”

(GEORG. i. 195.)

Medica (*medicago lupulina* or *sativa*), commonly called *lucerne*, acts as a manure to the land, fattens lean stock, agrees with those that are sick, and admits of being mowed four or five times a year.

Columella recommends our raking the seeds in, as soon as they are sown ; he praises it as the most excellent of the legumes or pulses, because one sowing lasts ten years, enriches the land that produces it, and affords in one jugerum nourishment for three horses.

Thus Lucerne would seem to be better adapted for the climate of Italy than for that of England, its culture here being confined chiefly to Kent and the Channel Islands.

Lupines, Columella says, are serviceable both as food, and as improving the land when ploughed in as a manure. This practice is still pursued in Italy, but in England lupines are chiefly known to us as ornamental flowers. They love a light red soil. The bitterness of the seeds is the chief objection to this vegetable as an article of food. Virgil calls it *tristis*, an epithet which cannot apply to the appearance of the plant, which is bright and cheerful, but has reference to the taste of the seeds.

Vetches (*vicia*) are to be sown twice, viz. in autumn and in January. They were the *vicia sativa* or Tares of English husbandry. All animals are fond of them, and thrive upon them in an eminent degree. Hogs in particular fatten upon this food very rapidly.

Fœnum Græcum (*Trigonella fœnum Græcum*) which Pliny calls *silicia*, and the rustics *siliqua*, is sown twice a year, in September and in February; the first for fodder, the second to be harvested. We have no experience of it in this country, as it is too tender a plant for cultivation; although there is a small demand for it medicinally, it being used at present in veterinary medicine, and formerly as a remedy for piles in man.

Two other kinds of pulses are alluded to in Columella, namely, *ervum* and *cicera*. *Ervum* was a kind of lentil, and is supposed to be that species which is called by botanists *E. ervillia*, or bastard lentil; but its properties were very much the same as those of our common lentil, *ervum lens*, nor would the ancients have distinguished between the two.

Lentils are much used in the southern parts of Europe, and formerly were so in England, but they have been superseded by the pea and bean. By some of the old botanists they are supposed to be the same as *ὄροβος* of the Greeks; but the botanical name *orobus* is now appropriated to a different plant.

The *Ervum* of Columella was sown in autumn and February. He states, that it thrives in a meagre and dry soil, and that the term ὄροβος was said to be given to it because it fattened oxen.

For this vegetable *cicer* was often substituted, of which plant, Pliny says, there are two kinds, *columbinum* and *arietinum*. *Cicer columbinum* is supposed to be the plant called by botanists *lathyrus sativus*, or Chichling vetch^e, cultivated in the south of Europe, and in our gardens. *Cicer arietinum*, or chick-pea, also abounds in the south of Europe, but is too tender for field cultivation with us, and also, when sown in cold countries, is apt to degenerate. Columella says that *cicer* is given to oxen bruised instead of *ervum*, and that it is not unpalatable even to man.

Hemp, *cannabis*, requires a fat and well-manured soil, well watered and deeply dug. It is sown about the end of February or the beginning of March, or even, if the weather be rainy, as late as the vernal equinox. Its use was for cordage; for no mention appears to have been made of those intoxicating properties which belong to the same plant when cultivated in India, and which are celebrated under the name of *hachish* in Algeria, and *bang* in the Indies.

Flax, *linum*, as being particularly noxious to the land, is not to be sown unless when the

^e Bot. Mag. pl. 115.

largeness of the produce, or the high price which it will fetch, holds out a strong inducement. In which case the richest soil is to be selected.

This is confirmed by the testimony of Virgil, who says that flax burns up the soil,

“ Urit enim lini campum seges,”

(GEORG. i. 77.)

and is in accordance with the experience of modern farmers, who pronounce it to be an exhauster of the soil, especially when the seeds are allowed to arrive at maturity. When pulled up green indeed, it is less injurious; but still, at whatever period it may be reaped, it acts in a certain degree as an impoverisher of the soil, inasmuch as its stems yield no return in manure, and its seeds only do so when consumed upon the farm.

As there is some difficulty in ascertaining what is meant by the two next grains I have to mention, I mean *rapa* and *napus*, I will first observe what is stated by ancient writers on the subject of either.

Rapa and *napus*, Pliny says, are good for cattle, and in Gaul they constitute their winter food. Both like a *putre* and *solutum solum*, but *rapa* thrives best in moist places, *napus* in dry and sandy ones, and one is converted into the other when the soil is changed. *Rapa* is cultivated for the sake of cattle, *napus* of man.

Pliny goes on to say that there are three kinds

of rapa; one kind is flat and broad; a second round; a third, the wild kind, with a long root like a radish, a pointed and rough leaf, and an acrid juice.

But the most perplexing circumstance is what Columella states, as to rapa, when sown in a different soil for ten years being changed into napus; and that of napus, when sown in a different soil, being converted into rapa.

It would seem from this, either that the Romans did not distinguish between turnips, and cole or rape, or else that the terms *napus* and *rapa* both apply to turnips of different varieties. Botanists, on the contrary, have been in the habit of designating turnips by the specific name of *brassica rapa*, and rape by that of *b. napus*, regarding these plants as distinct species, and not as varieties of the same.

Having now settled, so far as we are able, the kind of vegetables that were sown upon a Roman farm, we are in a position to understand the directions which Columella and others have given, with respect to the various operations of husbandry, by means of which a crop of each was obtained.

And first with respect to ploughing.

The directions which Columella gives on this subject are judicious and practical. He condemns the custom, common, as it should seem, in his age, as it is now in various parts of

the continent, of yoking together the oxen by their horns, instead of harnessing them to the plough, and remarks justly, that the animals are tortured, as well as rendered inefficient, by this absurd method.

“Plus enim queunt pecudes collo et pectore conari, quam cornibus, atque hoc modo tota mole corporis, totoque pondere nituntur; at illo, retractis et resupinis capitibus excruciantur, ægreque terræ summam partem levi admodum vomere sauciant.”

Rich land should be ploughed, if wet, early in the season, before the herbaceous plants have ripened their seeds, and the ploughing ought to be repeated till it can scarcely be perceived where the share has passed. Poor land on the contrary, if wet, is first ploughed at the end of August, or the beginning of September, a practice no doubt more suitable to the hot climate of Italy than to our own, since the exposure of light land to the full influence of the sun may there have been prejudicial.

Virgil gives similar advice, recommending if the soil is rich, to plough it early in the year; if poor, only slightly to turn it up about the rising of Arcturus, (i. e.) about the autumnal equinox.

“Ergo age, terræ

Pingue solum primis extemplo a mensibus anni

Fortes invertant tauri, glebasque jacentes

Pulverulenta coquat maturis solibus æstas;

At si non fuerit tellus fecunda, sub ipsum

Arcturum tenui sat erit suspendere sulco.” (GEORG. i. 63.)

Dickson has pointed out, that from the peculiar construction of the ordinary Roman plough^f, which he conceives to have had neither coulter nor mould board, furrows would only be made in the land when the share was held obliquely; and that when held straight, it only divided without turning over the soil.

He is borne out in this surmise by a passage of Varro, in which it is said, that on the third ploughing after the seed has been thrown in, *boards being added to the share*, they cover over the seed in the ridges, and make furrows for carrying off the rain. Then it is that the oxen are said *lirare*.

“Tertio cum arant jacto semine, boves *lirare* dicuntur; id est, cum tabellis additis ad vomerem simul, et satum frumentum operiunt in porcis, et sulcant fossas, quo pluvialis aqua delabatur.”

Now as the main object in the previous ploughings was to stir and pulverise the soil, by turning again and again upon the same tract, few traces of the course taken by the plough would be perceived, when the operation was skilfully executed.

Hence the overseer is directed to probe the land with a stake, in order to ascertain better

^f The Virgilian plough is described as having a mould board; but this Dickson supposes to have been only used for covering the seed when sown, whereas the common plough, employed to prepare the soil for the seed, was destitute of it.

than he can by the eye, whether it has been thoroughly broken up by the plough.

Great importance was accordingly attached by the Romans to straight ploughing. The term "prevaricare," as Pliny informs us, was first applied to a peasant who ploughed crooked, and afterwards transferred to a witness in the law-courts who deviated from the truth; and as the ridge thrown up by the plough was called *lira*, the verb *delirare* originally signified, to make an irregular ridge, and was afterwards applied to those whose mental faculties were in an abnormal condition.

In order to pulverize the soil completely, and to break down the *scamna* or lumps, that were apt to occur in the intervals between the courses taken by the plough, Columella recommends, that the implement should be afterwards made to cross the field in a direction at right angles to its former course.

Virgil also makes the same remark :

Et qui, proscisso quæ suscitât æquore terga,
Rursus in obliquum verso perrumpit aratro.

(GEORG. i. 97.)

Three, if not four, ploughings were commonly given to land by the Roman farmers in the time of Columella, and Virgil recommends that corn land should have two ploughings given it in cold, and two more in warm weather.

Illa seges demum votis respondet avari
Agricolæ, bis quæ solem, bis frigora sensit.

(GEORG. i. 47.)

In accordance with which practice, of the twelve inferior gods who presided over agriculture, four were especially invoked during the acts of ploughing; namely Vervactor at the first, when the land was made *vervactum*, or the fallow was first turned up; Reparator during the second, when the ground was cut by the plough in a transverse direction; Imporcator at the third, when the land was made into *porcæ* or ridges; and Oborator at the fourth, when the seed was sown. Accordingly Columella tells us, that on wet land the first ploughing was given in April, the second in June, and the third at the end of August, or the beginning of September; whereas on rich land, on a declivity, the first ploughing was given in March, or even, if the season was warm and dry, in February; the second from the middle of April to the summer solstice; and the third about September.

Thus Virgil :

“ Vere novo, gelidus canis quum montibus humor
 Liquitur, et zephyro putris se gleba resolvit;
 Depresso incipiat jam tum mihi taurus aratro
 Ingemere, et sulco attritus splendescere vomer.”

(GEORG. i. 45.)

In both cases these ploughings were preparatory to the throwing up of the ridges in which the seed was deposited; for the same author adds :

“ Sed jugerum talis agri quatuor operis expeditur; nam commode proscinditur duabus, una iteratur, tertiatur dodrante, in liram satum redigitur, quadrante operæ;” that is to say, the jüge-

rum is finished by four days' work; for it is stirred up the first time in two days, the second time in one; it is then gone over a third time by a ploughing nine inches deep, and is brought into the form of furrows by a fourth and last operation.

In applying manure to the land, Columella lays stress upon ploughing it in, and covering it over immediately with earth, so that it may not lose its strength with the influence of the sun, and may impart all its virtue to the soil.

Hence, when heaps of dung are brought to the land, a larger quantity ought not to be scattered over it, than what the labourers can cover the same day.

It is satisfactory to have the sanction of a practical writer like Columella, to the correctness of a rule, which scientific principles of farming would lead us to inculcate. If the ammoniacal contents of manure are of any value, (and that they are, I cannot bring myself to doubt), it is obvious, that the common practice of allowing the dung to remain in little heaps on the surface, long before it is ploughed in, must be wasteful, by allowing the escape of the volatile matters which would otherwise go to enrich the soil.

I have mentioned in a former Lecture that the Romans seem to have had some glimpses of the doctrine of the rotation of crops; but it does not appear, that any system of culture founded

upon this knowledge was in general use amongst them.

Varro indeed states, that in the country about Olynthus the land was cultivated without intermission, but still in such a manner, that it bore a richer crop on the third year than on the two preceding.

This however is mentioned as an exceptional case, and whilst Varro states that the ground ought either to lie fallow, or at least to bear a crop which takes less out of it every other year, Pliny goes farther, remarking, that the former is the most useful plan, if the extent of the farm allows of it.

Virgil also directs the same thing :

“ Alternis idem tonsas cessare novales,
Et segnem patiere situ durescere campum.”

(GEORG. i. 71.)

And the existence of this practice seems to be taken for granted in many passages of Columella, as Dickson has well shewn.

It appears then, that except in districts remarkable for their fertility, such as Campania, the land was allowed to lie fallow every other year, and that when cultivated without fallow it was called *restibilis*, whereas when newly brought under culture it went by the name of *novalis*; and consequently the latter epithet was applied to it when it had lain fallow the year before.

Hence the bitterness of the complaint of the Mantuan peasant, that the very fields which had

been allowed to produce nothing during the preceding year, in order that they might bear him a better crop in this, should be wrested from him by a foreign soldiery :

“ Impius hæc tam culta novalia miles habebit ?
Barbarus has segetes ?” (ECLOG. i. 71.)

It is interesting to remark, that in the recent experiments of the Rev. Mr. Smith at Lois Weedon, this alternate system of fallow and culture has been adopted with such success, that a series of luxuriant crops of wheat have been produced without the addition of manure, from the portion of land which had been allowed to rest the preceding year^b.

The ground being thus prepared, by a series of ploughings following upon the fallow of the pre-

^b Mr. Smith's system is as follows :—He begins by dividing his corn field into sections of 5 feet in width. In the centre of each section he drops or drills the seed in triple rows 3 feet apart, so that between each triple row there is an interval of 3 feet left fallow when the plant is up. He trenches the spaces between the cultivated portion with the fork, taking up the soil to within 3 inches of the wheat crop. These spaces are kept clean at spring and during summer with the blades of the sharp-cutting bean hoe, and are kept open with the tines of the scuffler. Thus each year $2\frac{1}{2}$ feet of each section of the field are trenched and prepared for the succeeding crop ; whilst the other $2\frac{1}{2}$ feet are left for the crop at the time growing ; so that one half of the land is yielding wheat, and the other half left fallow in preparation for the succeeding year.

See Mr. Smith's pamphlet, entitled, *A Word in Season ; or, How to Grow Wheat with Profit* : and a Lecture of mine published in the *Gardener's Chronicle* in 1854, in which his method is explained.

ceding year, the next operation to which it was subjected was the sowing of the seed of the crop which it was designed to obtain.

Wheat and spelt are not to be sown, according to Virgil's instructions, before the ninth calend of November.

“ At si triticeam in messem robustaque farra
Exercebis humum, solisque instabis aristis :
Ante tibi Eoæ Atlantides abscondantur,
Gnosiaque ardentis decedat stella Coronæ,
Debita quam sulcis committas semina, quamque
Invitæ properes anni spem credere terræ.”

(GEORG. i. 219.)

Now the Pleiades set about the autumnal equinox, and the crown of Ariadne emerges about the 13th or 14th of October.

This period however, Columella says, is rather late for wet and cold soils.

A different mode of sowing appears to have prevailed according to the nature of the land. On wet soils the seed was deposited in ridges, the ground being turned up after the seed had been scattered. On dry ground, on the contrary, the ground was first ridged, and the seed then introduced into the furrows intervening.

In Columella we meet with calculations as to the quantity of seed which it is advisable to sow, a point of some interest to a modern reader, because it has been contended, that a less quantity of grain is required in a warm country than in a cold one.

Thus the following facts and calculations are

given by a writer in the *Annals of Agriculture*^c relative to this subject :—

	QUANTITY.	
In Egypt 1 modius of corn per aroure	5,593	} to the French hectare.
In Palestine, a saton of corn per bethsech	5,593	
In Greece, a medimnum per jou- geron	6,504	
In Sicily, a medimnum per jougeron	7,079	
In Murcia, a fanega per fanega of land	7,000	
In Italy, five modius per jugerum...	7,193	
In Castille, a fanega per fanega of land	7,763	
In Navarre, one and a half conque per acre	8,000	
In the Isle of France, $8\frac{1}{2}$ bushels per acre ..	8,500	
In England, $2\frac{1}{2}$ bushels per acre	8,878	
In Denmark, 2 tons per <i>toude- hart-korn</i>	10,140	

I give this statement as I find it, without having verified the data upon which it proceeds, but from my own calculations I arrive at rather a different result.

Thus, Columella states, the proper quantity of wheat to be sown to an acre (*jugerum*) is from 4 to 5 modii; the modius rather exceeding an English

^c Vol. xvi. for 1791, p. 340, I have substituted hectare for acre or arpent in the text, as the latter evidently did not accord with the calculations of the author, in the only instance in which I have examined them, viz. with reference to the proportion between the quantity sown in England and in France.

peck. As however the Roman acre contained only 28,800 square feet, whilst ours contains 43,560, the proportion is pretty nearly preserved.

For as

$$288 : 5 :: 435 : 7.7$$

which comes very near to 8 pecks, or 2 bushels.

Now the quantity usually sown to the acre in England varies from 2 to 3 bushels.

Columella seems to be rather in favour of thin sowing on rich and loose soil. When sown thin, he says, the crop tillers, and thus becomes more productive:—"At ubi ex imo semine plurimis culmis fruticavit, etiam ex rara segete densam facit."

Spring sowing succeeds in cold and snowy spots, when the summer is moist and without fogs, but in other cases the autumn is the best time. There is no distinct species of spring wheat.

Where the crop becomes injured by any salt emanations proceeding from the ground, pigeon's dung or the leaves of the cypress, may be applied as a remedy.

But, after all, the ancient practice of draining off the water by cutting furrows is the only effectual cure.

A selection should be made for sowing of the finest and most healthy seeds; for although it does not always follow that plump seed will produce plump grain, yet the latter cannot be ob-

tained from such seed as is poor and shrivelled ; as Virgil indeed has remarked in Georg. i. 197.

It may be mentioned, with reference to the experiments now carrying on to ascertain the vitality of seeds, that according to Varro, as quoted by Pliny, wheat preserves its vitality for 50 years, millet for 100, and beans for 120.

This greatly exceeds the duration which I have found to belong to the seeds which have come under the experiments instituted under my direction^a, but at any rate they agree so far, that the seeds of leguminous plants appear to possess greater longevity than the rest.

After the seeds have been scattered over the ground, the next concern of the farmer was to harrow them in, an operation which went by the name of *occatio*.

“*Sementi facta*” says Columella, “*inoccari oportet quod sparseris.*”

This was done either by the *rastrum* or by the crates, which have been above described.

Then followed the sarelng with the *sarculum*, called by the Roman writers *sarritio* ; an operation, which in dry and sunny places, he says, should

^a See Report of these trials in the Transactions of the British Association for the Advancement of Science. In the volume for 1850 a summary of the results obtained from 1840 to 1850 inclusive is given, from which it appears, that the only seeds which had preserved their vitality after 40 years, belonged to the Leguminosæ, viz. a species of *Colutea*, and of *Coronilla*.

be done as soon as possible before the winter comes on, and again repeated after it is over; but in cold and marshy places should be postponed until the winter is past. This operation however was not performed once only, but again and again; in the case of beans, three times.

Mr. Dickson enters at large into the question what this operation was, and concludes, that it was of the nature of hand-hoeing, and not the same as harrowing, as Mr. Tull had asserted. Its object seems to have been twofold, to admit air to the roots of plants, and to destroy weeds.

When weeding was performed by the hand, and not by the hoe, the operation was called *runcatio*. It was to be done, Columella says, either before or after, but not at the time at which the plant is in flower.

These then being the principal operations which the husbandman will have to execute in the ordinary course of field culture, Columella next enters into a calculation of the number of days' labour, which will be required in the case of a few of the principal crops.

For 4 or 5 modii (pecks) of wheat

Sowing and ploughing	4	days
Harrowing	1	
Hoeing 1st time	2	
—— 2nd time	1	
Weeding	1	
Reaping	1½	

Total 10½ days

Of barley the same quantity will take in all only $6\frac{1}{2}$ days' labour.

Columella infers from his calculations, that a corn field of 200 acres, with the pulse that ought to go with it, may be worked with two yokes of oxen, as many ploughmen, and six labourers.

For 25 acres of wheat require	115 days' labour
———— pulse.....	60
Rainy days and holydays	45
Days of rest after sowing	30
	30) 250
	8 months 10 days
Remain	3 ——— 25 ———

for sowing spring wheat, and carrying, dung, hay, food, and implements. Hence $(25 \times 8) = 200$ acres will require the labour of 8 men.

Some authors recommend employing lupines, beans, vetches and other legumes for manuring the land, a practice which Columella approved, as relating to lupine and even vetches, provided, after it has been mowed down in a green state, the land is immediately ploughed, so that what the sickle has spared, the share should turn up, otherwise the roots left in the ground tend to exhaust it.

Flax on the contrary and cicera impoverish the land, as Virgil remarks,

“ Urit enim lini campum seges, urit avenæ :
Urunt lethæo perfusa papavera somno.”

(GEORG. i. 77.)

Nevertheless, in all these cases the application of stable dung restores fertility to the land.

Hence it is of great importance to consider the different kinds of dung, of which we may enumerate three—that of birds, of man and of cattle.

Of the first, pigeon's dung is the richest, then that of fowls, except it be of web-footed ones, which is noxious. Next in value to pigeon's dung is that of man, especially if mixed with the other kinds of town filth. Human urine, if kept six months, is excellent for vines and apple trees, improving the flavour of the fruit.

Of the dung of cattle, that of the ass is said to be the best, then of sheep, then of goats, then of horses, and oxen, whilst pig's dung stands lowest in the scale.

Where stable dung cannot be obtained, the farmer should collect leaves, scrapings of the sheep pen, ashes, the contents of privies, &c. to supply its place, and these are to remain, until the seeds of plants which they contain have rotted away.

The dung should not be more than a year old, as its virtue is afterwards impaired. Accordingly, if a field is to be sowed with wheat in autumn, it should be dunged in September; if in the spring, in the winter previous. 18 loads of dung suffice for an acre of level ground, 24 for an upland one. The heaps ought not to be spread over the land before the ploughing begins; and if any thing has prevented your doing it at that time, you should scatter afterwards the pulverized dung from the aviaries over the land, as you do the seed.

If dung be wanting, it is useful to spread chalk over sandy places, and sand over chalky ones. Or if this cannot be done, lupines should be sown and ploughed in.

This account does not, it must be confessed, shew much discrimination as to the particular uses of these several substances, for it cannot be admitted, that lupines, as a fallow, will do to take the place of stable dung, nor even that chalk or *marl*, as such, can be substituted.

Nevertheless it is not improbable, from the recent discoveries made with respect to the presence of large quantities of phosphate of lime in the green-sand, and in other of the rocks, and from beds containing an abundant supply of this ingredient being called *marls*, as we are told is the case in Hampshire, that the virtue the ancients attributed to marl in agriculture may in some cases have been owing to the phosphate present in them, in which case they would really be a fair and proper substitute for stable manure.

Pliny speaks of various sorts of marl—*alba*, *rufa*, *columbina*, *argillacea*, *tofacea*, *arenaria*; and makes mention of veins of marl running through the rocks, like veins in mines—“*ut in metallis.*”

He states, that in Britain it has been used as a good dressing to land for eighty years; and that one sort of marl is raised in lumps like stones, and is reduced to shivers by the rain and frost.

But that which brings his description more close to that of the Farnham phosphorite, is where

he describes a kind, which he says "est quidam terræ adeps, ac velut glandia in corporibus, ibi densante se pinguedinis nucleo."

This precisely corresponds to the little lumps of marl found in the green sand at Farnham, impregnated with phosphorite.

In all cases, however, the farmer, whatever crops he cultivates, must possess a supply of hay; and hence meadow or pasture land is of the greatest importance. Cato indeed, as we have seen, assigned the first place to it; and undoubtedly it is less affected by the seasons, and requires a smaller outlay, than any other description of land.

It is of two kinds, dry and irrigated.

If the soil be in itself rich, it does not require irrigation, and produces a better description of herbage than that which has undergone this treatment. If irrigated, it must be on a slope, so that there may be a continuous flow of water from it, or it will degenerate into marsh.

In the culture of meadows care should be taken that no roots or stumps of trees remain in the ground, nor thorns, or large weeds.

Swine must not be allowed to feed on them, because they dig with their snouts, and tear up the turf; nor the larger kinds of cattle, unless when the ground is dry.

Stones should be carried off the ground, and moss got rid of, either by removing or by ploughing

them up: in which latter case, we sow the land, first with turnips, the year following with wheat, next grub and plough up all the brambles and weeds, and then plant vetches. This done, we beat and pulverize the soil well, and finally, if there be a supply of water, irrigate it.

The practice of irrigation, which in this humid climate is confined to comparatively few situations, is in warm countries, like Spain and Italy, almost essential to successful cultivation.

Its neglect in the former country, since the expulsion of the Moors, has greatly diminished the productiveness of the soil; whilst its good effects are still striking in Valentia, where it continues to be practised. The *facultas aquæ*, of which Columella speaks, is with them prized as of the most inestimable advantage.

Nor is it less important in Lombardy and other parts of the Italian peninsula, as may be seen by reference to the work of Sismondi on Tuscan Agriculture, and others.

Virgil too has given us, in a few masterly strokes, a very animated picture of the process of irrigation in his time:

“ Deinde satis fluvium inducit, rivosque sequentes?
 Et, cum exustus ager morientibus æstuat herbis,
 Ecce supercilio clivosi tramitis undam
 Elicit? illa cadens raucum per levia murmur
 Saxa ciet, scatebrisque arentia temperat arva.”

(GEORG. i. 106.)

Pliny informs us, that the best kind of herbage

was trefoil; the next, common grass; the worst, on account of the injurious nature of its seed-vessels, *mimulus*. What this plant might have been has much puzzled Commentators. Some regard it as *Lysimachia nummularia*, reading *nummulus* for *mimulus*; but it is more probable, I think, that the text is correct, and that the plant intended, was either *rhinanthus crista galli*, or *pedicularis sylvatica*, the first of which is distasteful, and the latter injurious, to cattle. *Equiseta*, or horse-tails, are also much disliked by the mower.

There was a kind of fodder cultivated in Cato's time, but not mentioned by subsequent writers, called *ocinum*; which appears to have been a mixture of several kinds of plants proper for the food of cattle, as *farrago* was a mixture of various kinds of grain. It must be carefully distinguished from *ocymum*, the herb *basil*, which is noticed by Columella.

Grass ought to be mown before it gets dry, as it yields a more abundant as well as a sweeter food. Before it is housed, it should be put up into covered ricks (*metæ*).

With respect to corn, it should be reaped as soon as it is ripe, to preserve it from birds, wind, and rain. If cut early, the grain swells after it has been housed.

In Homer's description of the shield of Achilles, we have a pleasing picture of the mode of reaping practised at that early period:

Ἐν δ' ἐτίθει τέμενος βαθυλήϊον· ἔνθα δ' ἔριθοι
 Ἦμων, ὀξείας δρεπάνας ἐν χερσὶν ἔχοντες.
 Δράγματα δ' ἄλλα μετ' ὄγμον ἐπήτριμα πίπτον ἔραζε,
 Ἄλλα δ' ἀμαλλοδετήρες ἐν ἑλλεδανοῖσι δέοντο.
 Τρεῖς δ' ἄρ' ἀμαλλοδετήρες ἐφέστασαν· αὐτὰρ ὅπισθε
 Παῖδες δραγμαεύοντες, ἐν ἀγκαλίδεσσι φέροντες,
 Ἄσπερχές παρέχον· βασιλεὺς δ' ἐν τοῖσι σιωπῇ
 Σκήπτρον ἔχων ἐστήκει ἐπ' ὄγμου γηθόσυνος κῆρ.
 Κήρυκες δ' ἀπάνευθεν ὑπὸ δρυὶ δαῖτα πένοντο,
 Βοῦν δ' ἱερεύσαντες μέγαν ἄμφεπον· αἱ δὲ γυναῖκες
 Δεῖπνον ἐρίθοισιν λεύκ' ἄλφιστα πολλὰ πάλυνον.

(Iliad. σ'. 550.)

Another field rose high with waving grain :
 With bended sickles stand the reaper-train :
 Here stretch'd in ranks the levell'd swarths are found,
 Sheaves heap'd on sheaves, here thicken up the ground.
 With sweeping stroke the mowers strow the lands ;
 The gath'ers follow, and collect in bands ;
 And last the children, in whose arms are borne
 (Too short to gripe them) the brown sheaves of corn.
 The rustic monarch of the field descries
 With silent glee, the heaps around him rise.
 A ready banquet on the turf is laid,
 Beneath an ample oak's expanded shade.
 The victim ox the sturdy youth prepare ;
 The reaper's due repast, the women's care.

Varro, Columella, and Pliny, all three describe the same process, but Pliny's account is the most curious. One method, he says, was by means of reaping-hooks, by which the stalks were cut off in the middle with sickles, and the ears detached by a pair of shears—"inter duas mergites." In other cases, the corn is torn up by the roots ; a practice condemned by our author, as it deprives the land of the juices contained in the stubble.

But the most remarkable mode of reaping was one adopted in Gaul, which comes near to our modern reaping machine—a large and hollow frame, armed with teeth, and supported on two wheels, being driven through the standing corn, so that the ears are torn off and fall within the frame.

“Galliarum latifundiis valli prægrandes dentibus in margine infestis, duabus rotis per segetem impelluntur, jumento in contrarium juncto: ita direptæ in vallum cadunt spicæ.” (Lib. xviii. c. 72.)

If the grain be cut with a part of its straw attached, it is carried into a shed, the *nubilarium*, and kept till a favourable day for drying it occurs. If on the contrary the ears only are cut, they are taken into the granary, and in the winter thrashed out with flails or trodden out by cattle. In the latter case, a *tribulum*, or *trahæ*, may be added. This was a thick wooden board armed underneath with spikes of iron or sharp flints, and pressed down by a heavy weight placed upon it, so that when drawn over the corn by the oxen, it separated the grain from the straw. Hence by Christian writers the term *tribulation* has been used, to express those sorrows and trials, which tend to separate in men whatever is light, trivial and poor, from the solid and the true, their chaff in short from their wheat. (Trench on the Study of Words.)

The grain is then spread over the threshing

floor, in order that the wind may carry away the chaff, but the latter must be separated by winnowing (*frumenta vannis crepurgantur*), if after some days, this is not found to be done. For there is always a risk, that a long succession of calm days is the prelude to a storm, which may be violent enough to sweep away the fruits of our year's labour altogether, if not properly housed.

Columella closes his second Book with directions, as to what may lawfully be done on holy-days, quoting from Virgil,

“ Rivos deducere nulla
Religio vetuit, segeti prætere sœpem,
Insidias avibus moliri, incendere vepres,
Balantumque gregem fluvio mersare salubri.”

To this Columella adds, as things permitted, to grind corn, to cut fagots, to make candle-dips, to cultivate a vineyard that has been purchased, to clean out preserves of fish, ponds, or old ditches, to cut aftermath, to spread manure over a field, or to pile it up in heaps, to pick the fruits that have been purchased from an olive plantation, to dry apples, pears, and figs, to carry trees for planting on the back, or on a single beast of burthen, but not on one yoked to a waggon. “*Far pinsere, faces incidere, candelas sebare, vineam conductam colere; piscinas, lacus, fossas veteres tergere et purgare, prata sicilire, stercora æquare, fœnum in tabulata componere, fructus oliveti*

conductos cogere, mala, pira, ficos pandere, caseum facere, arbores serendi causa collo vel mulo clitellario afferre: sed juncto adhibere non permittitur."

Other limitations then follow, which seem to be ingeniously framed, so as to give a convenient loophole to such masters, as were eager to extract from their slaves more labour, than the religious institutions of the country distinctly sanctioned.

Nevertheless, there can be no doubt, that these provisions, much as they were liable to be evaded by severe or grasping masters, must have contributed in the majority of instances greatly to the mitigation of the toils of the slaves; and it is remarkable, that the number of days in the year which Columella calculates for holydays, and for weather too stormy for outdoor-work, comes within seven of the number, which the institution of the Sabbath has secured to the field labourer in all parts of Christendom at the present day.

It is true, that in the Romish church an additional number of idle days is nominally provided; but in the more industrious portions of Europe, these are by no means lost to labour; and, consequently the proportion, which Columella mentions as recognised in ancient times, is not very widely departed from at present.

LECTURE V.

COLUMELLA.

BOOKS III. IV. V.

I HAVE given in the third and fourth Lectures a pretty full account of the contents of the second book of Columella. In the third book, the Author proceeds to speak of the cultivation of trees or shrubs, which furnish food to man, or in other ways minister to some useful purpose. As however these, for the most part, are such, as do not admit of general cultivation in Great Britain, I shall not find it advisable to bestow upon this portion of the Treatise the same extended notice, which has been taken of the earlier parts already treated of.

Our Author begins by considering the culture of vines, which, as it occupies the whole of the 3rd, and the greater part of the 4th book, contains of course many minute directions, both with reference to the preparation of the soil, and the treatment of the plants themselves, which might be of interest to a French or Italian of the present day, but which would have little practical bearing, if addressed to the British farmer.

It may, however, be worth remarking, that inasmuch as Italy is exactly the climate for the vine to flourish in, a much greater latitude is permitted by Columella for its cultivation, than would be recognised in colder countries.

In Germany, for instance, the growth of vineyards is confined, to slopes with a southern exposure, and to soils which from their dry and loose texture are especially fitted to absorb the sun's rays.

Columella, on the contrary, merely says, that the kind of vine is to be selected, which is most suitable for each particular locality, one kind thriving best in an open field, another on a hill; some succeeding in a rich, others in a poor soil. In short, it would appear that vineyards may be had in almost every kind of soil and of situation provided only the ground be not very wet, and possess no positively bad quality which can influence the flavour of the grape.

For as Virgil says :

“ Salsa autem tellus, et quæ perhibetur amara,
Frugibus infelix, (ea nec mansuescit arando,
Nec Baccho genus, aut pomis sua nomina servat.”)

GEORG. ii. 238.

That the quality of the soil may injuriously affect the vine, even when atmospheric conditions are most favourable, is seen at the present time from the wine of the Cape, which, except in one particular locality, has an earthy and highly disagreeable flavour, although obtained from

vines derived from some of the most favoured districts in Europe.

Nevertheless, the extremes of heat, even in Italy, are to be avoided; although of the two, an excess in this respect is less hurtful than of cold, as an excess of dryness is better than an excess of humidity.

Columella lays great stress upon a proper selection of the variety suited for the particular character of the soil and position; and enumerates a variety of kinds of grapes, known in his time by particular names, of which the Aminean, derived from some place in Greece, which is also highly commended by Pliny, deserves the preference over every other, for the quality, if not for the quantity, of its produce.

There were, it appears, two sorts, of which the smaller was well known, as that which covers the celebrated hills of Campania and of Surrentum.

Thus it would appear, that at that period, as at the present, the country about Naples was in high repute for the vines which it afforded; and, so far as this example goes, we might be disposed to set down the excellence of the wine, rather to the soil and climate, than to any superiority in the vine selected to grow there.

From a more general view of the question, however, it will appear probable that both circumstances concurred; for unquestionably one of the most important of the means put into our hands for improving upon Nature, consists in

carefully selecting the best varieties, which Nature developes, as it were by chance, amongst an infinite number which spring up spontaneously, and in propagating them to the exclusion of the rest.

It is true, that any variety, if placed in an unfavourable position, gradually falls back to the roughness of the original stock.

“*Namque est aliquibus tantus locorum amaror,*” says Pliny, “*ut omnem in his gloriam suam relinquunt.*”

And as Virgil says,

“*Vidi lecta diu, et multo spectata labore,
Degenerare tamen : ni vis humana quotannis
Maxuma quæque manu legeret : sic omnia fatis
In pejus ruere, ac retro sublapsa referri.
Non aliter, quam qui adverso vix flumine lembum
Remigiis subigit, si brachia forte remisit,
Atque illum in præceps pronò rapit alveus amni.*”

(GEORG. i. 197.)

But, on the other hand, no circumstances of climate or position, however favourable, will, except by accident, convert a crab into an eatable apple, or a sour wild vine into one calculated to afford grapes for the table or for the winepress.

Thus, by transplanting the Burgundy grape to the Rhine, much of the flavour of the most esteemed French wine has been maintained for centuries, in a distant and even more northern country, and in like manner the famous Tokai grape has been introduced with success into the

South of France; whilst the Australian vine is said to retain the characters of the European stock which was conveyed there across the ocean.

It is not without reason therefore, that Columella lays stress upon the selection of a sort specially suited for each particular locality, and that he enumerates with this intention a long catalogue of varieties; ending with a quotation from Virgil, who, in allusion to the same subject, remarks,

“ Quem qui scire velit, Libyci velit æquoris idem
Discere quam multæ zephyro turbentur arenæ.”

(GEORG. ii. 105.)

For, he remarks, every country, and even every district, has its peculiar kinds, which have names assigned to them by custom; whilst some change their names with the spots where they are cultivated, and others even are so altered by being transplanted, that they can no longer be recognised as the same.

Indeed Gerardin, in his recently published *Cours d'Agriculture*, enumerates, from the *Ampelographie* of Count Odart, not less than 88 varieties of vines cultivated for their good quality in France, and all of these, with many more, he states, are to be seen preserved in the nursery attached to the Luxembourg Palace at Paris.

But a preliminary inquiry suggests itself, namely, whether vine culture is a profitable one or not; and here, it must be remarked, Columella

speaks with more confidence, than a modern writer perhaps would be disposed to do.

It is, I believe, at present generally admitted, that of all descriptions of husbandry, the culture of vineyards is perhaps the least lucrative, and that, except in those cases where the wine obtained is in repute, and can obtain a sale beyond the limits of the district in which it is produced, the profits are scarcely such as to afford more than the most scanty remuneration to the cultivator.

In a vine country not particularly famous for the quality of its produce, the peasants are proverbially poor and ill-conditioned, and the proprietors of the soil are seldom in flourishing circumstances.

This arises principally from two causes, 1st, from the great variation in the produce of a vineyard from year to year; and, 2ndly, from the fact, that wine is not absolutely a necessary of life, but to be regarded rather in the light of a luxury.

Thus, when the vineyard yields an abundant crop, the profits are curtailed by the fall which takes place in the price of the article; whilst if the yield be small, the value is not enhanced proportionally, because the ordinary consumers are able to dispense with its use.

The majority therefore of modern cultivators, I conceive, instead of considering, with Columella, what sorts of vines would suit each particular

soil and situation, would rather content themselves with appropriating to vineyards those spots, which either from their barrenness or exposure were incapable of yielding abundant crops of other kinds, or else, from their peculiarly favourable position, are capable of bringing to perfection the superior descriptions of grapes.

Our author, however, combats the notion that vineyards are otherwise than profitable; and this he does by stating the large returns which some vineyards have yielded.

Cato, for instance, asserts, that a jugerum will yield no less than 600 urns of wine. Now an *urn* is set down as equal to 7 gallons, so that the whole amount would be 4200 gallons.

Seneca says, a jugerum yields 8 culei, each equal to 143 gallons, making 1144 gallons.

Now the jugerum is calculated at 28,800 square feet, and is therefore not much more than two thirds of an English acre, and less than one third of a French hectare, an English acre being 43,560 square feet, and a French hectare 94,768.

Columella indeed goes on to declare as his opinion, that a vineyard had better be extirpated, if it does not yield more than 3 culei, or 429 gallons, to the jugerum.

Now taking these measures as exactly given, the amount is excessive as compared to what is obtained in modern times.

At Volney, one of the best vineyards in France, the average produce per hectare during the last

35 years was only 16 hectolitres, equal to 422 wine gallons; the maximum 44.7 hectolitres, equal to 1180 gallons. That of La Côte near Geneve was somewhat more, namely 4614 litres, or about 1125 gallons; whilst in the south of France, the average yield was about 16 muids or 875 gallons, and the maximum 16 muids or 1400 gallons.

Thus, putting out of the account the statement with respect to Cato's vineyard, which is obviously extravagant, it would seem as if the ancients obtained as much wine from a jugerum as we do from a hectare.

Leaving this difference unexplained, I will glance very slightly over Columella's other directions.

With respect to the quality of land suited for a vineyard, although a very rich soil is not desirable, yet in transplanting, that to which the vine is transferred should be somewhat better than what it is taken from. In general, however, *Mediocris et modice siccus ager*, ground of medium quality, and moderately dry, is recommended by Columella, whereas Virgil says,

“ At quæ pinguis humus, dulcique uligine læta,
 Quæque frequens herbis, et fertilis ubere campus,
 Qualem sæpe cava montis convalle solemus
 Displicere; huc summis liquuntur rupibus amnes,
 Felicemque trahunt limum: quique editus austro
 Et filicem curvis invisam pascit aratris:
 Hic tibi prævalidas olim multoque fluentes
 Sufficiet Baccho vites.”

(GEORG. ii. 184.)

Tuff and puzzolana, however hard they may appear, are excellent for vines, for they crumble under the influence of rain and frost. Gravelly land is also suitable, as is, for the same reason, the alluvial soils of rivers, and the lower portion of mountains. Marly (*cretosa*) soil is also well adapted for the vine, but not when it consists wholly of clay; and ochrey land (*rubrica*) is unfavourable to it, unless it be well worked, so as to be rendered less tenacious.

Of still greater importance even than the quality of the soil, is the selection of the cuttings, which must be taken from a vine at once prolific and highly flavoured. The Aminean variety is in both respects commendable, for although a prejudice exists as to its falling short in the former respect, yet the extraordinary produce obtained from Cato's vines, which were of this kind, shows the contrary. The excellence indeed of the Aminean grape, as grown in the Cæcuban, Massic, and Sorrentine vineyards, shows, that Italy is as famous for its vines, as Germany for the stature of its men, Liguria for its large cattle, and Mysia and Libya for its abundant wheat harvests.

Having therefore selected your vine, abundant cuttings are to be taken from it for planting your ground, which indeed is easily done, for a single precocious vine has been found to yield cuttings enough for two acres.

These cuttings are to be selected, not from the

extremity of the vine, but from its centre, care being taken that the vines which afford them should be such as have already given evidence of their fruitfulness by the abundance of grapes they have borne, and that not for one but for four years, there being, as Pliny has more fully explained (lib. ii. c. 48.) a kind of cycle, according to the doctrine of Eudoxus the Pythagorean ; so that the same weather is apt to come round again after the lapse of the above period.

Other indications of fitness in the vine to afford good cuttings are, its pushing forth even from the hard wood shoots with some branches upon them, and its yielding fruit even from its lower and younger branches.

This is the sort of vine from which we are to take the *malleolus*, by which term we express, the shoot produced upon the branch of the preceding year, and which we insert into soil moderately damp, but not swampy.

It is called *malleolus* from its having a head or knob at its extremity, consisting of a piece of the hard wood on either side of it.

The next point is the *pastinatio*, that is, the preparation of the ground for receiving the vine, which is done by removing all trees and shrubs, grubbing up the roots, and rendering the soil loose and crumbling, but allowing the loose stones to remain, these being favourable to the growth of vines :

“ Aut lapidem bibulum, aut squalentes infode conchas.”

(GEORG. ii. 348.)

In cold situations the vines should face the south, in warm ones the east; except indeed where, as in Bœtica in Spain, the land is exposed to violent tempests.

Virgil however objects to a western exposure,

“ Neve tibi ad solem vergant vineta cadentem.”

(GEORG. ii. 298.)

The two methods of preparing the ground for receiving the cuttings of the vine are by trenches and furrows.

Trenches, Columella says, should be two feet deep, and three long, and the cuttings be introduced in a quinquencial fashion.

This is what Virgil refers to, when he compares the regular arrangement of the cuttings in a vineyard, each inserted in its respective trench, to an army marshalled for battle :

“ Nec secius omnis in unguem

Arboribus positis secto via limite quadret.

Ut sæpe, ingenti bello quum longa cohortes

Explicuit legio, et campo stetit agmen aperto,

Directæque acies, ac late fluctuat omnis

Ære renidenti tellus, necdum horrida miscent

Prælia, sed dubius mediis Mars errat in armis.

Omnia sint paribus numeris dimensa viarum ;

Non animum modo uti pascat prospectus inanem ;

Sed quia non aliter vires dabit omnibus æquas

Terra, neque in vacuum poterunt se extendere rami.”

(GEORG. ii. 277.)

But the expense of this method, leads many to

prefer planting their vines in furrows; and Virgil admits,

“ Ausim vel tenui vitem committere sulco :”

(GEORG. ii. 289.)

for vines do not require to be planted so deep as larger trees. A depth of two feet and a half being sufficient for a furrow.

Vines may be planted either in spring or in autumn; in spring, if the ground be moist and rich; in autumn, if it be dry and poor. In this Virgil concurs, in the beautiful lines beginning,

“ Nec tibi tam prudens quisquam persuadeat auctor,
 Tellurem Borea rigidam spirante moveri.
 Rura gelu tum claudit hiems; nec semine jacto
 Concretam patitur radicem adfigere terræ.
 Optuma vinetis satio, quum vere rubenti
 Candida venit avis, longis invisâ colubris;
 Prima vel auctumni sub frigora, quum rapidus Sol
 Nondum hiemem contingit equis, jam præterit æstas.
 Ver adeo frondi nemorum, ver utile silvis;
 Vere tument terræ, et genitalia semina poscunt.
 Tum pater omnipotens fecundis imbribus Æther
 Conjugis in gremium lætæ descendit, et omnes
 Magnus alit, magno commixtus corpore, fœtus.”

(GEORG. ii. 315.)

The distances between the rows will depend upon the sort; but here Columella and Virgil appear to be at issue, the former recommending that if the soil be poor, they be planted at intervals of 5; if of middling quality, of 6; if rich, of 7 feet; whilst Virgil tells us,

“ Si pinguis agros metabere campi;
 Densa sere; in denso non signior ubere Bacchus.”

Sin tumultis acclive solum collesque supinos;
 Indulge ordinibus: nec secius omnis in unguem
 Arboribus positis secto via limite quadret."

(GEORG. ii. 274.)

Columella directs, that only that part of the cutting, which had been in contact with the old wood, should be planted, and enters into various minute directions on this subject. On a level ground, he says, its length should be from 9 to 12 inches, on a slope as much as 15.

Virgil too confirms this statement,

" Neve flagella

Summa pete, aut summa destringe ex arbore plantas."

(GEORG. ii. 299.)

and even recommends, that every slip should stand the same way, and retain the same position with regard to South and North, that it had done before it was severed from the parent tree.

" Quin etiam cœli regionem in cortice signant;

Ut, quo quæque modo steterit, qua parte calores

Austrinos tulerit, quæ terga obverterit axi,

Restituant; adeo in teneris consuescere multum est."

(GEORG. ii. 269.)

Julius Atticus had directed, that the cutting should be planted in the ground, with its head twisted forwards, and bent, in order that it might be kept fixed by the prong, or *pastinum*, which was inserted into the ground.

Columella objects to this practice for various reasons, and recommends that the cutting should be introduced into the soil in a straight direction.

Quicksets, roots and all, (*viviradices*) are sometimes planted, and are at once more hardy and sooner in a condition to bear fruit, although in the provinces, where no pains were taken to form runners of vines, cuttings were employed. Colum. iii. 14.

But whichever of these modes be preferred, a still and dull day should be selected for the purpose, as heat or wind are likely to dry up the juices of the plant, and cause it to wither.

According to Columella the best cuttings are taken from the body; the next best, from the branches; and the worst, from the top of the tree. The latter, indeed, strike soonest, and are most fruitful; but they soonest decay.

Columella mentions in his fourth book two modes of grafting vines, namely, either by incision, or by boring.

“*Inseritur vitis vel recisa, vel integrâ perforata terebrâ.*”

In the former case, the operation appears to have been conducted much in the same manner as at the present day, the graft, or *surculus*, shaped like a wedge and pointed at bottom, being inserted into a cleft in the stock made to receive it, which extends to the pith. It is thus accurately fitted to the stock, and its bark is in actual contact with it.

The latter mode, which modern gardeners call *peg-grafting*, consists in boring a hole perpendicularly through the centre of the stock, and insert-

ing into it the graft, previously shaped so as exactly to fit the aperture.

To these methods Columella adds in his fifth book that of grafting by inoculation, in which case a bud, with a small portion of bark attached to it, is inserted below the bark of another tree, in such a manner as to be in close contact with its alburnum.

Our author enters in great detail into the several methods of effecting this; but what may interest a modern reader more, is his confident assertion, that every tree can be grafted upon every other, provided only their bark be similar.

In proof of this he states, that if a fig-tree be planted close enough to an olive, to allow of the extremities of its branches being brought into contact with the former, we may cause the olive-branches to grow out of the stump of the fig, by sawing off the trunk of the latter at a certain height from the ground, splitting with a wedge the part that remains standing, and inserting the extremities of the branches into the fissure thus occasioned. The latter will by degrees so coalesce with the wood of the fig-tree, that they may in four years' time be severed from their parent tree, and continue to live as grafts upon the fig. And this same method applies, he says, to every other tree.

Nor is Columella the only ancient writer that entertained this notion.

Thus Virgil gives his testimony to the same effect :

“Inseritur vero et fœtu nucis arbutus horrida ;
Et steriles platani malos gessere valentes :
Castaneæ fagus, ornusque incanuit albo
Flore piri, glandemque sues fregere sub ulmis.”
(GEORG. ii. 69.)

And then, after describing the methods of grafting he concludes ;

“Nec longum tempus, et ingens
Exiit ad cœlum ramis felicibus arbos,
Miraturque novas fondes, et non sua poma.”
(GEORG. ii. 80.)

Pliny too observes, that we see the cherry growing upon the willow, the plane upon the laurel, the laurel upon the cherry, and fruits of various tints and hues springing at once from the same tree ; whilst Palladius, in his poem *De Insitione*, particularises not only these, but various other instances, in which scions have been grafted upon stocks altogether different from themselves.

And not only is testimony in favour of this opinion, but even probability may be pleaded in its behalf. If the Mistletoe be capable of deriving its nourishment from trees so different in their organisation, as the apple, the lime, and the oak, one does not see, why the same might not be the case with the graft of any other plant, provided only that there was a sufficient correspondence, in the periods at which the sap rose, and in the temperament of the scion and the stock with

reference to meteoric conditions to admit of nourishment passing from the one to the other.

A plant, which had no leaves to elaborate its own sap, might be expected to thrive only upon one particular tree; but one provided with them, ought, we should infer, to be in some degree independent of the source from which it drew its nourishment.

And yet all modern authorities concur in assigning a very limited range to the capacity of grafting one plant upon another. Decandolle concludes, that the scion and the stock must be at least of the same natural family. He has indeed succeeded, he says, in grafting the lilac on the phyllyrea, the chionanthus on the ash and the lilac, the olive upon the ash, and the bignonia radicans upon the catalpa; but the plants obtained were but shortlived; for either the graft drew too much nourishment from the stock, and thus destroyed it, or received more than it could elaborate, and therefore perished of plethora.

How then are we to explain the experiment reported by Columella? Doubtless by supposing the olive shoots to have sent out independent roots, which penetrated through the stump of the fig, and took root in the soil, which Thouin has proved by experiment to have happened in a similar case.

In the same way we may account for the story reported by Pliny, of a tree in the garden of Lucullus, which was so grafted, as to bear pears,

apples, figs, plums, olives, almonds, and grapes; and for the fact, that at this day the gardeners in Italy, especially those of Genoa and Florence, sell plants of jasmine, roses, honeysuckles, all growing together from a stock of orange, or myrtle, or pomegranate, on which they say they are grafted.

But this is a mere deception, the fact being, that the stock had its centre bored out, so as to be made into a hollow cylinder, through which the stems of jasmines, and other flexible plants, were easily made to pass, their roots intermingling with those of the stock; and after growing for a time, the horizontal distention of the stem forced them together; and they assumed all the appearance of being united^a.

But if the writers of antiquity are to be censured, for hastily adopting views, which had at least some analogies to support them, they might retaliate upon some of the moderns, for having introduced a theory connected with the same subject, which seems equally devoid of foundation, and certainly is not so well recommended by any intrinsic probability.

I allude to the notion entertained by Mr. Andrew Knight, that every graft has a certain limit to its existence prescribed to it, and that the limit is determined by the age of the tree from which it was itself derived.

This theory appears to me, in the first place,

^a Lindley's Theory of Horticulture.

unnecessary, in order to account for the facts cited in its behalf.

The failure of a few varieties of the apple tree, such as the golden pippin, if indeed it be so certain and so entire as has been contended, admits of explanation, as resulting from a law, which pervades all departments of organic nature, namely, the tendency of external agents to obliterate those distinctions, which nothing but a rare concurrence of circumstances had in the first instance brought about.

Virgil long ago, perhaps, shed as much light on the subject as the case admits, in lines 197 et seq. of his first Georgic, which have been quoted just above.

Indeed, if it be true, that in the human race, as well as in our domestic animals, in spite of the tendency which *like* has to produce *like*, external causes so interfere, as to render it next to impossible to maintain for a number of successive generations the same intellectual or physical type, which a happy concurrence of circumstances had in the first instance brought about; one does not see, why the same difficulty should not exist in perpetuating a particular variety of fruit, wherever that variety happens to be a rare one, or in other words, required for its production an unusual combination of favourable circumstances.

Palladius, in his Poem De Insitione, notices, amongst many other instances of successful

grafting, some of them true, others fabulous, the following :

Insita proceris pergit concrescere ramis
Et sociam mutat Malus amica pirum,
Seque feros sylvis hortatur linquere mores,
Et partu gaudet *nobiliore* frui.

But the very process of *ennobling* a race, whether of animals or of plants, implies the imparting to it a finer and more delicate organization, and consequently one more liable to give way, before the destructive agencies that are always at work, than the coarser and hardier forms which nature more commonly elaborates.

The hypothesis too seems inconsistent with facts—for if it be meant to express a general law of nature, it ought to prevent the perpetuation of any varieties whatsoever; whereas we know, that most of our domestic vegetables are varieties which have retained their peculiarities from time immemorial^a.

If the golden pippin has become extinct, there is at least no fear of our commoner sorts of apples degenerating into crabs, as according to this hypothesis might be expected to happen; nor, whatever diseases may be caused by excessive cultivation, does any one imagine, that the potatoe, derived, as it is, from tubers imported from Chili,

^a Dr. Henderson imagines the currant or Corinth grape of the present day to be the same as the Græcula, which Pliny describes as “non inferior Ammineis bonitate, prætencerâ acino; et uva tam parva, ut nisi pinguissimo solo colere non prosit.”

will ever revert to the stunted condition of the original stock.

Lastly, the theory seems at variance with the general principles of vegetable physiology.

A tree is not an individual, but a collection of individuals, grafted upon a common stock. It has therefore no natural term of existence, like an animal; but is propagated by a succession of buds, grafted as it were upon the older portions of the plant.

In no case therefore is there any reason, why the newer portions should share in the fate of the older ones; although it be equally true, that, according to the doctrine of chances, as will be the case with new varieties, every tree must at length perish, through the operation of those external causes which are at all times at hand to destroy it.

I may refer to the Numbers of the Gardener's Chronicle of the present year (1857) for a long and able discussion of the case before us; but the indefinite duration of a tree, which alone, I am inclined to think, is fatal to Mr. Knight's theory, has its foundation laid in the principles long ago expounded by the elder Decandolle, in his *Flore Française*, which dates as far back as 1805, and afterwards in his *Physiologie Végétale*, published in 1832.

Although it may seem advisable to confine ourselves to that kind of vine which we regard as

the best, yet there is one advantage in introducing several, that we thus provide against an entire loss of crop, in case the climate should at any time be unpropitious to a particular sort.

It would be very interesting, Columella says, to have an assortment of vines in a garden, arranged according to their respective varieties; each variety having its own time for ripening, pruning, &c., and hence rendering it inconvenient to associate them together in the same vineyard.

Columella then proceeds, in the 4th Book, to some practical directions, as to the depth of the trenches; the mode of growing the scions; the stirring up the ground with prongs (*bidentibus*); the necessity of well looking after a vineyard, when once it has been established; the methods of pruning, propping, and tying up the vines; and the mode of supporting them on trellis, which were, at the least, four feet high, and sometimes as much as seven

The poles upon which the vines rested went by the name of *pedamenta*, or, when square frames were used, the term *juga* was employed.

The wine obtained in this manner was of the best quality; and therefore this, although the most expensive, was the commoner method at the time Columella wrote; although the vines were also encouraged to twine themselves round large trees, *maritari*, as they were called, in the manner now practised.

The usual height to which they were allowed to grow was at least thirty feet, and in some parts of Bithynia, if we may credit Florentinus, they attained to sixty feet without experiencing any degeneracy. This practice, however, was only allowable in rich soil; for in poor land they were much lower. Columella assigns from eight to twelve feet as the usual height of such plantations in Gaul.

Pliny goes the length of asserting “*nobilis vina non nisi in arbustis gigni;*” and Columella (lib. v. 6.) agrees with him; but Dr. Henderson (*Hist. of Wines*^b) gives good reasons for disputing this position.

For cleaning the soil contiguous to the vine, and removing the redundance of branches and fruit, directions are given which come last in the order of sequence; for vineyards, as Virgil remarks, require constant attention. The whole ground is to be ploughed three or four times a year, and the clods continually to be broken with bended prongs; all the wood to be lightened of its leaves—the labour of the husbandman comes round again, and the year revolves in its accustomed course.

And when the vineyard shall have lost its last leaves, and the cold north wind shall have deprived the woods of their glory, even then the diligent countryman extends his care to the following year, and attacks the vine that is aban-

^b The Reader may consult this learned writer for much interesting information respecting ancient and modern wines.

done by its leaves, and unprotected, with Saturn's hook, and shapes it by pruning, &c.

“ Est etiam ille labor curandis vitibus alter,
 Cui numquam exhausti satis est: namque omne quotannis
 Terque quaterque solum scindendum, glebaque versis
 Æternum frangenda bidentibus; omne levandum
 Fronde nemus. Redit agricolis labor actus in orbem,
 Atque in se sua per vestigia volvitur annus.
 Ac jam olim, seras posuit quum vinea frondes,
 Frigidus et silvis aquilo decussit honorem,
 Jam tum acer curas venientem extendit in annum
 Rusticus, et curvo Saturni dente relictam
 Persequitur vitem attondens, fingitque putando.”

(GEORG. ii. 397.)

Columella then notices the trees planted for the sake of the vines, which Pliny calls the *armamenta*, and other writers the *arbusta*; as, for instance, the willows, and reeds (the *arundo donax* of Italy), used for binding them up, and the young chestnuts, the branches of which were employed as stakes and props to support them. These constitute a necessary appendage of every well-managed vineyard, as the proprietor will otherwise have to incur the expense and trouble of procuring them from without.

But whilst the vine requires such assiduous culture, the olive, on the contrary, may be left almost to itself, when once planted in a congenial soil. Thus Virgil—

“ Contra, non ulla est oleis cultura: neque illæ
 Procurvam expectant falcem rastrosque tenaces,

Quum semel hæserunt arvis, aurasque tulerunt.
 Ipsa satis tellus, quum dente recluditur unco,
 Sufficit humorem, et gravidas cum vomere fruges.
 Hoc pinguem et placitam paci nutritor olivam."

(GEORG. ii. 420.)

In like manner, Columella remarks, of all trees the olive requires the least expense; for although it bears fruit, not every, but on alternate years, yet its excellence is, that it is sustained by slight culture, scarcely indeed requiring any at times when it does not bear fruit: and, on the other hand, that if it be neglected during several years, it does not fail, as a vineyard would do, but even then yields some profit to the proprietor; whilst, if care be afterwards taken of it, the damage is repaired in a single year.

The fittest soil for the olive is one of gravel mixed with chalk, but in reality a much richer soil, if not necessary, will suit it well.

Its peculiar merit, however, is, that it thrives where the soil is too barren to afford abundant crops of other kinds, and hence it covers the bleak hills, in the south of France, the slopes of the Apennines, and the mountains of Greece.

"Difficiles primum terræ, collesque maligni,
 Tenuis ubi argilla et dumosis calculus arvis,
 Palladia gaudent silva vivacis olivæ." (ECL. i. 197.)

There appears to have been a general notion in Columella's time, that it would not thrive at a greater distance than 60 miles from the sea; an opinion which, although not strictly true, is to a certain extent borne out by the fact, that this

tree flourishes most on the borders of the Mediterranean, of the Black Sea, and of the Caspian, and that in France the best olive trees are those about Aix, Nismes, and Avignon.

In accordance with his belief that olives bear only every alternate year, Columella recommends our dividing an olive plantation into two portions, which might yield fruit alternately.

This statement is partially confirmed by modern writers; for although the olive puts forth flowers every year, yet, after a full crop of fruit, it commonly does not bring its produce to maturity in the following season. Hence it was the custom of the Romans, to place their olive plantations in the same field as their corn, and to collect the fruit from the former only every other year, when the land did not bear a crop of grain.

The smallest distance, Columella says, between the rows of trees in a rich field of corn ought to be, 60 feet one way and 40 the other, but on a poor soil, or one not fit for corn, 25 feet are enough. Cato indeed directs, that not only olives, but also elms, vines, and figs, should be planted in pits in land where corn is also grown, (cap. xvii.)

Notwithstanding the greater hardihood attributed to the olive, in the sense of its being more independent of the care of the husbandman, its geographical range is more circumscribed than that of the vine. Being an evergreen, too, it is more exposed to the cold of winter, and a frost of any duration destroys it. Even in the south

of France almost all the olive trees were killed by a frost in 1709; and when in 1789 the thermometer at Orange fell to $15^{\circ}6$, the cold weather lasting 19 days, the olive was destroyed in those places where the thaw was rapid, and the sky clear; although a slow thaw, accompanied with drizzling rain, prevented it in other cases from being equally damaged.

In point of utility, the olive stands very high. Columella calls it the first of trees. Sophocles celebrates it as the peculiar pride of Athens, and the favourite of her tutelary deity (*Æd. Col.* 697); and in countries where the warmth is too great to admit of the free admission of animal oils into the dietary of the population, this tree, as the main source of vegetable oil, which is an almost necessary substitute, becomes of paramount importance.

I will not detain you with any account of the directions given in Columella for the culture of apple trees; or for that of the elm, which latter was the tree principally selected for supporting the vine, when it was encouraged to trail up to a great height; and of which two kinds were known to the Romans, the Italian, and the Gallic, the latter, also called *atinea*, being perhaps the wych elm of this country.

Columella also mentions another species of Gallic shrub, used for supporting vines, and termed *rumpotinum*. This Pliny calls a *poplar*, but the

term "rumpi" seems to have been used for any tree to which vines could be trained. Thus Varro remarks: "quartum est pedamentum nativum ejus generis, ubi ex arboribus in arbores traductis vitibus vinea sit; quos traduces, quidam rumpos, appellant."

There is however one kind of shrub, to which much importance was attached by the ancients, and of which therefore a short notice is requisite.

This is the *cytissus*, the nature of which has been a subject of some dispute amongst naturalists.

Virgil alludes to it in several places of his Eclogues, as increasing milk,

"Sic cytiso pastæ distendant ubera vaccæ:"

as also in the Georgics, (ECL. ix. 31.)

"At cui lactis amor, cytisum lotosque frequentes
Ipse manu salsasque ferat præsepibus herbas."

(GEORG. iii. 394.)

and in the 10th Eclogue, as grateful to bees,

"Nec lacrymis crudelis Amor, nec gramina rivis,
Nec cytiso saturantur apes, nec fronde capellæ."

(Ver. 28.)

Columella says, it is of great importance to have as much *cytissus* on the farm as possible, not only because it is very useful to all kinds of cattle, fattening sheep, and making ewes give plenty of milk, but likewise because it may be used for forage, eight months in a green, and the rest of the year in a dry condition. Moreover it quickly strikes root, even in the poorest land, and is not liable to be hurt by any accident.

Pliny confirms this statement, adding, that it is the very best medicine for the diseases of cattle, and even gives the palm to it over all kinds of plants used in forage, although in other respects there are certain discrepancies between the account of the shrub given by him, and by Columella.

Tournefort first pointed out, that it was probably the *medicago arborea*, a plant common about Athens, and in the smaller islands of the Grecian Archipelago; and Dr. Sibthorp is of the same opinion, identifying it with the *κντίσσοσ* of Dioscorides. Others indeed have supposed it to be the common laburnum, *cytissus laburnum*, because its wood is said to be black, (see notes to Columella, p. 303;) but the *medicago arborea*, in other respects, answers better to the description given, as bees settle upon this plant, and cows and goats eat its leaves with avidity.

LECTURE VI.

COLUMELLA.

BOOKS VI, VII, VIII, and IX.

HAVING in the preceding Lectures given a sketch of the more purely agricultural portion of Columella's Treatise, I shall next proceed to a brief survey of those Books which relate to the management of cattle, and the other domestic animals maintained by the Romans for various uses, either as providing food, supplying materials for clothing, or assisting in the operations of husbandry.

This department of the subject was distinguished by the Romans under the name of *pastio*; and was divided by them into (1) *agrestis*, comprehending the management of cattle, and (2) *villatica*, that relating to poultry, game, &c.

Accordingly, Columella alludes in succession to the care of oxen, sheep, horses, mules, asses, swine, dogs, poultry, pigeons, geese, fish, and bees; the same subjects, in short, which are included in the 3rd and 4th Books of Virgil's *Georgics*.

He begins by noticing the opinion of some re-

spectable husbandmen, who would wish to have nothing to do with live stock at all, and are anxious to dispense altogether with the aid of cattle in agriculture.

The occurrence of so strange a prejudice in the times of ancient Rome requires some explanation. It could hardly exist in modern times, where the demand for beef and mutton is such, as to render the feeding and fattening of domestic cattle a principal consideration, independent of their uses as beasts of burden on the one hand, or for their fleece on the other; but it is remarkable, that in none of the Roman writers on agriculture are any instructions given as to the fattening of cattle, nor indeed is any, but the slightest, allusion made to them as articles of food.

In the accounts handed down of Roman banquets, fish, game, poultry, venison, and even pork, are mentioned as forming parts of a luxurious entertainment, but nowhere, I believe, either beef or mutton; and we are informed, that in the early days of Rome, as well as at Athens, it was as great a crime to slay an ox, as a man.

It is curious indeed, that in the few places in which Pliny mentions beef, either roasted or taken as broth, it is recommended as a medicine, and not as an article of diet; and when, as Columella says, Cato pronounces, in reply to a person who consulted him respecting the most lucrative

department of farming, "Si bene pasceret;" as to the next best expedient for obtaining abundant crops, "Si mediocriter pasceret;" these replies must be regarded as corresponding in meaning to the other *dicta* of this ancient oracle, when, in answer to a similar inquiry, he said, that the first point in farming was "bene arare," the next in importance "arare;" and only the third in point of rank, "stercorare."

For it may be collected, both from the prose writers de Re Rustica, and likewise from Virgil himself, that the great value of oxen, in their opinion, was for ploughing, as that of sheep was for their fleece and milk.

In the Latin language indeed, there is no single word for beef, mutton, or veal, just as is the case in our own Saxon-English; the French words for these articles of food being generally adopted, because the latter were chiefly consumed by our Norman conquerors.

Do not however let me be misunderstood; I am far from meaning that beef and mutton were not eaten at Rome, and in Italy, during the period to which allusion is made. Common sense will indicate the reverse,—for what was to become of the fatted oxen offered as sacrifices to the gods, if they were not devoured by the priests and their attendants? and what pretence would Ovid have had for introducing in his *Metamorphoses* the address of Pythagoras? who, to dissuade the people from an animal diet, says,

“ Quid meruistis, oves, placidum pecus, inque tuendos
 Natum homines, pleno quæ fertis in ubere nectar?
 Mollia quæ nobis vestras velamina lanas
 Præbetis, vitaque magis, quam morte juvatis?
 Quid meruere boves, animal sine fraude dolisque,
 Innocuum, simplex, natum tolerare labores?”

(B. xv. 116.)

And although Martial, in the following epigram, alludes to the repugnance which the Romans entertained to killing sheep,

“ *Caput arietinum.*

Mollia Phryxei secuisti colla mariti:
 Hoc meruit, tunicam qui tibi sæpe dedit?”

yet the purport of the lines plainly intimates, that this enormity was occasionally, at least, committed.

Plautus indeed mentions the markets in his time, as containing lamb, mutton, and beef, as well as pork, and venison; and it is difficult to understand, how armies could be maintained in a state of efficiency, unless herds of cattle and sheep accompanied their march, to supply them with invigorating food.

At the same time, whilst beef does not seem to have been a favourite dish amongst the wealthy Romans, and indeed is scarcely noticed in the long catalogue of luxuries dwelt upon with so much unction by Athenæus, it was probably beyond the reach generally of the poorer classes; and we must recollect, that the warmth of the climate in Greece and Italy renders animal food in general, and especially the more stimulating kinds, less

wholesome, and less sought after, than it is in more northern latitudes.

Profuse as the suppers of a luxurious Roman were, the dishes appear to have been of a lighter kind than those of a Feudal Baron: a sirloin of beef would have scarcely obtained the same cordial testimony of approbation from a Roman emperor, as it elicited from our Charles the Second; and an ox roasted whole would probably have been looked upon with disgust by the people in general.

Indeed the very report of such a custom existing amongst a barbarous nation was received by the Athenians with incredulity; as we learn from Aristophanes, who, in his *Acharnenses*, introduces the ambassador just returned from a mission to the Great King, mentioning, amongst other wonders that he had seen, that whole oxen were served up at table: to which the Interlocutor replies, "Who ever saw oxen roasted whole?—it is a traveller's tale."

εἴτ' ἐξέειπε, παρετίθει θ' ἡμῖν ὄλους
ἐκ κριβάνου βοῦς.

καὶ τίς εἶδε πώποτε
βοῦς κριβανίτας; τῶν ἀλαζονευμάτων.

(*Acharn.* 85.)

In which perhaps the wonder partly was, that oxen should be served up entire^a, and partly that

^a Herodotus (*Clio* c. 133) mentions, among the peculiar customs of the Persians, that the rich, for their birthday feasts, roasted oxen, horses, camels, and asses entire; whilst the poor contented themselves with a whole sheep or lamb, and that they considered the Greeks, who did not so indulge, as small eaters.

they should have had ovens large enough to bake them in.

As oxen then amongst the Romans were mainly intended for one single purpose, namely, the labours of the farm, no attempt is made by the *Scriptores Rei Rusticæ* to point out the qualifications which characterise the different races; for although Columella distinguishes the Campanian from the Umbrian, the Hetrurian and Latian from the Apennine breed, (which last, although less comely, was the hardiest of any,) he contents himself with quoting from the Carthaginian Mago the following description of the points of a good bullock:

The oxen we buy (he says) should be young, square, with large members, and lofty horns, black and strong; the forehead broad and rough; the ears hairy; lips and eyes black; noses flat and turned up, with wide nostrils; a long and brawny neck; dewlaps large, and reaching down to their knees; chest broad, shoulders large; belly protuberant, with sides well stretched out; flanks broad; back straight and even, or a little declining; hips round; legs compact and straight, but rather short; knee-joints well set; hoofs large; tails very long and hairy; hair over the whole body, thick and short, either red or a dark brown; and the coat altogether very soft to the touch.

With regard to the bull, the chief differences from the above are, that he is fierce-looking,

more lively in his deportment, with a neck more brawny, and so large indeed as to form a large part of his body; and a belly a little smaller in its dimensions than is suitable for an ox.

The cow, on the contrary, most to be approved of, is of a tall make, long, with a very large belly, a very broad forehead, eyes black and opening widely; horns graceful, smooth, and black; hairy ears, very large dewlaps and tail, hoofs and legs of moderate size.

As to Virgil, he confines himself to the cow, on the ground that the qualities of the offspring depend upon the make of the mother; a notion, the truth of which, if not fully acceded to in our own times, the Arabians at least are fully persuaded of in the case of horses, as appears from their never selling a mare, although they are willing enough to dispose of their stallions.

He accordingly gives the description which follows:

“ Optima torvæ
 Forma bovis, cui turpe caput, cui plurima cervix,
 Et crurum tenuis a mento palearia pendent.
 Tum longo nullus lateri modus: omnia magna:
 Pes etiam, et camuris hirtæ sub cornibus aures.
 Nec mihi displiceat maculis insignis et albo,
 Aut juga detrectans; interdumque aspera cornu,
 Et faciem tauro propior; quæque ardua tota,
 Et gradiens ima verrit vestigia cauda.”

(GEORG. iii. 51.)

Both these descriptions tally in many respects with those given of a good bullock by modern writers.

Thus sir George Sinclair says, that the chest should be broad, the carcass deep and straight, the belly moderate sized, the legs short, the head and bones as small as is consistent with health and strength, and the loins and hips broad and full.

And the latest modern authority, Mr. Youatt, in his account of the peculiarities of the Devon ox, agrees in a great degree with the above. (Cattle, p. 12.)

After this account of the qualities of the ox, a good deal follows in Columella as to the mode of training cattle of this kind for the plough, with which, however, I shall not trouble you, as the use of cattle in modern times, in this country at least, is almost confined to their supplying the shambles; whereas, amongst the Romans, this was regarded the least important of their uses.

Columella then gives directions for the feeding of oxen. Where the country is fertile enough to afford abundance of green herbage, the latter is to be preferred to all other kinds of food; but where this is not to be had, vetches, chick-peas, (*cicercula*), the *cicer arietinum* of modern botanists; barley, in case of hard work; lupines, straw, the leaves of various trees, especially of the elm, the ash, and the poplar, grape-stones bruised, and acorns, are given according to the season.

Although, wherever the nature of the soil and of the culture permitted, oxen were allowed to pasture, yet stall-feeding was not unknown; and

it was the custom in winter to keep them in spacious stalls, built with a southerly aspect, and sheltered from cold winds, with a paved and sloping floor, and abundance of litter (*stramentum bobus et pecori diligenter substernatur*)^a. Lumps of salt were placed near their stalls.

Nevertheless, no directions are offered as to fattening, and in general it must be confessed, on looking over the list of articles employed in ancient Rome, that much improvement has been effected in the dietary of domestic animals, especially by the introduction of the turnip.

Columella then enters upon the diseases of oxen, and their remedies, and afterwards proceeds to the breeding of cattle.

On these points however there is nothing of special interest; nor need I refer to his remarks on horses, except indeed to remark, that his description of the points of a good steed are far more graphically put before us in the well known lines of Virgil:

“ Illi ardua cervix,
Argutumque caput, brevis alvus, obesaque terga:
Luxuriatque toris animosum pectus. Honesti
Spadices, glaucique; color deterrimus albis,
Et gilvo.” (GEORG. iii. 78.)

Brood-mares were frequently kept in large troops, which were removed, according to the season, from the mountains to the coast, and studiously kept apart from the males, except at

^a Cato, cap. x.

the breeding season; when, in Columella's opinion, it was the more expedient to bring them together, because the mares, if debarred at that period from sexual intercourse, are apt to *conceive by the winds*, and in that case to engender an offspring, which is sure to die within three years.

This fact, he says, is substantiated as having taken place at a certain spot in Spain.

Virgil also adopts this same fable, which, extravagant as it may appear to us, was very generally believed amongst the ancients; and in the following beautiful lines of the Georgics brings the subject vividly before us:

“ Vere magis (quia vere calor redit ossibus,) illæ
 Ore omnes versæ in zephyrum stant rupibus altis,
 Exceptantque leves auras : et sæpe sine ullis
 Conjugiis vento gravidæ (mirabile dictu)
 Saxa per et scopulos et depressas convalles
 Diffugiunt. (GEORG. iii. 272.)

The same reasons, which have been assigned for the unsuitableness of Columella's directions with respect to oxen to modern practices, apply also to his remarks on sheep.

At present we prize the sheep, in this country, for the meat it affords, still more than for its wool; and our chief efforts therefore are directed towards enlarging its size, and fattening its carcass. In ancient Rome its wool and its milk were its principal uses.

“ Nam id præcipue nos contra frigoris violentiam protegit, corporibusque nostris liberaliora

præbet velamina. Tum et eam casei lactisque abundantia non solum agrestes saturat, sed etiam elegantium mensas jucundis et numerosis dapibus exornat.—(Col. vii. 2.)

Now the latter use is almost unknown in modern times, at least, in this country; the employment of ewe's milk being completely gone out, except in a few remote parts of Scotland and Wales; and the only cheese of any reputation made of these materials on the continent being that of Rochfort.

Cheeses from cow's milk (*casei bubuli*) are also mentioned, but they were regarded as less digestible than those from the ewe.

In general, the use of ewe's milk for cheese or butter is condemned by modern Agriculturists, because, before the lamb is weaned, the whole of the mother's milk is wanted for its support; and after weaning, the drain upon the mother by milking prevents her from thriving, as she would otherwise do, or becoming fat.

In ancient times, however, ewe's milk was employed almost exclusively, and what was not consumed at the time of milking was converted into cheese.

Of this, Columella mentions two kinds, the soft and the hard; of which the former, perhaps resembling our cream cheeses, required to be eaten within a few days, but the latter might be preserved for a length of time.

The coagulation of the milk seems to have

been effected, in Columella's time, not by means of rennet, but by introducing a little curd; or directly by means of the flower of the wild-thistle, or the milky liquor which flows from the unripe fig. Varro, however, alludes to the use of rennet (*coagulum*), which was taken either from the hare, the goat, or the lamb, (*lib. ii. c. 11.*) but not from the calf, as with us.

The milk was to be placed within a moderate distance from the fire, in order to become coagulated, and was then put into baskets (*fiscellæ* or *calathi*), or into moulds (*formæ*), in order that the whey might run off.

It was next subjected to pressure, salted, and stored on shelves, as with us.

The word *butyrum* once occurs in Columella, but only as an application to a wound in a sheep. It never appears to have been used as an article of food. Indeed, in hot countries it is very difficult to prevent it from becoming rancid.

It appears, then, that whilst the object of the English farmer is to procure a breed of sheep, as well calculated as possible for developing fat and muscle, that of the Roman was to obtain one which would afford a good fleece and abundance of milk.

Pliny indeed, in a passage in which he alludes to oxen being killed for food, adds, that sheep are only serviceable for their fleece and milk; and in Spain, at the present day, the flesh of the Merino is seldom eaten except from necessity.

The Arabs, notwithstanding their numerous

flocks, rarely employ them for food, though a lamb or kid roasted whole is sometimes, in the towns, eaten as a luxury by the rich. Hence the killing a sheep or lamb is regarded as the strongest proof of hospitality to a stranger.

In the *Odyssey* sheep are said to be sacrificed, and as furnishing part of an entertainment; but we only read of their being killed either for religious or else for festive purposes.

Now the size as well as the colour of the sheep differs, Columella says, in different countries; and where our object is to obtain a white fleece, it is important not to introduce into the flock a ram with the slightest admixture of black, as it is sure to appear in the breed.

Therefore Virgil has done right in ordering us to reject a ram, if it has merely a black speck upon his tongue:

“ Illum autem, quamvis aries sit candidus ipse,
Nigra subest udo tantum cui lingua palato,
Rejice, ne maculis infuscet vellera pullis
Nascentum.” (GEORG. iii. 387.)

But the wool of Tarentum, Pliny says, was admired for its tinge of black, and that of Canusium for its fine brown or yellow colour. It is curious that the Tarentine sheep are still of this same colour; a circumstance attributed to the cattle eating a particular plant called the *hypericum crispum*^a. There appears however to have been, as at present, a white breed also^b.

^a See Swinburne's Travels.

^b See Martial.

Mr. Yates thinks it probable, that the Tarentine breed was obtained from Miletus in Ionia, so famous for its fleeces: thus the "Milesia vellera" are celebrated in Virgil.

Columella adds, that the dark and brown sheep of Polentia, now Polenza, in Italy, and of Cordova in Spain, are also in much esteem; and that we may thus divide sheep into two classes, the soft and the rough.

Columella approves of covering the more delicate sheep with skins during the night; a proceeding not generally adopted in our colder climate, probably because the vicissitudes of temperature are less striking than in Italy. Nevertheless, in consequence of the suggestions of Liebig, who has shewn that a less consumption of food takes place, if an animal be kept warm, it has become the practice, in some parts of England, to put jackets upon the sheep in winter.

In ancient times sheep provided with such a protection were called *pellitæ*.

In speaking of the management of sheep, Varro alludes to the summer and winter migrations of the flocks, the sheep of Apulia being taken every year to pass the summer on the mountains of Samnium, and sometimes even on those of Reate.

Mr. Keppel Craven gives an account of a similar migration of the flocks amongst the shepherds in Apulia, proving, not only that the old practice is still maintained, but that even the same line of route is observed, as in ancient times.

“Above two hundred persons,” he says, “were employed, and resided on the spot. The stock of sheep consisted of 8000, divided into several flocks; to which those of cows, goats, and buffaloes, together with a set of brood-mares, and a suitable quantity of poultry, bore an equivalent proportion. All the cattle are guarded by large milk-white dogs, of the Abruzzi breed. These animals are very handsome, and resemble the Newfoundland species, but have sharper noses: they are very intelligent, and equally fierce. The flocks are tended by natives of the Abruzzi, who also undertake the care of milking them, as well as making the cheese, &c.: they are assisted by their wives and children, who accompany them in their yearly migrations to and from the mountains. These shepherds are clothed in the skins of the animals which they watch, and are reckoned a quiet, attentive, frugal, and trustworthy race^c.”—*Tour through the Northern Provinces of the Kingdom of Naples*, p. 80.

Virgil makes a correct distinction between the kind of pasture best suited for encouraging the growth of pure wool, and for the secretion of milk:

“Si tibi lanitium curæ; primum aspera silva
Lappæque tribulique absint; fuge pabula læta;
Continuoque greges villis lege mollibus albos.”

(GEORG. iii. 384.)

^c I am indebted for this extract, as well as for many other particulars relative to ancient sheep, to Mr. James Yates' interesting and elaborate work entitled *Textrinum Antiquorum*.

Whereas,

“ Cui lactis amor, cytisum lotosque frequentes
Ipse manu salsasque ferat præsepibus herbas.”

(GEORG. iii. 394.)

This is consistent with modern experience. Sheep fed on short grass have always finer wool than those fed on rich ones; thus the southdown bears the highest price of any English wool.

On the other hand, the production of milk is favoured by leguminous plants which supply them with caseine. Liebig has shewn that the legumine contained in these plants is identical with the caseine of milk, and that this principle is most abundant in the leguminosæ.

Columella directs, that the sheep should be driven every day to the water, an injunction which indicates the difference between the climates of England and Italy, for with us sheep rarely drink, the succulent nature of the herbage supplying them with the necessary moisture.

The feeding and fattening of poultry, and other birds, were with the ancients a matter of even more importance to the farmer, than they are with us.

If the introduction of firearms has diminished the horrors of war, and therefore been a boon to the human race, it is by no means so with regard to the feathered creation. To have brought down a bird by a spear or an arrow must have been a feat of no small difficulty, and hence we find,

that the Romans had large preserves, not only of poultry and pigeons, but even of thrushes and quails, enclosed in pens which were called "ornithones," from which they could draw their supply for the table at pleasure.

We are told indeed of two sorts of ornithones, the one merely aviaries stocked with birds for the amusement of the proprietor; the other kind, constructed with a view to profit, which were often of vast extent, to supply the demands of the Roman market for such articles of luxury. In the Sabine country particularly, we read of extensive pens, filled with birds for the latter purpose.

For thrushes alone there were large rooms provided, each capable of holding several thousand birds. As they were put in to be fattened, the place had only just light enough to enable the birds to see their food, but there was a good supply of fresh water accessible.

And I may remark, that whilst nothing is said by the Roman writers about the fattening of oxen and sheep, particular directions are given for fattening poultry, and other birds—a strong additional argument of the little importance they attached to the larger animals as articles of food.

The instructions given by Columella with regard to fattening poultry are as follows:

Their pen should be warm and almost dark, so confined that the birds may not have room to

turn, but with two apertures, one for them to put out their heads, the other for their tails and buttocks to protrude. The floor is to be strewed with clean straw, or soft hay, and the greatest cleanliness maintained; the feathers from the head and under the wings and loins being brushed repeatedly, and every kind of filth removed. Their food must be barley meal mixed with water, given more sparingly at first, but the quantity gradually increased to the largest amount which the fowl can digest.

After it has eaten to repletion, it is allowed a little liberty, not so as to roam about to any distance, but only to enable it to peck what it can find, for which it may have a fancy.

To render the fowl more tender, the water with which the meal is mixed is sweetened, and some add a little wine. Pigeons are fattened upon the same principle, young ones having their wing-feathers cut, to prevent their flying, and their legs either tied or else broken, to prevent their moving about in their coop. The latter practice seems, not only cruel, but, from the pain it would occasion, likely to impede the fattening process. This, however, Columella denies, contending that two or three days after their legs have been broken, they cease to suffer pain. The pigeon houses of the Romans were often of great size: Varro mentions their holding 5000 birds each: they were vaulted or roofed in with tiles, and furnished with one small entrance, but well

lighted with large barred or latticed windows (Fenestræ punicanæ).

The walls, carefully stuccoed, were lined with round-shaped nests with a single small aperture, often formed of earthenware, one of which was intended for each pair.

The other birds kept by the Romans as articles of food, were, turtle-doves, peacocks, thrushes, quails, geese, and ducks. Columella also distinguishes the breed of fowls, now called gallinas, by the name of meleagrides.

For the feeding and care of each of these, our author gives us particular directions. In many cases their waterbirds were not only provided with a suitable piece of water, but were even enclosed within a wall 15 feet high, and with a net stretched over it. This was called *nessotrophium*.

Varro also gives us a detailed account of a preserve for dormice, (lib. iii. c. 15.) which was to be paved, to prevent the animals from escaping, and to have within the enclosure oaks to supply them with acorns. But when the mice are fattened for the table, they are to be kept in the dark in stone jars, and fed with acorns, walnuts, and chestnuts.

We learn also from Pliny that preserves for sea-snails or periwinkles were first formed before the civil war between Cæsar and Pompey.

Many distinct kinds of conchifera from Africa,

Illyria, and various other countries, were then introduced. They were fattened with a mixture of boiled wine, meal, and other substances, so that they became quite an article of luxury; and the art of breeding was brought to such perfection, that the shell of a single animal could contain as much as 80 quadrantes, or 15 quarts^d.

Minute directions are given in Varro (lib. iii. c. 14.) as to the construction of the cochlearia, in which snails and shell-fish were preserved.

Similar care was also exercised in the preservation of fish. The Romans were not content with ponds for freshwater fish, but also excavated basins in communication with the sea, into which salt water fish could be introduced. This indeed was more practicable on the calm and tideless coasts of the Mediterranean, than it would be on the shores of the Atlantic, but still the gigantic nature of some of these undertakings may well surprise us.

Lucullus for instance, as Pliny informs us, had a mountain pierced near Naples, to admit the sea into his preserves, and expended more money upon this than upon his whole villa; whilst C. Hirrius, who possessed a villa otherwise of very humble pretensions, had preserves for the murænæ of such a size, that he lent 6000 of these fishes to Julius Cæsar on the occasion of his triumphal banquets.

Columella gives a series of directions for the construction of these piscinæ, which, he says, if

^d One of the large pinnae are probably here intended.

of sufficiently ample dimensions, should have rocks covered with sea-weed introduced into them, so as to imitate more nearly the natural conditions in which the fish had bred. This one fact may serve to give one an idea of the extent of these artificial preserves.

The treatment of bees occupies nearly the whole of the ninth Book of Columella, as it does the fourth of Virgil's *Georgics*, a space which, according to modern ideas, might appear out of proportion to the relative importance of the subject, as compared with the other pursuits which engage an husbandman's attention.

It must however be borne in mind, that before the art of obtaining cane-sugar became known, honey was in some sort a necessary of life.

We learn from the latest researches of the chemist, that sugar enters almost as an essential ingredient into the food of all the higher animals; for although starch, which affords the staple of our farinaceous food, may be convertible into sugar by the processes of digestion, yet the change is probably of too slow a nature to satisfy the demands of the system, especially when the animal is not in its full vigour. Hence milk, the aliment upon which the young of all the higher animals subsist, is made up, of an albuminous principle, namely, caseine; of an oil; and of a species of sugar; the first intended to supply the waste of the tissues, and to provide

for their growth; the two latter subservient to the support of the animal heat.

In a more advanced period of life, indeed, farinaceous matter takes the place of the oily and saccharine principle, in the dietary of all nations; but even then the advantage of an admixture of oil and sugar is perceived, in the demand which exists, for animal oils in cold, and for vegetable ones in warmer districts; whilst the fattening effects of sugar are shown, by the condition of the negroes during the period of the year when they subsist chiefly on molasses, and by the conversion of honey into wax by the bee^a.

It is interesting therefore to find, that the bee, or at least an insect analogous to it, which stores up honey, is distributed over most parts, not only of the old world, but also of the new.

In the United States, indeed, the bees, now so common there, are not indigenous, having been the progeny of those, which were brought over in hives, soon after the colonization of the country.

At present, however, although this insect may be more common in warm climates, where the demand for saccharine food is naturally greatest, it extends even to the regions of the north, wherever the summer temperature is high

^a See Leibig's work on Animal Chemistry, 1842, and especially his Extract from Gundlach's Natural History of Bees. Dumas, who formerly took an opposite view, has since admitted the correctness of the theory, which assumes that wax is produced from sugar.

enough, to allow of the spontaneous growth of flowers which can supply it with the materials for its winter food. Thus the honey-bee is included in Linnæus' Swedish Fauna, although no mention of it occurs in his *Lachesis Lapponica*, so as to indicate its extension to Lapland.

Now indeed that cane and beet-sugar are articles so easily accessible, honey has become a mere luxury in European countries; but that vast quantities of it must still be consumed in certain parts of the globe, is evident from the amount of beeswax which is imported from Africa and other regions.

In 1831, the whole amount of this substance imported into England was 7203 cwt., of which, 3892 cwt. came from Western Africa, 1551 cwt. from Tripoli, Barbary, &c., 910 cwt. from the United States, and the rest from Russia, Germany, &c. (M'Culloch.)

Now every pound of beeswax, implies more than 15 lbs. of honey^b, all which must be consumed in the countries which supply us with the former.

We may therefore readily understand, how large an amount of honey must have been required in ancient times; and what importance must have been attached to its production in the rural economy of ancient Rome.

^b This at least is the proportion of wax to honey in the honeycombs of this country; for 1 lb. of the latter only yielded me 470 gr. of bees'-wax.

In treating of this subject, Columella dismisses as puerile the fables, repeated with respect to the origin of bees and of honey, which Virgil has given us in a poetical dress.

One notion however with respect to the honey which they store up, namely, that it is derived from the air, an idea which Virgil has expressed, when he says,

“ Protenus aërii mellis cælestia dona
Exsequar.” (GEORG. iv. 1.)

is not altogether devoid of foundation, although in a different sense from that which the ancient writers intended; for if honey be obtained from the nectar of flowers, it is certainly, in many instances at least, of aerial origin, especially in the case of those air plants, as they are called, which, rooted as they are in hard rocks, or in the crevices of decayed wood, can scarcely draw any nourishment except from the constituents of air and water.

No doubt, however, the aerial origin of honey arose in their minds, from a comparison between honey, and the honey-dew, which covers the leaves of many trees, and is now known to be an excretion from the aphis tribe. This Pliny (xi.12.) imagines to be derived from the heavens, and suggests several fanciful explanations as to its cause.

Columella remarks, that there are many varieties of bees, of different degrees of goodness, but that the smaller and milder are to be preferred;

an observation which, I believe, accords with modern experience.

Their duration does not exceed ten years, so that it is necessary constantly to introduce new swarms, the mode of effecting which he proceeds to explain.

But before he enters upon this subject, our author gives some directions as to the proper situation for a hive, adopting the recommendations of Virgil :

“ Quo neque sit ventis aditus (nam pabula venti
Ferre domum prohibent), neque oves hædique petulci
Floribus insultent, aut errans bucula campo
Decutiat rorem, et surgentes atterat herbas.”

(GEORG. iv. 9.)

The neighbourhood should abound also in aromatic plants, as the rosemary, both kinds of cytissus, the ilex, and the fir. Biot and Decandolle, the former in the Balearic islands, the latter at Narbonne, have ascertained, that the excellence of the honey in these two localities was due to rosemary, (Bibl. des. prop. rus, July, 1807.)

Of larger trees, the oak, the pistachio, (terebinthus,) the lentiscus, the cedar, and the lime, are the most appropriate; whereas the yew is the most objectionable of any.

Of flowers, the asphodel, the narcissus, the white lily, the leucojum, and the rose, are favourable to the production of honey, but especially the wild thyme, which latter communicates its own flavour and scent to the honey which it contributes to form.

It is remarkable, that Columella neither alludes to the heath, which renders the Attic honey so celebrated, nor to the rhododendron ponticum, which is supposed to have communicated poisonous qualities to the honey of Trebisond, as described by Xenophon.

Bees like a quiet situation, screened from extremes both of heat and cold, in winter opposite to the south, and removed from all fœtid and noxious smells.

Although, as a protection against thieves, there should be a hovel near, where a guardian may reside, and a slight inclosure may for the same reason be necessary, yet a high wall is objectionable; a supply of water should also be at hand, and the other directions of Virgil on this head are to be followed :

“ At liquidi fontes et stagna virentia musco
 Adsint, et tenuis, fugiens per gramina, rivus ;
 Palmaque vestibulum aut ingens oleaster inumbret :
 Ut, quum prima novi ducent examina reges
 Vere suo, ludetque favis emissa juvenus,
 Vicina invitet decedere ripa calori ;
 Obviaque hospitiis teneat frudentibus arbos.
 In medium, seu stabit iners, seu profluet humor,
 Transversas salices et grandia conjice saxa :
 Pontibus ut crebris possint consistere, et alas
 Pandere ad æstivum solem ; si forte morantes
 Sparserit, aut præceps Neptuno immerserit Eurus.”

(GEORG. iv. 18.)

The hives are most commonly composed of cork, if that be plentiful, it being proof both against the heat of summer and the cold of

winter. If not, osiers may be substituted, and if both are scarce, a hollow tree will serve the purpose. For a hive, clay is the worst material of any, as it admits both heat and cold, but both dung and bricks are occasionally used. The latter our author considers preferable.

There are two ways of procuring bees, either by purchase, or when in a wild state, by hunting them out into their retreats.

For discovering their haunts, Columella proposes a method very similar to the one adopted in North America at the present time.

It is known that when the pastures afford suitable materials for honey, bees are fond of resorting to the fountains that lie near, and to these the bee hunter resorts, in order to observe the number that come.

Should this be small, he concludes the spot to be unfavourable; but if considerable, he is encouraged to proceed; and for this purpose the following was the method adopted by the Roman bee hunter:

In the first place, he mixed up some red ochre with water, and smeared with it the grass in the neighbourhood of the spring. By this means the backs of all the bees that resort there became coloured red, and this mark enabled him to recognise them when they returned from their flights; from the time occupied in which, he could tell the distance of their hives from the spot to which they had resorted. If this were near, there

would be little difficulty in discovering where it lay, which may then be done simply by following the bees in their track homewards.

If however it be distant, the bee hunter took a reed, and made a hole in it, which he filled with honey, or some sweet syrup. When several bees, attracted by this, entered the hole, he closed it with his thumb, and let out one single bee at a time. This he chased as far as he could, and when he had lost sight of it, let out another, and then another, until he could follow it to the entrance of the hive. Should this be a cave, he smoked out the bees, and drove them into some contiguous bush or tree, where he could collect them in an appropriate vessel. But if it were an hollow tree, he sawed it across at a little distance both above and below the hive, and covered over the apertures with cloths. He was thus enabled to carry home the hive of bees which he had discovered.

The method adopted by the North American bee hunter is similar, though somewhat more scientific:

The hunter, on a clear sunshiny day, takes a plate or trencher, with a little sugar, honey, or molasses on it, and when he has got into the woods, sets it down on a rock or stump in the woods; this the bees scent out; for it is generally supposed that bees will scent honey or wax at more than a mile's distance. The hunter secures in a box some of these bees whilst they are filling themselves, and after a little time lets one

of them go, observing very carefully the course it steers; for after he has risen in the air, he flies directly, or in a straight course, towards the tree where the hive is. The hunter therefore carries with him his pocket compass, his rule, and other implements, together with a sheet of paper, upon which he sets down the course. Supposing it to be west, he is sure from this that the tree must be somewhere in a line west from where he is; but still he wants to know the exact distance from his station. To determine this, he turns a little to the north or south, as the case may be. Suppose him to go 100 perches to the north, he then lets out another bee and observes very carefully the course it takes. This being marked down, he has only to ascertain the point at which this, and the course taken by the first bee, intersect each other, and here the hive may be expected to be.

All this is founded on the straight course which bees take, when they return home laden with their honey; a course so mathematically true, that the hunter can depend upon this method for tracking them to their homes. (Mr. Dudley, *Phil. Trans.* No. 367, vol. 31.)

In speaking of the method of preserving our stocks, Columella puts us in possession of the state of knowledge which prevailed in his time with respect to the domestic economy of these curious insects. This indeed must have attracted notice from a very early period. It is true that Homer, in alluding to bees, seems only to have

been aware of the murmur and bustle which they manifest when disturbed, comparing it to the noise and tumult of a body of soldiers when dismissed from their ranks :

Ἦύτε ἔθνεα εἴσι μελισσάων, ἀδινάων,
 Πέτρης ἐκ γλαφυρῆς αἰεὶ νέον ἐρχομενάων,
 Βοτρυδὸν δὲ πέτονται ἐπ' ἀνθεσιν εἰαρινοῖσιν·
 Αἰ μὲν τ' ἔνθα ἄλις πεποτήγεται, αἰ δέ τε ἔνθα·
 Ὡς τῶν ἔθνεα πολλὰ νεῶν ἄπο καὶ κλισιάων
 Ἠϊόνος προπάρουθε βαθείης ἐστιχόωντο
 Ἰλαδὸν εἰς ἀγορῆν· μετὰ δέ σφισιν Ὅσσα δεδήκει
 Ὀτρύνουσ' ἰέναι, Διὸς ἄγγελος· οἱ δ' ἀγέροντο.
 Τετρήχει δ' ἀγορῆ, ὑπὸ δ' ἐστεναχίζετο γαῖα
 Λαῶν ἰζόντων, ὄμαδος δ' ἦν· (Iliad. β'. 87.)

“As from some rocky cleft the shepherd sees
 Clustering in heaps on heaps the driving bees
 Rolling, and blackening, swarms succeeding swarms
 With deeper murmurs, and more hoarse alarms ;
 Dusky they spread, a close embody'd crowd,
 And o'er the vale descends the living cloud.
 So from the tents and ships a length'ning train,
 Spreads all the beach, and wide o'er shades the plain ;
 Along the region runs a deaf'ning sound,
 Beneath their footsteps groans the trembling ground,
 Fame flies before, the messenger of Jove,
 And shining soars, and claps her wings above.”

Nevertheless, we find from Pliny, that Aristomachus, a Greek philosopher, devoted fifty-eight years to their study ; and Philiscus the Thracian lived in desert places for the sake of examining their habits. Accordingly, the works of Pliny and Columella, as well as of Aristotle, contain many real particulars with respect to their habits,

although mixed up with a good deal, which modern observation has proved to be erroneous.

Enough however was known of their policy to render Pliny eloquent on the subject: "Favos," he says, "configunt, et ceras, mille ad usus vitæ: laborem tolerant, opera conficiunt, rempublicam habent, consilia privatim, ac duces gregatim; et quod maxime mirum sit, mores habent.

"Præterea, quum sint neque mansueti generis, neque feri, tamen tanta est natura rerum, ut prope ex umbra minimi animalis, incomparabile effecerit quiddam. Quos efficaciam industriæque tantæ comparemus nervos? quas vires? quos rationi medius fidius viros? hoc certe præstantioribus, quo nihil novere, nisi commune." (Nat. Hist. lib. xi. c. 4.)

They form honeycombs and wax applicable to a thousand useful purposes; they endure labour; they perfect their operations; they possess a commonwealth, have their private deliberations, and their chiefs for each swarm; and, what is most wonderful, their code of morals (or perhaps, their laws and institutions). Moreover, though their disposition, if not ferocious, cannot be said to be placable, yet it must be admitted that nature has exhibited in their case her power, by producing from an animal so minute and insignificant that to which nothing else can be compared. For where shall we find sinews to equal theirs for exertion and industry? where such strength? where, in the name of fortune, men that can

compete with the reason they display, in one respect at least certainly surpassing all mankind, inasmuch as they have all things in common?

And in like manner Virgil says, many have imagined that bees are endowed with a portion of the divine mind, and with spiritual influences:

“Esse apibus partem divinæ mentis, et haustus
Ætherios dixere:” (GEORG. iv. 220.)

For

“Solæ communes gnatos, consortia tecta
Urbis habent, magnisque agitant sub legibus ævum:
Et patriam solæ, et certos novere penates:
Venturæque hiemis memores, æstate laborem
Experiuntur, et in medium quæsita reponunt.”
(GEORG. iv. 153.)

In this the poet was mistaken, for naturalists have discovered various communities of insects which work thus in common. But where he describes the division of labour in the hive, and the beautiful organization of the entire insect community, he comes nearer to the truth:

“Namque aliæ victu invigilant, et fœdere pacto
Exercentur agris: pars intra sæpta domorum
Narcissi lacrymam, et lentum de cortice gluten,
Prima favis ponunt fundamenta, deinde tenaces
Suspendunt ceras: aliæ, spem gentis, adultos
Educunt fœtus: aliæ purissima mella
Stipant, et liquido distendunt nectare cellas.
Sunt, quibus ad portas cecidit custodia sorti:
Inque vicem speculantur aquas, et nubila cœli:
Aut onera accipiunt venientum, aut agmine facto
Ignavum, fucos, pecus a præsepibus arcent.
Fervet opus, redolentque thymo fragranti a mella.”
(GEORG. iv. 158.)

The Roman writers had also discovered, that every community of bees possessed a sovereign, to whom they paid implicit deference and attention, and when deprived of whom, they are thrown into a state of disorder and anarchy. But not being aware that this sovereign was a female, of which all the other bees were the progeny, they regarded it as the king of the hive. Thus Virgil :

“ Præterea regem non sic Ægyptos, et ingens
Lydia, nec populi Parthorum, aut Medus Hydaspes,
Observant. Rege incolumi mens omnibus una est :
Amissa rupere fidem ; constructaque mella
Diripuere ipsæ, et crates solvere favorum.”

(GEORG. iv. 210.)

Columella therefore explains, that, as there can be no divided authority amongst bees, whenever the community becomes too numerous to be contained within the hive, a swarm issues forth under a new king, and seeks for fresh quarters. Then it is that the skill of the beekeeper is called in requisition, to prevent their desertion of the premises, by seizing the chieftain or queen bee, and conveying it into a new hive, where it will be followed by the whole swarm.

Much vigilance therefore is required to watch the moment when the swarm issues forth, which is generally preceded by a buzzing and tumult within the hive.

This however might also arise from a contest between two rival chiefs and their respective parties, when it is followed by a furious battle, waged between them in the vicinity of the hive.

But as this is attended with a great loss and destruction of the bees, we must endeavour to put a stop to the fight, either by drawing off the combatants, by the allurements of some sweet liquor, or by frightening them by noise, or in some other way. And we must endeavour to prevent a repetition of the conflict, by seizing upon one of the chiefs, and putting her to death.

Those directions are given in a more poetical garb, but with no essential difference by Virgil :

“ Sin autem ad pugnam exierint ; nam sæpe duobus
Regibus incessit magno discordia motu,
Continuoque animos vulgi et trepidantia bello
Corda licet longe præsciscere : namque morantes
Martius ille æris rauci canor increpat, et vox
Auditur fractos sonitus imitata tubarum.”

(GEORG. iv. 67.)

Then, after a glowing description of the fight, he adds,

“ Hi motus animorum atque hæc certamina tanta
Pulveris exigui jactu compressa quiescunt.
Verum ubi ductores acie revocaveris ambo ;
Deterior qui visus, eum, ne prodigus obsit,
Dede neci : melior vacua sine regnet in aula.

(GEORG. iv. 87.)

If, on the contrary, the bees that have issued from the hive, instead of being divided into two swarms, hang down like a bunch of grapes from a tree or bush, we may infer that there is only one leader, and have only to conduct the swarm, in the manner before explained, into an appropriate hive ; although, if it should prove to entertain any roaming propensities, we may secure

the entire swarm by plucking off the wings of their leader, and thus preventing it from leaving the hive, confident that the rest of the swarm will not desert their sovereign.

The royal bee (as I shall call it, in order not to transfer to the ancient writers the ideas of modern naturalists) is distinguished from the rest by its greater size and length, and brighter colour; the latter, however, according to Kirby and Spencer, not holding good with respect to the whole of the body, but only of the abdomen.

According to Columella, it has no sting; or if what looks like a thicker band of hair, which it has on its belly, be one, at least it does not use it as a weapon of offence.

Modern authors however recognize it as a sting, differing from others only in being curved.

With regard to the two kinds of royal bees, which Columella admits, and which Virgil describes in so beautiful a manner,

“ hic melior, insignis et ore,
Et rutilus clarus squamis : ille horridus alter
Desidia, latamque trahens inglorius alvum,”

(GEORG. iv. 93.)

all we can say is, that there is no foundation, in fact, for this distinction; and that ancient writers may probably have confounded the drone, to which the latter description applies, with the queen bee, which is distinguished from the rest by its more brilliant colour, as well as by its greater size.

When it is deemed expedient to join together two swarms, from their not being numerous enough to thrive separately, it may be done by killing one of the royal bees; and in that case the younger is to be victimized, the older bees not liking to find themselves under the authority of a youthful chief.

This is in accordance with modern experience; for when two queen bees issue forth, as is sometimes the case with the first swarm, the older one being distended with eggs, and consequently larger, is preserved; and the younger one, which has no eggs matured, is destroyed.

Ancient writers were not aware of the true nature and function of the drones, which is now known to be that of the male. Columella indeed says, that they contributed in some degree to the hatching of the eggs, from which the bees are derived, but only, as it should seem, by sitting upon them, and keeping them warm.

Their destruction, or expulsion from the hive, by the working bees, had long been observed, and is the signal, says Columella, that the time is come for taking the honey.

The erroneous notion entertained by the ancients with regard to the sex of the royal bee, kept them in ignorance as to the generation of these insects, and led to many fanciful and absurd hypotheses on the subject.

Thus Virgil says, that they are produced "sine concubitu," and that they gather their

young themselves from flowers, and sweet herbs :

“ *Illum adeo placuisse apibus mirabere morem,
Quod nec concubitu indulgent, nec corpora segnes
In Venerem solvunt, aut fœtus nixibus edunt :
Verum ipsæ e foliis natos et suavibus herbis
Ore legunt ; ipsæ regem parvosque Quirites
Sufficiunt ; aulasque et cerea regna refingunt.*”

(GEORG. iv. 198.)

He even countenances the fable, which Pliny repeats with a little variation, that the Egyptians produce a swarm of bees from the corrupted carcass of a beast ; a tradition founded upon the rapidity with which flies and other insects are engendered under such circumstances :

“ *Tempus et Arcadii memoranda inventa magistri
Pandere, quoque modo cæsis jam sæpe juvenicis
Insincerus apes tulerit cruor. Altius omnem
Expeditam prima repetens ab origine famam.*”

(GEORG. iv. 283.)

He then goes on to state, that in Egypt they place firm reliance upon the practice, and describe the method thus : after selecting a confined space for the purpose,

“ *Tum vitulus, bima curvans jam cornua fronte,
Quæritur : huic geminæ nares, et spiritus oris
Multa reluctanti obsuitur, plagisque peremto
Tunsa per integram solvuntur viscera pellem.
Sic positum in clauso linqunt, et ramea costis
Subjiciunt fragmenta, thymum, casiasque recentes.
Hoc geritur, zephyris primum impellentibus undas,
Ante novis rubeant quam prata coloribus, ante
Garrula quam tignis nidum suspendat hirundo.
Interea teneris tepefactus in ossibus humor*

Æstuat : et visenda modis animalia miris :
 Trunca pedum primo : mox et stridentia pennis
 Miscentur, tenuemque magis magis aëra carpunt :
 Donec, ut æstivis effusus nubibus imber,
 Erupere ; aut ut, nervo pulsante, sagittæ,
 Prima leves ineunt si quando prælia Parthi."

(GEORG. iv. 299.)

Aristotle indeed, whom Pliny follows, comes one step nearer to the truth ; for after alluding to some of the fabulous notions above mentioned, he remarks, that others affirm the drones to be the males, the working bees the females^d.

The former is now known to be the fact. But although the working bees are undeveloped females, yet the only one capable of producing eggs is the queen bee, which itself however is developed from one of the workers, by being pampered with more nutritious food, and lodged in a roomier cell.

I have now, I believe, extracted most of the particulars of Columella's Treatise, possessing interest in the estimation of an academical au-

^d See the newest views on this subject by Von Siebold, in the Edinburgh Ph. Journ. for April 1857.

The most startling fact he announces is, that the eggs which have not come into contact with the spermatic fluid produce drones ; and those which have, working bees, or queen bees, according to their subsequent treatment. Nor is this altogether an anomaly, for in other lepidopterous insects, it would appear that females are produced occasionally without impregnation.

Siebold also assures us that the queen bee possesses the power of depositing male or female eggs at pleasure.

dience, which come, strictly speaking, under the denomination of Husbandry; but the term "Res Rustica," in the acceptation of our Author, had a wider meaning, embracing also Floriculture and Gardening. Upon these latter subjects therefore I shall enter in my two concluding Lectures, in which I propose to bring before you such scattered notices, as the Ancient Writers contain, with respect to their Gardens; and to identify, so far as I can, the names of the plants they specify, with those, which are at present found growing in the classical countries, from which their knowledge was principally derived.

LECTURE VII.

COLUMELLA.

BOOK X.

A COURSE of Lectures on the Rural Economy of the Ancients would not be complete without some mention of their Gardens, and of the Plants cultivated within their precincts.

It is true, that Virgil has passed over this department of rural economy in his Georgics, alleging as a reason, a want of space for its full consideration; although no one can help regretting the omission, who reads the beautiful lines in which he introduces a casual allusion to the subject:

Atque equidem, extremo ni jam sub fine laborum
 Vela traham, et terris festinem advertere proram:
 Forsitan et, pingues hortos quæ cura colendi
 Ornaret, canerem, biferique rosaria Pæsti:
 Quoque modo potis gauderent intuba rivis,
 Et virides apio ripæ; tortusque per herbam
 Cresceret in ventrem cucumis: nec sera comantem
 Narcissum, aut flexi tacuissem vimen acanthi,
 Pallentesque ederas, et amantes litora myrtos.
 Namque sub Cæbalix memini me turribus arcis,
 Qua niger humectat flaventia culta Galæsus,

Corycium^a vidisse senem, cui pauca relict
 Jugera ruris erant : nec fertilis illa juvenis,
 Nec pecori opportuna seges, nec commoda Baccho.
 Hic rarum tamen in dumis olus, albaque circum
 Lilia, verbenasque premens vescumque papaver,
 Regum æquabat opes animis : seraque revertens
 Nocte domum, dapibus mensas onerabat inemtis.
 Primus vere rosam, atque auctumno carpere poma :
 Et, quum tristis hiems etiam nunc frigore saxa
 Rumperet, et glacie cursus frenaret aquarum,
 Ille comam mollis jam tondebat hyacinthi,
 Æstatem increpitans seram zephyrosque morantes.
 Ergo apibus fœtis idem atque examine multo
 Primus abundare, et spumantia cogere pressis
 Mella favis ; illi tiliæ, atque uberrima pinus ;
 Quotque in flore novo pomis se fertilis arbor
 Induerat, totidem auctumno matura tenebat.
 Ille etiam seras in versum distulit ulmos,
 Eduramque pirum, et spinos jam pruna ferentes,
 Jamque ministrantem platanum potantibus umbras.
 Verum hæc ipse equidem spatiis exclusus iniquis
 Prætereo, atque aliis post me memoranda relinquo.

(GEORG. IV. 116.)

But what Virgil declined, Columella has attempted to supply in the 10th book of his Treatise, in which he presents us with a poem on Gardening, not destitute of elegance ; though in a few parts more turgid in its style, and more far-

^a It has been questioned, whether Virgil really meant that his old man was a native of Corycia, or whether he did not give him this title out of compliment to his skill in gardening. For the Cilicians, of which Corycus was a city, were famous for their skill in gardeniug. Voss, however, observes, that certain Cilician pirates, whom Pompey subdued, were transplanted by him to Calabria, and supplied with land. Hence this old man may have been one of the number of the above colony.

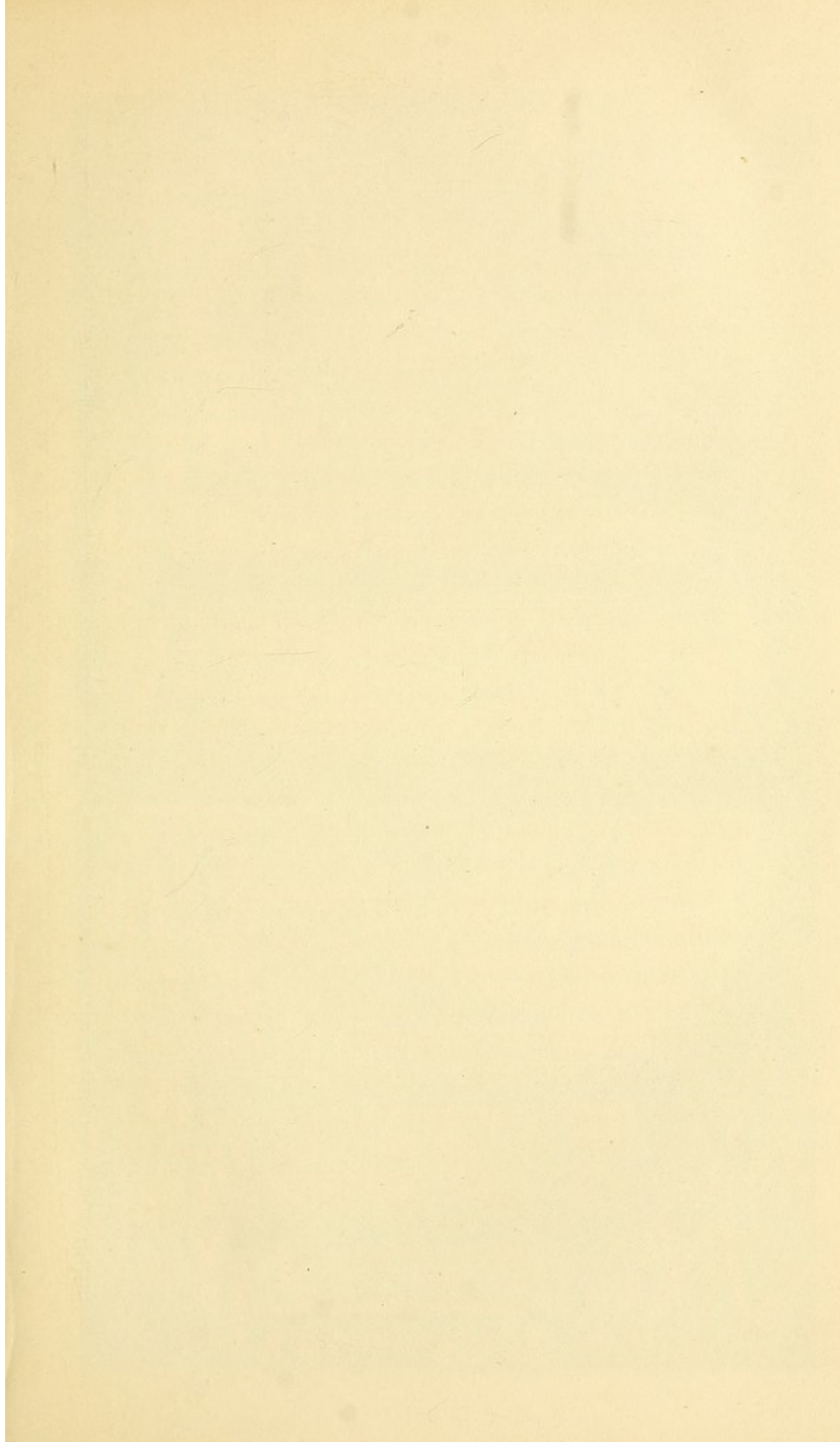
fetched in its allusions, than the severer taste of the poet, whom he proposes to himself as his model, would have permitted. He has also given us the greater part of the same directions, divested of their poetry, in a chapter of his 11th book.

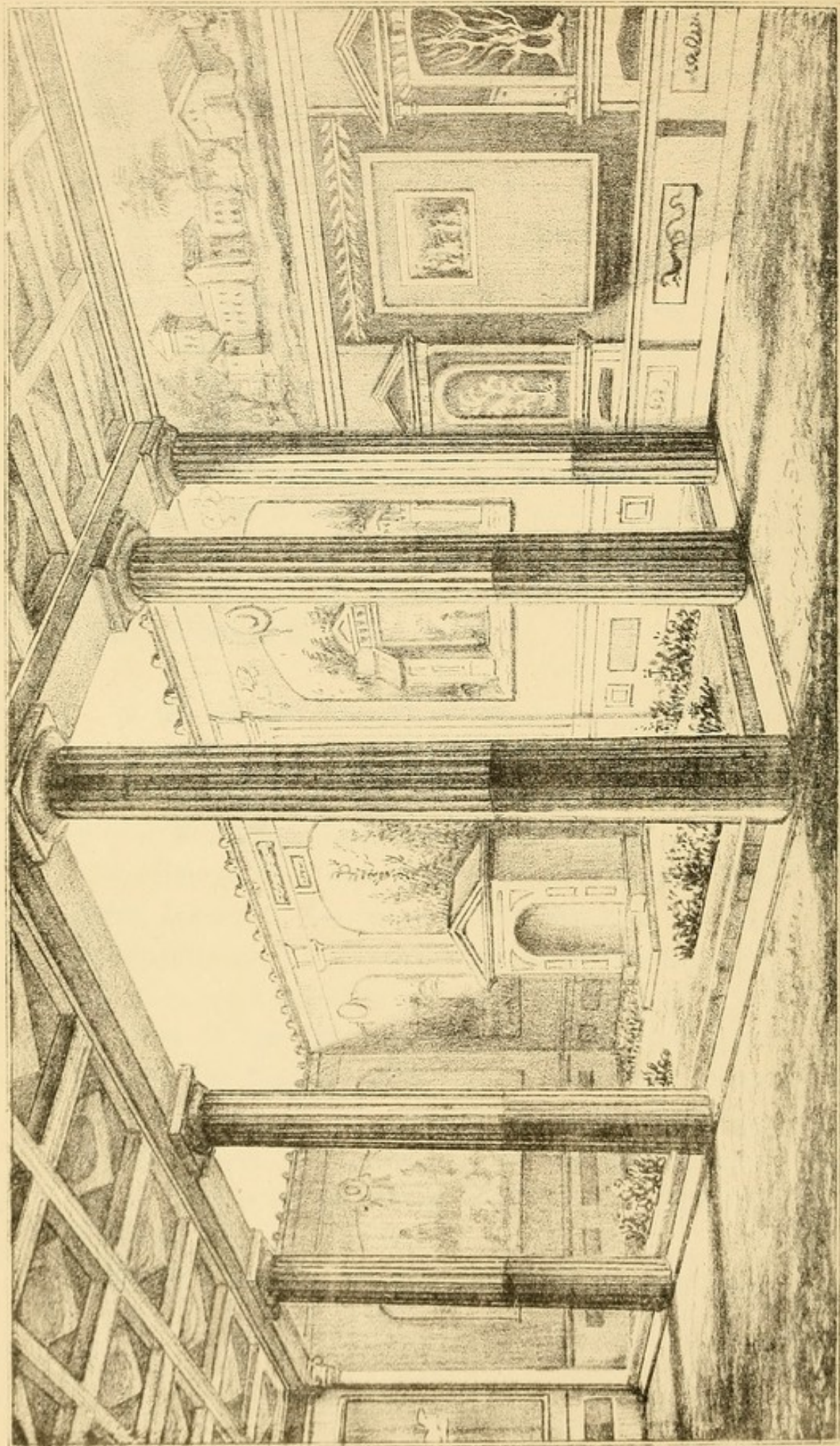
Both together, however, impart to us, it must be confessed, but a slight insight into Roman gardening, the descriptive part being very meagre, and the number of plants enumerated falling considerably short of a hundred. We must therefore draw largely from other sources, and especially from Pliny, whose notices of the plants known at that period are far more extensive than those which Columella has given us.

In the earliest periods of Roman history every family had its garden, and, as little animal food was consumed, it was from this source that the population principally drew its subsistence.

Hence in the laws of the Twelve Tables, the term *hortus* is synonymous to *heredium* or inheritance; and the word *villa* is nowhere made use of. As a proof indeed of the honour paid to gardens by the old Romans, Pliny remarks, that men of the highest rank were willing to borrow their names from its contents, as in the Valerian family, where the Lactucarii did not think themselves disgraced by taking their names from the Lettuce.

These however were mere kitchen gardens,





GARDEN & PORTICO, POMPEII.

fr. W. Gell

containing such plants and trees alone as were subservient to the daily uses of life; and in Cato's work, the only notice we have of a garden is of this description, although it be true, that, according to Pliny, he recommended that plants which could be used for chaplets should be likewise cultivated in it.

In proportion however as civilisation and wealth increased, a taste for ornamental plants became prevalent; and even in Rome itself, as we are informed by Pliny, it was the fashion of the day, among the lower classes, to have little gardens in the front of their houses, until debarred from that indulgence by the necessity of shutting out the robbers which so abounded in the city.

That flower-pots were common in the windows of the Roman citizens, appears also from an epigram of Martial,

“Donasti, Lupe, rus sub urbe nobis :
Sed rus est mihi majus in fenestra.” (xi. 19.)

Of these mimic gardens a representation is given by sir W. Gell in his *Pompeiana*^b, where a house may be seen depicted, with its walls painted with trees, fountains, and birds, in imitation of a real garden, and with the small area it enclosed, ornamented with vases of flowers.

But if the common people cherished such a love for ornamental flowers, it is not to be wondered at, that amongst the wealthier Romans,

^b Given in the plate annexed, which is taken from Gell's *Pomp.* part ii. v. 2.

the gardens were of great size, and that much expense was lavished upon their decoration.

The gardens of Sallust, of Lucullus, of Cæsar, of Pompey, &c. were celebrated for their beauty and extent; and Pliny informs us, that pleasure grounds, as well as parks and villas, existed in his time in the very heart of the city.

Thus Claudian says,

“ Quid loquar inclusas inter laquearia sylvas,
Vernula qua vario carmine ludit avis ?”

And Seneca remarks,

“ Palatia in laxitatem ruris excurrunt.”

Essential parts of every complete garden were the Gestatio and the Hippodromus; the former a broad regular pathway noticed in Pliny's description of his villa^c, in which the Romans were carried to and fro in a lectica for an airing; the latter a place to drive about, like a circus, consisting of several paths, divided by hedges of box, and surrounded by trees, so as to occupy considerable space.

Martial appears to have possessed both these conveniences in his town villa :

“ Cui plana summos despicit domus montes,
Et rus in urbe est, vinitorque Romanus ;
Nec in Falerno colle major auctumnus,
Intraque limen clausus essedo cursus.”

(EPIGR. xii. 57.)

Nevertheless the descriptions of these gardens, in the classical writings that have come down to us, are scanty and meagre.

^c See Lecture ii.

Statius, for instance, has celebrated at some length the beauties of two country houses belonging to his friends Vobiscus and Pollius Felix^d, but without alluding to their gardens; and indeed the only pleasure ground, properly so called, of which we possess any detailed account, is that of Pliny the Younger, which was attached to his summer villa, situated in Tuscany, (Book 5, Letter 6^e.)

After describing the house and the walks immediately adjoining it, "you enter," he says, "a straight walk, which breaks out into a variety of others, divided by box hedges.

"In one place you have a little meadow; in another the box is cut into a number of different forms, representing letters, sometimes expressing the name of the master, sometimes that of the artificer; whilst here and there little obelisks rise alternating with fruit trees; when on a sudden, in the midst of this elegant regularity, you are surprised with an imitation of the negligent beauties of rural nature; in the centre of which lies a spot surrounded with a knot of dwarf plane trees. Beyond, there is a walk planted with the smooth and twining acanthus, where the trees are cut also into a variety of names and shapes. At the upper end is an alcove of white marble, shaded with vines, supported by four small Carystian pillars.

"From this bench the water, gushing through several little pipes, falls into a stone cistern un-

^d Sylva, lib. x.

^e Lecture ii.

derneath, from whence it is received into a fine polished marble basin, so artfully contrived, that it is always full without ever overflowing.

“Fronting the alcove stands a summer-house of exquisite marble, the doors of which open into a green enclosure, so that from its upper and lower windows the eye is presented with a variety of different verdures. Next to this is a little private recess furnished with a canal; and which, though it has windows on every side, enjoys a very agreeable gloominess, owing to a spreading vine which climbs to the top and entirely overshadows it. Here you may recline and fancy yourself in a wood, with this difference only, that you are not exposed to the weather.

“In this place also a fountain rises and instantly disappears; whilst in different quarters are disposed several marble seats, which serve, no less than the summer-house, as so many resting places, after one is fatigued with walking. Near each seat is a little fountain; and throughout the whole hippodrome, several small rills run murmuring along, wheresoever the hand of art thought proper to conduct them, watering sometimes one, and sometimes another green spot, and now and then refreshing the whole.”

From this description it would seem, that the Romans, in the time of Pliny, had not advanced beyond that stiff and formal style of gardening, which prevailed a century or two ago in England, and which is still in vogue on the continent;

and that their principal study was to clip their trees into strange fantastical shapes, just as in the time of Charles the Second was the case in England, and even met with commendation from such authorities as sir W. Temple :^e

“ The suffering eye, inverted nature sees,
Trees cut to statues, statues thick as trees ;
With here a fountain never to be play'd,
And there a summerhouse that knows no shade ;
Here Amphitrite sails through myrtle bowers,
There gladiators fight, or die in flowers :
Unwater'd see the drooping seahorse mourn,
And swallows roost in Nilus' dusty urn.”

(Pope's Epist. iv. 119, &c. vol. 3.)

Thus in our own Botanic Garden, the two yews which terminate either side of the central walk were clipped to represent giants, much to the admiration of the good people of that period, as we may infer from the copies of doggerel verses written at the time, to celebrate their remarkable appearance^f.

It is stated that C. Matius Calvena^g, the friend of Julius Cæsar, and favourite of Augustus, first

^e See Horace Walpole on modern Gardening.

^f See, in Antony Wood's collection of printed papers in the Ashmolean Museum, Vol. 423. Art. 38, a ballad “on the gyants in the Physick Garden in Oxford, who have been breeding feet as long as Garagantua was teeth. To the tune of the Counter Scuffle,” 1662. Also Art. 39, “upon Mr. Robert's Yew-men of the Guards to the Physick Garden,” July 1662. And Art. 41, “upon the most hopeful, and even flourishing sprouts of valour, the indefatigable centrys of the Physick Garden,” by John Drope, A. M., Fellow of Magd. Coll. Oxon. 1664.

^g See Pliny, lib. xii. c. 6.

taught his countrymen this monstrous method of distorting nature by cutting trees into regular shapes.

So common did it become, that gardeners went by the name of *topiarii*, to indicate that this was their especial function. Some of their duties, however, were more consistent with good taste; for Cicero mentions that his *topiarius* had covered the walls, trees, and terraces of his villa with ivy; and Pliny says the same with reference to his Tuscan retreat.

Nor was Nature in all cases entirely banished; for we have already seen that thickets and meadows were interspersed in Pliny's garden with formal avenues; and we have an inkling of better taste in the praise bestowed by Martial upon the rural retreat of his friend Faustinus^h, and in the ridicule he casts upon the *Daphnonas*, *Platanonas*, et *aëreas cyparissos*—the stiff avenues of laurels, planes and cypresses—belonging to another acquaintance, more famous for his ostentation than for his hospitalityⁱ; as well as in Nero's attempt to introduce into the Gardens of his Imperial Palace, fields, lakes, woods, and landscapes, under the guidance of Severus and Celer, two persons, says Tacitus^k, who had the genius and boldness to try to accomplish by art, even what nature had denied.

Still, however, the chief admiration of the

^h Lib. iii. 58.

ⁱ Ep. lib. xii. 50.

^k Annals, lib. xv.

Romans appears to have been lavished upon the ingenuity displayed in clipping and pruning their trees into a number of fantastic shapes—walls, figures of beasts, ships, letters, and so forth, being thus imitated.

The box was especially tortured in this manner. The cypress tree too, as Pliny says, was clipped and trained to form hedge-rows, or else was twisted into various forms, according to the caprice of adepts in the art of Gardening, (*ars topiaria*,) representing scenes of hunting, fleets, and various other objects, which it clothes, as it were, with a thin and short leaf, that is always green.

This practice of distorting Nature is, of course, worthy of all reprobation; but it may be doubted, whether we do not at the present time, in this country at least, fall into the opposite extreme to that which the ancients indulged in.

He indeed, whatever his means may be, who, as a matter of taste, prefers a cottage in a retired and picturesque locality, to a more ostentatious residence placed in the midst of an ample domain, acts only consistently, in striving to conceal the share which Art has had in supplying his wants, and in maintaining in all their integrity the rugged features of the locality which he has selected, in order, as Martial says,

“Rure vero, barbaroque lætari.”

But it is different with the owner of a large and stately mansion, which bears upon its very

face the triumph of Art over Nature, and seems intended to court observation, rather than to escape it.

Here it would seem only in accordance with the tone and character of the scene, that the gardens immediately around the principal residence should exhibit signs of the same expenditure of human skill and labour, which is displayed in the edifice, of which it must be regarded as an appendage.

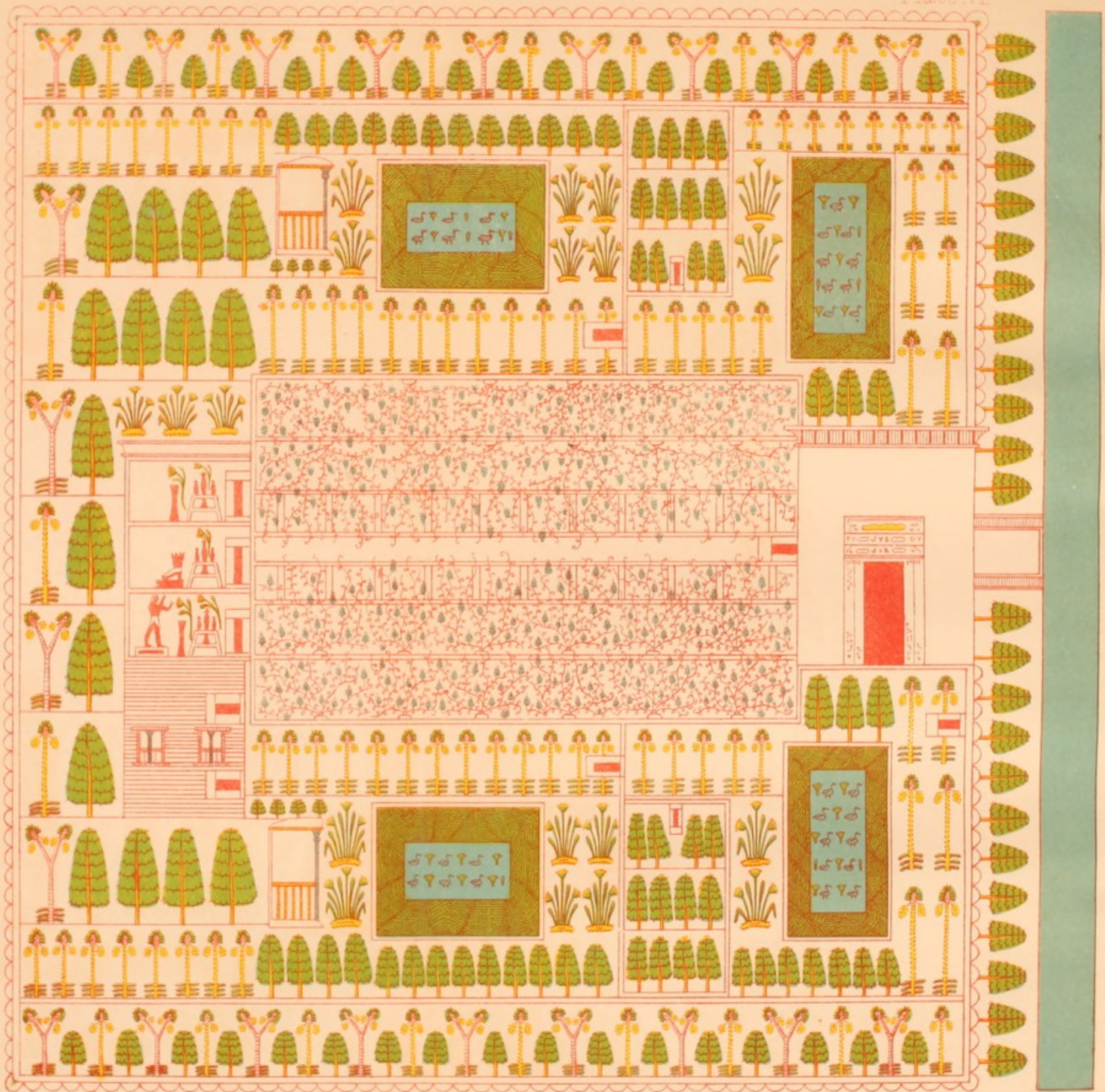
The same poet, who ridicules the false magnificence of Timon's garden, where

“ Groves nod at groves, each alley has a brother,
And half the platform just repeats the other,”
(Ess. iv. 117.)

tells us, in another place of the same essay (57), to

“ Consult the genius of the place in all
That tells the waters or to rise or fall,
Or helps th' ambitious hill the heavens to scale,
Or scoops in circling theatres the vale ;
Calls in the country, catches opening glades,
Joins willing woods, and varies shades with shades ;
Now breaks, or now directs, th' extending lines,
Paints as you plant, and as you work, designs.”

A spacious and sumptuous edifice seems to demand in its immediate vicinity, straight and broad terraces, fountains and statues, parterres systematically arranged, and filled with choice exotics ; and when a less artificial style is resorted to, the pleasure-grounds should be at such a distance from the residence, that we may forget for the moment, that the whole is the creation of Art, and the result of lavish expenditure.



PLAN OF AN EGYPTIAN GARDEN.

From Rosellini's *Monumenti dell' Egitto e della Nubia*, Vol. 2. Pl. 69.

But of grounds laid out with a view of displaying the beauties of Nature, we have no account in the writings of antiquity; unless the parks, or Paradisi, of the Persian monarchs may be regarded as answering that purpose.

Amongst the bas-reliefs lately brought from Nineveh, and now deposited in the British Museum, is one representing an Assyrian garden. It describes a pleasure-ground of considerable size, as an aqueduct or river flows through the enclosure, with cross channels leading from it, intended no doubt for irrigation. The aqueduct crosses a road, which leads up to a temple placed on the height above; and trees of various kinds, but apparently not palms, are arranged in avenues through the Garden.

Of an Egyptian garden too we have representations in the works of Rossellini and Lipsius. Thus in plate 39 of the 2nd volume of the great work of the former, is shewn us the manner in which the Egyptians trained their figs; and in plate 40, their method of watering the kitchen vegetables; whilst plate 69, of which I have inserted a reduced copy, exhibits to us the entire arrangement of a Garden.

This latter picture, Rossellini says, is taken from a vast Theban tomb, which belonged to a military chief in the reign of Pharaoh Amenof II, the 6th king of the 18th Dynasty. It represents a large square, surrounded with jagged walls, on the right side of which flows a river, and on that

side is shaded by an avenue of large trees; in the middle of this side is a road, which leads to the gate of ingress, which opens into a massive gateway in the Egyptian fashion; the architecture and jambs of which are adorned with the name and titles of the king, which however cannot be any longer deciphered.

Behind this principal entrance, which must be supposed to be in a line with the wall, is an outer gate, or a passage flanked with trees, through which we come to a small gate, and from this enter into a large arbour of vines, which occupies the centre of the Garden.

Within the quadrangle are alleys composed of trees of various kinds in regular alternation; namely, the Date, a tree of indeterminate form which is perhaps meant for the Sycamore or the Persea, and the Doom Palm. It was the custom in Egypt, and in other countries of Africa, to plant trees of various species in regular alternation.

Other smaller alleys approach the flank of the vine-arbour, which appear to be all shut; since, besides a double line, which denotes a wall of enclosure, doors are represented which lead to them.

And these alleys are intended to enclose and give shade to four basins, or tanks, surrounded by a margin of turf, and full of water, in which nymphæas float, and water-birds swim.

Near the margins of the basins are figured with a beautiful symmetry, tufts of papyrus,

planted in large and low vases, which we may suppose full of the water necessary for the vegetation of the plant, indicated in the usual manner, by an undulating line.

On the left of the tombs, which stand on the flanks of the vine-arbour, we observe two temples of the accustomed form, serving both as a tabernacle for the images of the gods, and also as a tent; these are surrounded at their base by a sort of balustrade, and, there being no proof that they were consecrated to any gods in particular, may be supposed to have been made to serve as resting places for those who walked in the Garden.

Towards the bottom of the picture, beyond the arbour, is situated the dwelling, into which we enter by two doors on the same flank; to the ground floor two elegant windows gave light, and above are three stories, the uppermost covered by a cornice, upon which are placed three vases, with plants of the papyrus, like to those which stand near the basins; on each of the stories of the dwelling is prepared an offering of vases and flowers; and on the first floor is figured a man with his hands raised in the act of offering sacrifice, or of praying; whilst on the second floor there was a figure kneeling, which is now half destroyed.

These figures having reference to the domestic religion of the Egyptians, may possibly have been designed with the intention of offering up prayer

for the good of the deceased, on whose tomb is probably represented the house and garden, which had served him as his abode during life.

In Columella's poem, "De Cultu Hortorum," there is no allusion to what is now called landscape gardening, no description of a pleasure ground, or of an elegant suburban retreat; but simply an account of what would be contained in such a garden, as might be appended to a farm house, or be cultivated with a view to profit, in which, therefore, not merely ornamental plants, but also pot-herbs were included; and in which both fruit trees and vines found a place within the precincts.

It is, in fact, an amplification of Homer's description of the gardens of Alcinoüs in the 7th Book of the Odyssey, where it is stated, that the ground was divided into three parts, serving as a grove for fruits and for shade, as a vineyard, and as an enclosure set apart for olives and pot-herbs. It is watered, he says, by two fountains, one of which supplies the town, the other the palace.

The trees bore throughout the year, so that whilst some were in flower, others were loaded with ripe fruit. The prominence given to pot-herbs may be inferred from the term "πρασιαί:"

*Ἐνθα δὲ κοσμήται πρασιαί, παρὰ νείατον ὄρχον
Παντοίαι πεφύασιν, ἐπηεταδὺν γανόωσαι.*

Od. vii. 127.

the term *πρασιαί*, or plots, being derived from

the Greek word for *onion*. Nor is any mention made of ornamental plants, or of a pleasure-ground.

Plutarch also speaks of the practice of planting roses and violets side by side with leeks and onions, which would seem to imply, that even in his time the ornamental part of the garden was not kept distinct from the useful.

Such, then, being the case, we need not be surprised, that in the garden described by Columella little more is offered than directions, as to the various operations necessary for keeping such a plot of ground in good order, and as to the periods at which they should be carried on, together with an enumeration of such plants as ought to be introduced into it.

He begins by directing us to choose a rich soil, which, after digging, becomes as loose and pulverulent as sand; a soil, which produces of its own accord a luxuriant pasturage, and abundance of elder-berries, together with a profusion of wild pears, apples, and grapes.

It should neither be dry, nor yet swampy; but ought either to be in the vicinity of a river, or else provided with a well, so shallow as not to fatigue the labourer in drawing up water for his plants.

The ground should be fenced in, either with a wall, or a thick hedge, but no elaborate ornaments should be introduced; nor should statues find a place in it, except it be one of the God of

Gardens, who may be allowed to hold his accustomed position, as the presiding deity and guardian of the place.

About the autumnal equinox, the soil, if it has been already well saturated by the rains, is to be turned up with an iron spade; but if not, it must be first irrigated; for if this cannot be done, the digging must of necessity be postponed till winter.

When, however, the swallow announces the return of spring, the gardener is to manure his ground with the rich heaps of his farm-yard, with the dung of cattle, or of men, and then to turn up the earth again with his prong (*bidens*). He next is to pulverize the soil with his mattock (*marra* and *ligo?*). And then, after having a second time triturated the soil with his hoes (*sarcula*), he must mark out again the plots, into which the garden is to be divided.

Then comes the sowing of the seeds which he desires to introduce; and in this part of the poem we meet with a long enumeration of plants, esteemed either for the beauty or fragrance of their flowers, for their supposed medicinal virtues, or for their various domestic uses.

These I will afterwards mention, but in the first place shall go on with the directions which follow as to the management of the garden.

The seeds being committed to the ground, they must be copiously watered; and if the land be so situated as not to admit of this, we must dig fur-

rows to the depth of three feet, so as to conduct what water there is to the roots of the plants, which have now begun to spring up.

But in March, when Aries heaves its head above the waters, is the time for exertion and watchfulness; then we must deck out mother Earth with her wonted embellishments; then is the time for the gardener to dispose the plants which he has sown in such a manner, as to exhibit the thousand hues which nature evolves.

For this is the period of the year, when the prolific powers of Nature are most active, and when animals and plants feel the genial influence of the season. Then is the time, at small distances apart, to plant nasturtiums, dreaded by caterpillars; the herb savory (*satureia hortensis*), having the smell of thyme and of thymbra; together with the pumpkin and the cucumber. Then too the artichoke is to be planted. But when the pomegranate comes into flower, the season is arrived for planting the arums (*arum colacasia*); then the coriander springs up, and the nigella (*melanthium*), which accords well with cumine; and the berry of the asparagus and the mallow, and the bryony, which, like the vine, twines round other trees in its neighbourhood; and the beet, which is white in its stalk, but green in its leaves. The corn, too, is now in flower; the melilotus (*lotus*), and the violet, have appeared; the snapdragon is open, and the rose spreads abroad its fragrance.

This is the softest period of the year, whilst the sun is still mild in its influence, and the springs are neither too cold nor too warm for the plants they irrigate. The garden is now enriched by the flowers of the vine, and the rose ripens into bloom. We may now pluck the flowers of the narcissus, and those of the sterile pomegranate.

And now bring the violet and the costmary (*balsamita vulgaris*), mixed with privet, with its little black berries, and with the crocus. Now fill the baskets with the dark-coloured hyacinth, and let the wicker be pressed out with roses, and with the crimson marigold (*calendula*), as an offering to Vertumnus.

But when the harvest field becomes yellow with the ripe sheaves, and the summer is come on, tie together bundles of leeks mixed with onions, and of the corn poppy mixed with anise, and congratulate yourselves on the success of your labours.

Now tread down the basil scattered over the ploughed land, lest the heat of the pulverized soil should burn up the crops, or the pulex gnaw, or the ant devour the seeds. The snail and the caterpillar indeed not only attack the leaves, but even the stalk of the cabbage and beet.

But the hopes of the gardener are often defeated by tempests, by hail, and by blight, whence spring beetles, which seize upon the grape and the willow, and grubs which devour the seeds.

To counteract these evils, the poet suggests

various remedies, partly medicinal, partly superstitious.

Of the former description are the lees of oil or the soot of the cottage, scattered over the seeds, the bitter juice of the horehound (*marrubium*) or the houseleek (*sedum*); of the latter kind directions are given, which shew, that the Romans, in the time of Columella, had not advanced in enlightenment much beyond the age of Cato, whose absurd recipes for a broken limb I have noticed in a former Lecture.

Take for instance the following :

“ At si nulla valet medicina repellere pestem :
 Dardaniæ veniant artes, nudataque plantas
 Fœmina, quæ justis tum demum operata juventæ
 Legibus, obsceno manat pudibunda cruore,
 Sed resoluta sinus, resoluto mœsta capillo,
 Ter circum areolas, et sepem ducitur horti.
 Quæ cum, lustravit gradiens, mirabile visu !
 Non aliter quam decussa pluit arbore nimbus
 Vel teretis mali, vel tectæ cortice glandis,
 Volvitur ad terram distorto corpore campe.
 Sic quondam magicis sopitum cantibus anguem
 Vellere Phryxæo delapsum vidit Iolcos.”

(x. 357—368.)

But now is the time to cut the earliest cabbages and the lettuces from Gades, and from Paphos, and to encircle the fascies with parsley, and with onions.

Now the (*eruca*) rocket, the sorrel (*lapathos*), the black bryony (*tamus communis*), the squill, the wild asparagus (*corruda*), come up; the *andrachne* spreads out its branches; the kidney

bean (*phaselus*) shoots up, the cucumber, and pumpkin trail along the ground.

But when the dog-star rises, the early fig drops from the tree, and the baskets may be filled with apricots, with damsons, and with peaches.

It is in September, however, that most kinds of fig become ripe. And after the 23rd of August, when the feast of Vulcan is concluded, whilst the rains are impending, and the clouds begin to collect, the turnip and the turnip cabbage are sown, and the ripe grapes warn us to shut out pilferers from our gardens, and to begin the vintage.

The above may serve as an analysis of the principal contents of Columella's poem, with the exception of the plants proposed to be introduced into his garden, which deserve some notice on our part, as indicative of the state of floriculture at this period.

I must observe, however, that in enumerating them, some allowance must be made for the difficulties of the subject, which arise, not only from the hasty manner in which the Botanists of the last century have in many instances applied the Greek and Roman names of plants to those that came under their observation, but also from the vagueness of the descriptions given by the ancient writers themselves of the plants they mention, which is such, as to prevent us often from correcting with any certainty the errors which our predecessors have committed.

With regard to Greek plants, the highest authority to which we can appeal is my distinguished predecessor Dr. Sibthorp, who had the advantage of verifying his conjectures with respect to the plants to which the names given in Dioscorides refer, not only by the two long journeys which he undertook in the country itself, during which he took particular pains to learn the modern name of each plant, as a clue to its ancient appellation; but also by the almost exclusive access he had obtained to plates taken from drawings accompanying the most ancient of all the MSS. of Dioscorides, which, being executed in the fifth century, may fairly be presumed to convey to us, what was understood to be the plants specified, at a period not long subsequent to that at which Dioscorides himself flourished.

This MS. was made for Juliana Aricia, daughter of the emperor Flavius Anicius, who lived about the end of the fifth century, during the reigns of Anastasius, Dicorus, and Justinian, at Constantinople, from whence the Book was brought to Vienna by Busbequius about 1560. The empress Maria Theresa in the last century caused copper-plates to be taken of the accompanying drawings, but from these only two impressions have been allowed to be struck off.

One of these was presented to Dr. Sibthorp by Baron Jacquin, when he passed through Vienna in his way to Greece; the other was given to Linnæus, and is in the library of the Linnean

Society in London. It is however imperfect, containing only 140 engravings, whereas the copy in my possession comprises 409.

I have also taken advantage, not only of Dr. Sibthorp's published works, but likewise of the MS. he left behind, one of which is a volume, containing his comments on most of the plants indigenous in Greece which are noticed by Dioscorides, and his reasons for the identifications of them introduced into his *Flora Græca*.

But, granting the correctness of Dr. Sibthorp's identifications as applied to the plants of Greece and the Levant, it by no means necessarily follows, that the names given by Pliny, Virgil, and Columella, refer to the very same species; for the *Flora of Italy*, although with many features of resemblance, is by no means the same as that of the countries, from which Theophrastus and Dioscorides drew their knowledge of the vegetable kingdom.

Still, in every case in which the popular name of a plant in the Italian or Romaic languages coincides with that of a Latin or Greek one, handed down to us from antiquity, there is a strong antecedent probability, that the same object is intended in both; and thus our inquiry is limited to the investigation of those names, which either possess no modern representative, or to such as are applied to plants so obviously differing from those which at present go under a similar name, that we are compelled to adopt some different hypothesis concerning them.

Bearing these considerations duly in mind, I will proceed to bring before you the plants, to which allusion is made in the poem to which I have just drawn your attention.

Now the plants mentioned by Columella may be divided into three heads; namely,

1. Those cultivated for ornament; 2. those used for food, either as pot-herbs or as fruits; 3. those possessing some real or some supposed utility in other ways, either as seasoning food, or as serving some medicinal purpose.

We will begin with those placed under the first of those heads, which we shall find very few in number, compared with those that fill the plots of the most humble garden of modern times.

The only ones, indeed, which may be regarded as fully identified with the plants of the present day, are as follow:

1st, *Caltha*, described as “*flaventia lumina calthæ*,” which seems to have been the marigold: its colour and strong smell appearing to identify it with the latter name^f.

2dly, *Lilium*, probably the white lily (“*lilium candidum*”)—*calathisque virentia lilia canis*^g (x. 99).

3dly, *Melanthium*—“*melanthia grata cumino*”

^f Of this genus, *Calendula arvensis* is found in Greece, and is delineated in the *Flora Græca*, t. 920; and *Calendula officinalis* in the south of Europe, *Bot. Magazine*, vol. 59.

^g The *Κρίνον* of Dioscorides, delineated in the plates to the V. MS., is probably, Sibthorp says, a sort of lily.

(ib. 245)—identified by Sibthorp with the *nigella sativa* or *damascena*.

The V. MS.^b indeed gives a figure which by no means agrees with this plant; but Sibthorp says, that the Greeks of the present day still sprinkle the seeds over their bread, as was the case in the time of Dioscorides. There is a good plate of this in the *Fl. Gr.* t. 511.

4thly, *Narcissus*—"Narcissique comas" (98)—doubtless the *narcissus poëticus* or *tazetta* of Italy. Probably both were confounded under this title. Sibthorp, in his MS. notes, prefers the latter. Féeⁱ, however, distinguishes *Narcissus poëticus*

"Pro molli violâ, pro purpureo narcisso;"

(ECL. v. 38.)

and *serotinus*,

"nec sera comantem

Narcissum, aut flexi tacuissem vimen acanthi."

(GEORG. iv. 122.)

5thly, *Rosa*—"rosa plena pudoris" (102)—of the identity of which with the rose of the present day there can be no doubt. Pliny enumerates twelve varieties cultivated in Italy in his day.

6thly, *Viola*—"quæ frondens purpurat auro" (101). *Iov* of Diosc., as represented in the V. MS. in a manner which, however rude, is evidently intended for some sort of violet, sufficiently well applies to the common violet—*viola odorata*, L. It is therefore a different species from Virgil's

^b By V. MS. I mean the Vienna Manuscript of Dioscorides above alluded to.

ⁱ The Author of the *Flore de Virgil*. Paris, 1822.

viola pallens, “*pallentes violas*,” which Tenore regards as the *Leucojum autumnale* of Sicily.

If the above plants may be regarded as nearly ascertained, the same is not the case with those which follow; as, for instance,

7. The *Amaranthus*—“*immortalesque amaranthi*” (175)—which is usually regarded as identical with the modern *amaranthus*. But, unfortunately, two species which are given by Billerbeck^k as corresponding best with two kinds of *amaranthus*, viz. *paniculatus* and *sanguineus*, mentioned by ancient writers, are indigenous in America; and *A. blitum*, the third, does not correspond with Pliny’s definition, which is “*spica purpurea verius, quam flos aliquis, et ipse sine odore*” (xxi. 23)—a purple spike rather than a flower, and without smell.

Fée therefore conceives, that it is the cockscomb (*Celosia cristata*), common in Italy at the present day. But we have no reason to suppose that this flower, which is a native of India, had been introduced into Italy in ancient times. It is more probable, that *Amaranthus caudatus* (Love lies bleeding), an East Indian plant, may have been known to the ancients, and been the plant intended, as it corresponds very well with Pliny’s description.

Sibthorp considers the *ἀμάρανθος* of Diosc. to be the *Gnaphalium stœchas* of the moderns, from which the wreaths of flowers placed over the

^k *Flora Classica*. Lipsiæ, 1824.

tombs of deceased persons by their relatives are now commonly made; but it must be evident, that the flower in no respect corresponds with Pliny's description of the amaranthus.

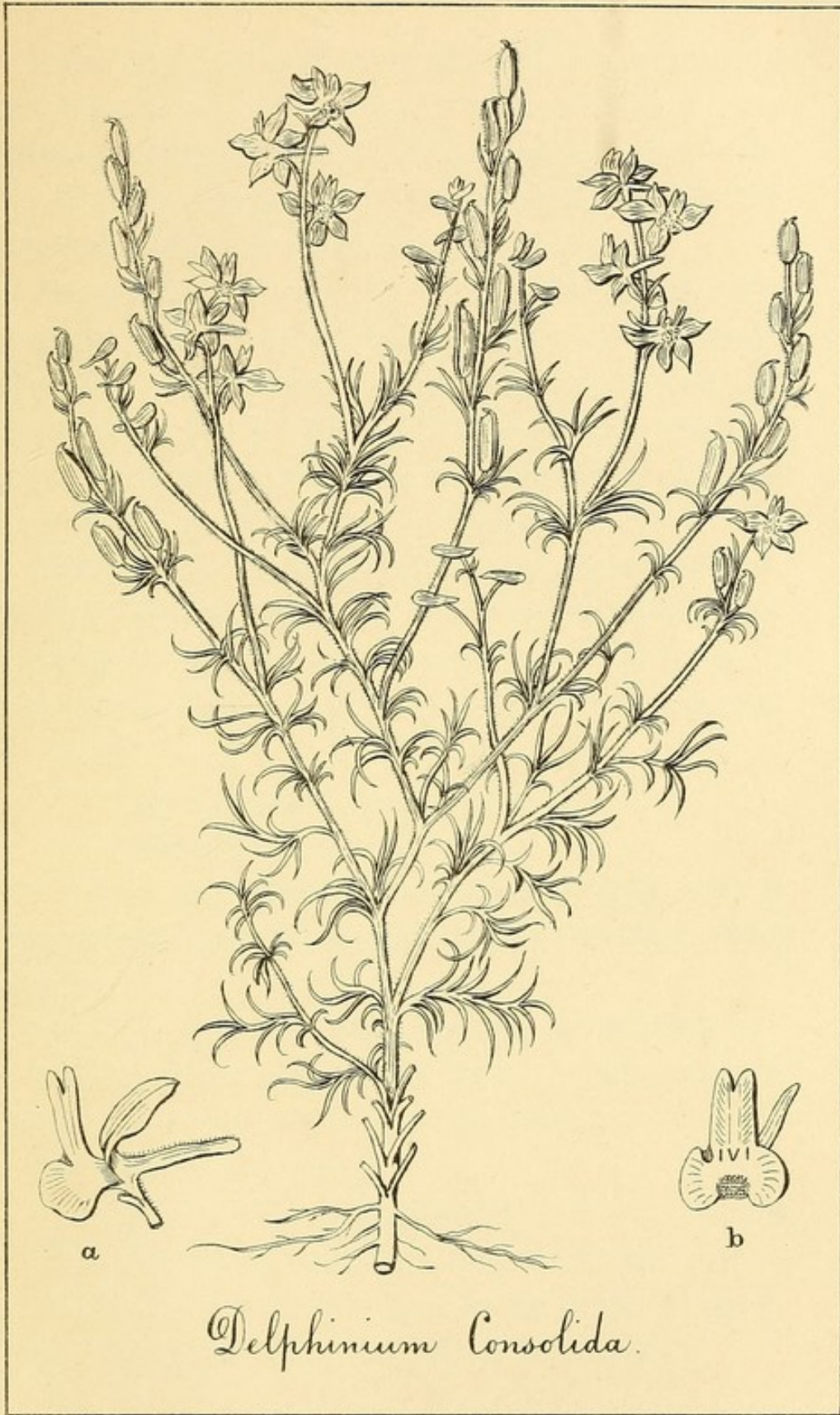
8. Hyacinthus; of which Columella mentions two sorts, "niveos vel cæruleos hyacinthos."

Upon the nature of this flower modern authorities are much divided. The remarkable character which the poets assign to it, of having the letters AI AI inscribed upon its petals, have led some Botanists to identify the plant with the Delphinium Ajacis, or with the Delphinium pubescens, a variety of *D. consolida*, which also has the same markings upon its petals¹. The former, however, is stated not to be indigenous in Greece; and therefore we are in a manner restricted to the latter species, which Sibthorp says is common in those regions.

Moreover Dioscorides, lib. iii. c. 85, states, that the flower he calls *Δελφίνιον ἕτερον*, having already alluded to a flower by that name, is also called *ύάκινθος*; and that by Delphinium was meant some species of larkspur, is confirmed by the drawing in the V. MS., which, rude as it is, bears a fair degree of resemblance to this genus.

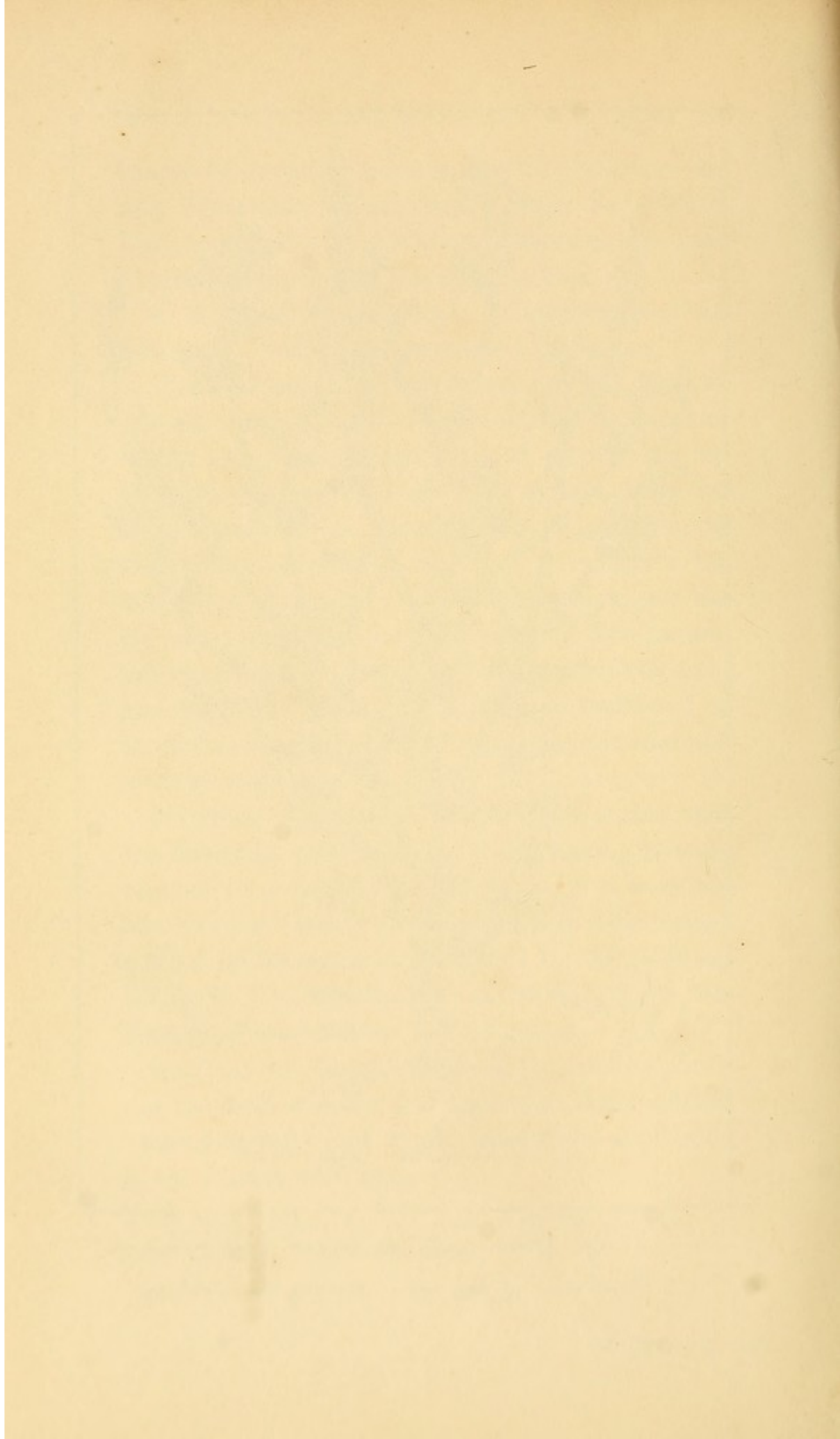
On the other hand Ovid says, that the hyacinth has the form of a lily, and applies to it the epithet "ferrugineus," which would seem to be applicable to the *Lilium martagon*.

¹ See Hogg, Observations on some of the Classical Plants of Sicily; Hooker's Journal of Botany.



Delphinium Consolida.

- a. A single flower with the lateral petals removed.
- b. Front view of the same showing the markings.



Upon the petals of this and some other lilies, markings may be traced, which, although less distinct than those on the petals of the larkspur, might possibly be considered as bearing some resemblance to the letters A I.

Dr. Sibthorp, however, in his MS. notes, pronounces the *ὑάκινθος* of Dioscorides to be a squill, probably *Scilla amœna*; and with this plant the drawing in the V. MS., of which I have given a copy in the annexed plate, accords better, than it does with any species of larkspur.

Mons. Dumolin, however, in his recent work^m, prefers considering it as the *iris germanica*, appealing, in support of his position, to the lines in Nicander's *Geoponica*, quoted by Athenæus, lib. xv. c. 31.

Ἴρις δ' ἐν ῥίζησιν ἀγαλλίδι ἢ δ' ὑακίνθῳ
Αἰαστῇ προσέοικε.

But these only imply, that the hyacinth bore a resemblance to an iris, not that it was the plant itself.

He also contends that the *iris germanica* exhibits on either side of the beard, which extends along the centre of its petals, markings like the Greek letters alluded to.

It must however be confessed, that many irises have these same markings, and that they are in none of them sufficiently striking or peculiar, to arrest attention, and give origin to a fable.

^m Flore Poetique Ancienne. Paris, 1856.

The same remark, I think, applies to the *Gladiolus byzantinus*, which Tenoreⁿ considers to be the plant in question, and which is common in the Levant as well as in Italy. Here also markings may be traced that bear a fancied resemblance to the letters A I, but they are by no means distinct, and many other flowers might be pointed out possessing the same characters.

Upon the whole, I think it must be concluded, that the term *ῥάκινθος* was in general applied to some plant of the lily tribe; but that the poets confounded with this the larkspur, which has upon it the markings alluded to; and that the name Hyacinth was given in the first instance to the plant which most distinctly exhibited them.

9. Leo. This plant, described by Columella as

“hiantis sæva Leonis

Ora feri”

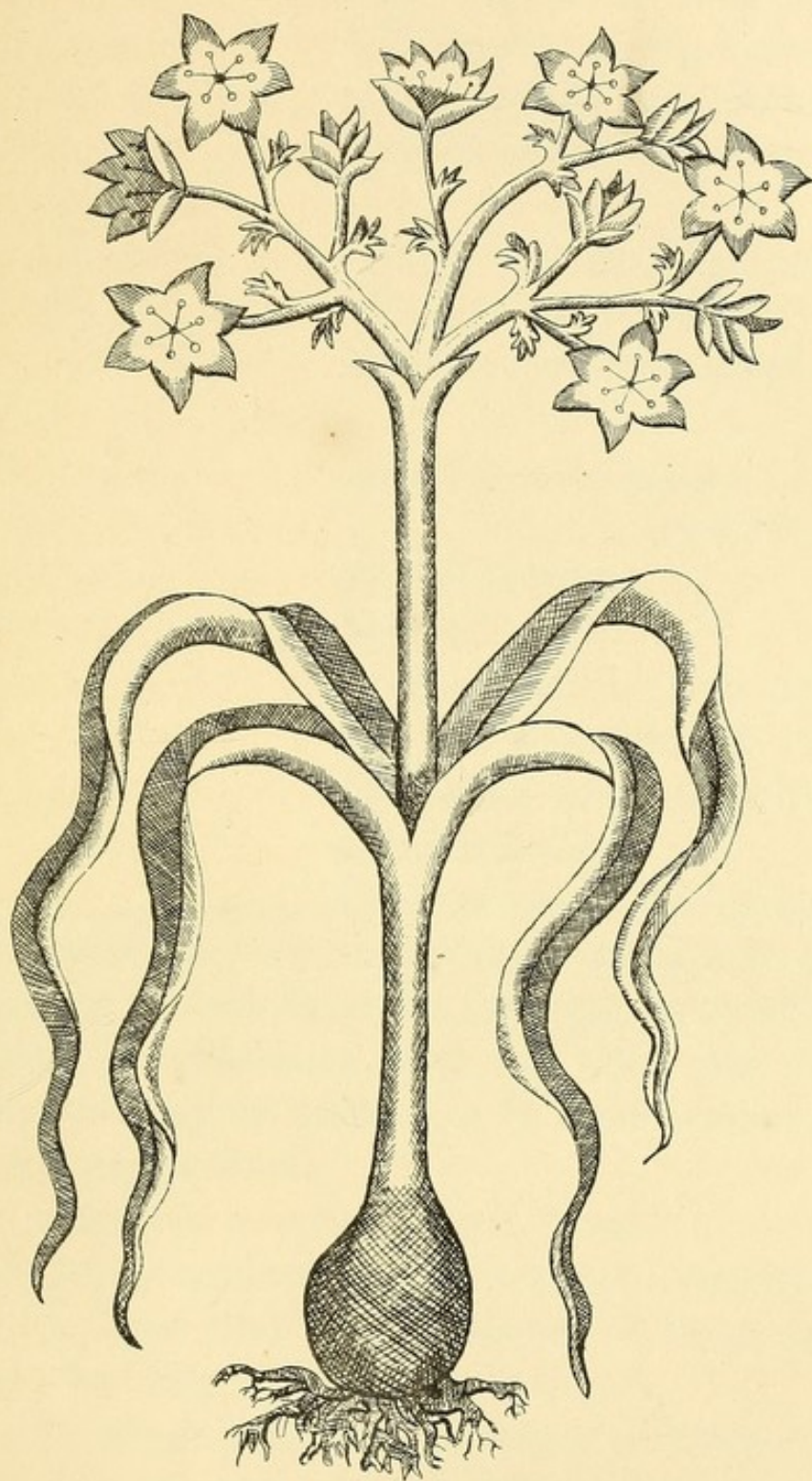
(x. 99.)

puzzles us the more, as it does not occur in any other Latin writer. *Leontice leontopetalum* is the plant which Sibthorp identifies with the *λεοντοπέταλον* of Dioscorides^o; but Columella's description of *leo* implies a ringent plant like the snapdragon, or, as Billerbeck will have it, the orobanche.

It is far more probable, however, that a snapdragon, than an orobanche, should have been in-

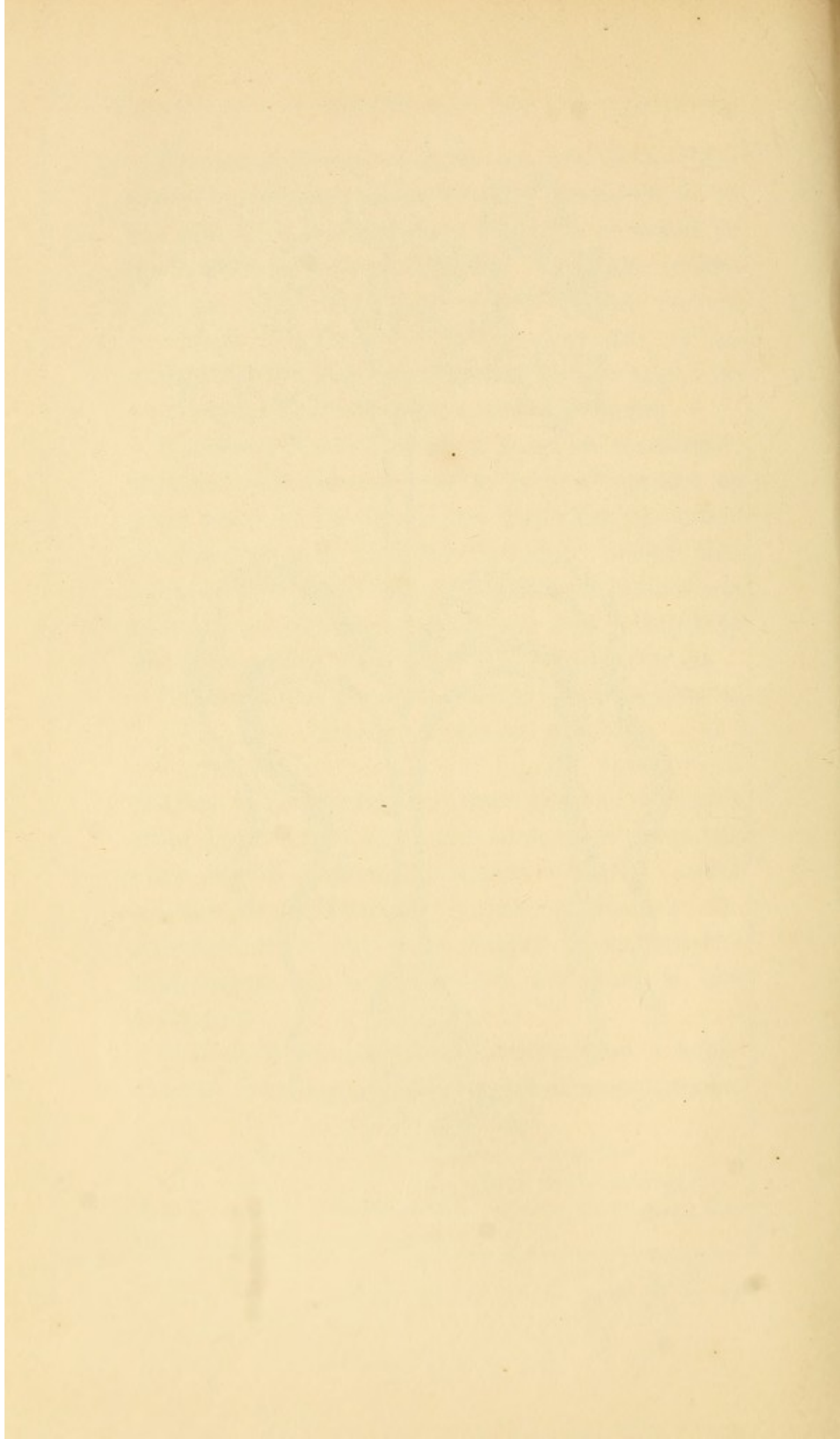
ⁿ Osservazioni sulla Flora Virgiliana. Napoli, 1826.

^o The engraving in the Vienna edition is like nothing in nature, but certainly differs more widely from a ringent plant, than from a regular monopetalous one.



Υάκινθος.

From a Drawing in the V. M. S. of Diosc.



troduced into a Roman garden, and the term *leo* may have been as naturally applied to this flower by the Romans, as the corresponding one *löwen-maul* (lion's mouth) is in the German, or as *snap-dragon* is in English.

10. *Ligustrum*,—the nature of this plant has been always a subject of much doubt, especially in the instance before us, where Columella speaks of it as black :

“ Fer calathis violam : et nigro permixta ligustro
Balsama :” (x. 300.)

whereas Virgil and others call it white ;

“ Alba ligustra.”

The common privet might apply to both descriptions ; for its flowers are white, whilst its berries are black : but Dumoulin contends, with some reason, that it was a *convolvulus*.

According to him, the *ligustrum* of the poets must have been a twining plant, whence indeed its name is derived (*ligustrum*, from *ligo*, ‘to bind’): it is also an herbaceous plant, and not a tree or shrub ; and may be inferred to be monopetalous, from the line in Ovid :

“ Candidior nivei folio, Galatea, ligustri.”

Folium being used to signify a petal. Servius moreover says, that “ the *ligustrum* of Virgil is thought by some to be a *convolvulus*.”

On the other hand, the *ligustrum* of Pliny is described as being a tree, so that we must suppose two distinct plants to have been designed by the one, and by the other.

Bating this difficulty, the interpretation of Du Molin has the advantage of enabling us to explain the epithet *black* given to *ligustrum* by Columella; for it is easier to find a dark convolvulus than a dark-flowered privet.

Lastly, we have the *leucojum*, which Columella designates as white, (*candida leucoja*,) and which, from its Greek etymology, may be regarded as synonymous to ἴον λευκόν. But this leaves us as much in the dark as before; for what, after all, is meant by a white violet?

Now in Dioscorides, λευκόϊον, or ἴον λευκόν, may be viewed as a generic name for various species of cheiranthus or wall-flower, if we admit Sibthorp's authority, which is confirmed by the plate of λευκόϊον in the V. MS.; and of this, two species, *C. cheiri* and *C. incanus*, are cultivated in gardens in Greece at the present day.

In the V. MS. is a drawing of λευκόϊον θαλάσσιον^p, which bears a near resemblance to *cheiranthus cuspidatus* (Fl. Gr. t. 639); and *hesperis matronalis*, a cruciform plant, not very unlike a wall-flower, is called *dame's violet* at the present day.

Thus the entire catalogue of ornamental flowers given in Columella would amount only to about eleven; and if we take into account such as are mentioned by Virgil, it will be found, that after deducting such ornamental trees as, *laurus*, the bay laurel; *myrtus*, the myrtle; *myrica*, proba-

^p See plate annexed.



Λευκόϊον θαλάσσιον.

From a Drawing in the V. M. S. of Diosc.

bly the tamarisk; and viburnum, the wayfaring tree, or more probably the clematis, only the following additions will be made.

First, then, appears the acanthus, a term applied to any description of flower that was associated with thorns, the word being derived from ἀκὴ a point, and ἄνθος a flower.

In Dioscorides^r accordingly several kinds of ἄκανθα are enumerated; namely, ἔρπακάνθη, which Sibthorp identifies with the acanthus spinosus of L.; ἀραβίκη, probably onopordon arabicum; λεύκη, a kind of thistle, probably, as Sibthorp thinks, cnicus acarna; and ἀγρία, which he identifies with cnicus syriacus.

But in Virgil the term *acanthus* is applied to two plants in particular, the first of which is characterized by the epithets *mollis*, *ridens* and *florens*; and which must be identified with the ἄκανθα ἔρπακάνθη of Dioscorides, and with the acanthus spinosus of Sibthorp.

Now, although this botanist distinguishes between acanthus spinosus, and mollis, yet it is probable that both may be varieties of the same species; and at any rate Virgil appears to have confounded them under the same appellation. This then is the plant which was cultivated by

^r The Vienna edition of Dioscorides has rude engravings of ἄκανθα ἀγρία, which looks like a thistle, Cnicus Syriacus of Sibthorp; ἀραβίκη, Onopordon arabicum; ἔρπακάνθη, Acanthus spinosus; λεύκη, Cnicus acarna.

None of these have the slightest resemblance to the acacia, but all have the characters of a thistle.

the Romans in their pleasure-grounds, and of which the graceful leaf supplied the model for the Corinthian capital.

But the other kind of acanthus, which Virgil designates by the epithet *semper frondens*, is associated by him with plants of the warmer parts of the east, and not with those of Italy or Greece.

Thus, in his 2nd Georgic, we have the following lines :

“ sola India nigrum
Fert ebum, solis est thurea virga Sabæis :
Quid tibi odorato referam sudantia ligno
Balsamaque, et baccas semper frondentis acanthi ?”

(GEORG. ii. 116.)

Theophrastus describes this acanthus in a manner which seems to identify it with the acacia ; and Dioscorides, speaking of the same tree, gives it that very name. It is therefore supposed to correspond with the acacia nilotica L., which is evergreen, and also has pods or berries (*baccæ*).

But besides these two plants, so distinguished by Virgil, there would seem to be a third alluded to in his 4th Georgic, when he speaks of the

“ Flexi vimen acanthi.” (iv. 123.)

Mr. Yates, in the *Classical Museum*, vol. iii, considers this to be a kind of broom of the genus *spartium*, and to be synonymous with the *aspalathus* of Dioscorides, the *spartium villosum* of Sibthorp, (*Fl. Gr.* 673,) universal in Greece, pointing out, that in the *Lexeis Atticæ* of Mœris, the same plant, which in the Attic Greek was

called ἀσπάλαθοι, in the common Greek is called ἄκανθαι.

2. Amellus, a plant which is very accurately described by Virgil in these lines :

“ Est etiam flos in pratis, cui nomen amello,
Fecere agricolæ, facilis quærentibus herba :
Namque uno ingentem tollit de cespite silvam :
Aureus ipse ; sed in foliis, quæ plurima circum
Fundantur, violæ sublucet purpura nigræ :
Sæpe deùm nexis ornataë torquibus aræ :
Asper in ore sapor. Tonsis in vallibus illum
Pastores, et curva legunt prope flumina Mellæ.

(GEORG. iv. 271.)

This corresponds very well with the aster amellus^p of modern botanists, in which the florets of the disk are yellow, those of the rays blue, and which, besides, is indigenous in the north of Italy, as well as in Sicily. (Sibth. Prod.)

3. Colocasia, arum colocasia L.

“ Mixtaque ridenti colocasia fundit acanthi.”

This plant, Pliny says, was introduced from Egypt into Italy in the time of Augustus, and was cultivated for the sake of its roots, which are esculent. It is found at present in Crete, Cyprus, and Zante, and is called *culcas* in Egypt. It is also common in India. (Wight's Icones^q.)

4. Crocus, the crocus sativus, or saffron. No doubt, many species of crocus are included however under this general appellation, which perhaps, as being a wild flower, is not inserted by Colu-

^p It is the ἀστήρ ἀττικὸς of Diosc., but the plate in V. MS. does not correspond with that.

^q The colocasia of Dioscorides, however, is the Nelumbrium.

mella in his Catalogue, although Virgil speaks of it, alluding to its fragrant stigmas. He also gives it the name of rubens, an epithet which applies better to some other species of crocus, than to the sativus. The plate in V. MS. more resembles *Amaryllis lutea* (Sibth.).

5. Hibiscus, mentioned in Virgil's Eclog. in two places, viz. ii. 30,

“Hædorumque gregem viridi compellere hibisco,”

and x. 71,

“Dum sedet, et gracili fiscellam textit hibisco.”

In both which cases a tough but flexible stem seems to be attributed to the plant.

The description given by Dioscorides of *ἀλθαία*, which some, he says, call *ἰβίσκος*, so well agrees with plants of the mallow tribe, that we should be disposed to identify the hibiscus of Virgil with some species of mallow; and according to Columella, the fibres of the marsh mallow are so tough, that in Spain they were beaten out like hemp, and were used in the fabrication of coarse stuffs.

It is therefore quite possible, that the stems of the *althea officinalis*, or *cannabina*, both of which exist in Greece (Fl. Gr.), and in Italy, might furnish twigs fit to drive cattle, and to form baskets, as Virgil represents. *Ἀλκεα* of Dioscorides is the same, Sibthorp says, as *hibiscus trionum*. (Fl. Græca 1666.)

6. *Saliunca*, described as,

“ Puniceis humilis quantum saliuunca rosetis,
 Judicio nostro tantum tibi cedit Amyntas.”

(ELOG. v. 17.)

Now Pliny describes this plant as follows :

“It has rather a short leaf, which does not admit of its being plaited for garlands, and numerous roots by which it is held together, being more of a herb than a flower, and so closely matted and tangled that it would almost appear to have been pressed together with the hand; in short, it is a turf of a peculiar nature. This plant grows in Pannonia and the sunny regions of Noria and the Alps, as also in the vicinity of the city of Eporedia (Ivree, Valley of Aoste), the smell being so remarkably sweet, that the crops of it have been of late as profitable as the working of a mine.”

“This plant is particularly valued for the pleasant smell it imparts to clothes.”

“Saliunca folio quidem subbrevis, et quod necti non possit, radici numerosæ cohæret, herba verius, quam flos, densa veluti manu pressa, breviterque cespes sui generis. Pannonia hanc gignit et Norici, Alpiumque aprica: urbium Eporedia: tantæ suavitatis, ut metallum esse cœperit. Vestibus interponi eam, gratissimum.” (Lib. xxi. c. 20.)

Now Dioscorides speaks of ἀλιοῦγγα as synonymous with ναρδὸς κελτικὴ, and the latter is regarded as the species called *V. saliuunca*, which is a native of Dauphiny. The tufted character of the *Valeriana celtica*, which makes it resemble a grass rather than a flower, brings it near to this

description of Pliny. It also has a fragrant smell such as that described, and is hence called French spikenard.

Jacquin, however, (*Collectanea*, vol. i.) rightly observes, that the *saliunca* of Virgil can hardly be the *Valeriana celtica*, because the poet speaks of it as a plant common about Rome, whereas this only grows in alpine regions. Perhaps therefore some other species of *Valeriana* is intended by the poet.

7. The thymus of Virgil is the common thyme of our meadows, and was also probably applied to other species of wild thyme.

8. Verbena.

“Effer aquam, et molli cinge hæc altaria vitta :
 Verbenasque adole pingues et mascula thura :
 Conjugis ut magicis sanos avertere sacris
 Experiar sensus, nihil hic nisi carmina desunt.”

(*Ec.* viii. 64.)

This name was applied generically to all plants employed in sacrifices. But when used specifically, it corresponds with the *ἱερὰ βοτάνη* of Dioscorides, which Sibthorp identifies with *verbena officinalis*, and which was worn by the Greeks as an amulet.

The plant is very abundant in Greece, and its islands, and is called at present *σταυρῶ βοτάνη*.

Such appears to be the entire catalogue; and even Pliny adds but little to the number, as may be seen by the following enumeration of the flowers used for chaplets or ornamental plants, (*coronamentorum genera*), which he describes, (*lib.* xxi.)

1. Rosa, 12 varieties.
2. Lily, 4 ...
3. Convolvulus sepium.
4. Narcissus, 3
5. Viola, purple, yellow, and red.
6. Caltha, Marygold.
7. Scopa^d, Chenopodium scoparia.
8. Baccharis, Salvia sclarea.
9. Combretum, not identified.
10. Crocus, Wild saffron.
11. Iris, two kinds.
12. Saliunca, a Valerian.
13. Polium (Teucrium polium.)
14. Amaranth, Love lies bleeding.
15. Cyanus, Centaurea cyanus.
16. Holochrysum, Gnaphalium stæchas.
17. Petilium^e.
18. Bellio, Chrysanthemum segetum.
19. Chrysocoma, Chrysocoma linosyris.

And in Greece, if we may judge from the following list, quoted by Athenæus from Theophrastus, the number of ornamental plants, commonly known, did not materially differ from that which the Romans cultivated.

Thus we find noticed the following :

**Ἴον*, Violet.

Διὸς ἄνθος, Flower of Jupiter (*Dianthus caryophyllus*).

**Ἴφνον*, *Lavendula spica*.

**Ἡμεροκαλλίς*, *Hemerocallis*.

Λευκόϊον, *Chiranthus cheiri*.

^d Lib. xxi. c. 15.

^e Sprengel supposes it to be *Geum rivale*, but this cannot be, because *Geum* is a spring flower, whereas *Petilium* is said to be an autumnal one ; nor does the former resemble in colour the wild Rose, as that of the *Petilium* is said to do.

- Φλόγινον ἄγριον, Wild wall-flower.
 Νάρκισσος, Narcissus.
 Λείριον, Lily.
 Ἄνεμώνη ὄρηια, Mountain anemone.
 Βολβοῦ κώδονον, Bulbocodium.
 Οἰνάνθη, Convallaria.
 Μελάριον, Purple violet.
 Ἐλίχρυσος, Gnaphalium orientale.
 Ἄνεμώνη λειμωνία, Narcissus pseudo-narcissus.
 Ξίφιον, Gladiolus.
 Ἵακινθος, Hyacinth.
 Ῥόδον, Rose.
 Κρίνα πορφυρανθῆ, Purple lilies, Liliun martagon.

The most numerous list, however, of what are called στεφανωματικὰ ἄνθη is that given by Athenæus from the poem of Nicander^f; but even this does not appear to include any flowers, except what are indigenous in Greece and Italy.

The following catalogue comprises most of those mentioned:

- Ἴον, Violet; two sorts, pale and golden-coloured.
 Ῥόδον, Rose; the Emathean and Megarian chiefly praised.
 Κρίνον
 Λείριον
 Ἄμβροσία
 Χαρμ' Ἀφροδίτης
 Ἴρις, Iris.
 Λυχνίς, Lychnis.
 Θραλλίς, Verbascum lychnitis, Schweigh.
 Ἄνθεμις, Anthemis nobilis.
 Βοάνθεμον.
 Φλόξ, Viola tricolor, viola flammea, agrostemma flos Jovis.
 Spr.
 Μήκων, Poppy.

^f Lib. xv. c. 31.

- Ἐρπυλλος, Thyme.
 Σάμψυχον, Marjoram.
 Λίβανος (λιβανωτίς), Rosemary.
 Πτέρις, *Adiantum capillus Veneris*, maiden's hair.
 Παιδὸς ἔρωτες (παιδέρωτες) *Acanthus*, brank ursine.
 Κρόκος, Saffron.
 Βούφθαλμον, *Chrysanthemum segetum*.
 Διὸς ἄνθος, *Dianthus*.
 Κάλχας.
 Πανόσμιον.
 Φάσγανον, *Gladiolus*.
 Ἄνεμώνη, *Anemone*.
 Ἐλένιον, *Inula helenium*.
 Ἄσθήρ, *Aster*.
 Γεράων πώγων, *Tragopogon*.
 Θέλκια.
 Κυκλάμινος, *Cyclamen*.
 Σαύρη, *Nasturtium*.
 Θήσειον.
 Σέλινον, parsley.
 Κοσμοσάνδαλον, *Cypripedium calceolus*, (Lady's slipper.)
 Ἄνθρίσκος, *Anthriscus*.
 Ἡμεροκαλλίς, *Lilium chalcedonicum* §.

The pot-herbs recommended by Columella for cultivation are in general more readily identified than those of the foregoing series.

They comprise the following :

1st. Several kinds of *allium*, namely, garlic (*A. sativum*), called by our author simply *allium*, described as

“*Alliaque infractis spicis,*” (112.)

§ In identifying these names with modern plants, I have chiefly been guided by the authority of Schweighæuser in his edition of Athenæus, 1805.

by which is probably meant infarctis, or confertis spicis, referring to the close or compact spike of flowers constituting the capitulum.

2. Ulpica, designated as "late olentia" (113), probably a larger sort of Garlic, brought from Carthage or from Crete (Pliny, l. 19. 39), called also ἀφροσπόραδον.

3. Cepa, termed "lachrymosaque" (123), the common onion.

4. Porrum, the leek.

These appear to have constituted so important a part of an ancient garden, that, as I have already observed, the term *πρασιά*, or a bed, derived its name from *πράσον*, the Greek word for onion.

We next meet with,

5. Anethum, anise, an umbelliferous plant, the seeds of which are used in cookery, remarkable for its strong, but agreeable smell.

"Et bene odorati flores sparguntur anethi." (120.)

6. Apium, parsley.

7. Asparagus.

"Et bacca asparagi spinosa prosilit herba." (246.)

This description does not apply to our cultivated asparagus, which is destitute of prickles, but rather to the species, *acutifolius*, *aphyllus*, and *horridus*, which occur in Greece, Italy, and Sicily. (Fl. Gr.)

That the Romans cultivated asparagus for the

table appears from Pliny, who calls it "altilisⁱ," (fatted), but it does not appear whether what is intended here by Columella is the latter, or the wild and prickly asparagus, which in another place he calls *corruda*.

Dr. Sibthorp, however, in his MS. notes on Dioscorides, adds, that the young shoots of the asparagus *acutifolius*, and perhaps also *A. aphyllus*, are boiled and eaten in Greece, as the garden asparagus is with us.

8. *Beta*, a variety of our common beet.

9. *Brassica*, cabbage, for this is the vegetable designed in the lines, in which he says,

"Tum quoque conseritur, toto quæ plurima terræ
Orbe virens pariter plebi regique superbo
Frigoribus caules, et veri cymata mittit :
Quæ pariunt veteres cesposo littere cumæ,
Quæ Marrucini, quæ Signia monte Lepino,
Pinguis item Capua, et Caudinis faucibus horti."

(127.)

together with a string of other places, too long to be here mentioned.

In the third of these lines he distinguishes the larger leaves which the cabbage develops in the autumn, and the sprouts or *cymata* which it puts forth in spring, the latter answering to our Brussels' sprouts.

Pliny gives a long account of the different kinds of cabbage in his 19th Book, ch. xli.; and the importance attached to the cabbage in the

ⁱ This word is once used by Varro with reference to oxen. *Altiles ad sacrificia saginati*. Lib. ii. cap. i. sect. 20.

dietary of the ancients, who were not provided with the potatoe, has been already alluded to.

10. *Cynara*, called *hispida* (235), and by Pliny simply a thistle, "*carduus*." Of this, Columella describes several kinds,

"*Hæc modo purpureo surgit glomerata corymbo.*" (237.) one having several heads clustered together in a corymbiform manner, and of a purple colour; a second (238),

"*Myrteolo modo crine viret, deflexaque collo
Nunc adaperta manet,*"

having leaves of a green colour, resembling the myrtle, and a head which is sometimes bent down with expanded leaves, and at others

"*pineæ vertice pungit,*" (239.)

like a fir cone, is prickly at the top; or

"*similis calathæ, spinisque minantibus horret,*" (240.)

bristles with threatening thorns, spreading out in a cup-shaped fashion; or, lastly,

"*Pallida nonnunquam tortos imitatur acanthos,*" (241.)

pale, it imitates the twisted acanthus.

It would be impossible to identify all these varieties with the sorts of artichoke now cultivated; but there is enough to prove to us that Columella intended the same vegetable which we now cultivate for our tables.

May not the cardoon (*cynara cardunculus*), as well as the artichoke (*cynara scolymus*), be intended by ancient writers under this general appellation?

11. Capparis, the caper plant,

“ vili quoque salgama merce
Capparis, &c.” (117.)

common in Greece and the south of Italy, is noticed in the 10th as well as the 11th book of Columella, (118) as a plant to be cultivated in gardens; but whether to be employed as a condiment, as well as on account of the medicinal virtues to which Pliny alludes, it is difficult to say. It seems, however, that it was pickled for use. The Vienna MS. of Dioscorides contains a pretty good engraving of this plant.

12. Faselus, kidney-bean,

“ et gravis atriplici consurgit longa faselus.” (375.)

If atriplex is the common garden orange (*atriplex hortensis*), it is difficult to explain why the ancients conceived that it would be damaged by its proximity to the kidney-bean. It is mentioned in the 2nd book, amongst the plants sown in the fields, along with the pea, which curiously enough is not introduced into the catalogue of garden plants.

13. Crambe, sea-kale, or *crambe maritima*, is thought to be the vegetable meant under the name of coramble (178),

“ Nunc veniat quamvis oculis inimica coramble;”

for the *κράμβη* or *κοράμβλη* of the Greeks was supposed by them to be injurious to the sight.

On the contrary, Pliny says, that Cato assumes it to be good for dimness and dazzling of the sight:

“Prodesse tradit oculorum caligini scintillationibusque.”

It must be evident that both statements are equally unfounded. The *crambe* of Pliny, however, is not stated to grow near the sea, nor does it appear that the *corambe* of Columella had this tendency; so that it is very possible that these writers may mean a different plant from the *κράμβη θαλασσία* of Dioscorides, which is our sea-kale. May it not be simply one of the varieties of cabbage?

14. *Intybum*,

“Torpenti grata palato, *intyba*.” (110.)

This description applies well to endive or succory, which, from the analogy of the name, as well as from other circumstances, we should be disposed to assign to the Latin *intybum*. Virgil, in *Georg.* i. 120, seems to speak of the wild plant;

“*amaris intuba fibris* ;”

and in *Georg.* iv. 120, of the cultivated one :

“*Quoque modo potis gauderent intyba rivis*.”

15. *Lactuca*, lettuce,

“*Teneris frondens lactucula fibris*,” (111.)

is evidently the plant which Virgil, in his *Mortuum*, elegantly designates as “*nobilium requies ciborum*” (76), as an agreeable repast after more stimulating dishes, or at the end of a banquet. Columella makes mention of several kinds of lettuce, but in line 179 alludes to one in particular, as possessing medicinal qualities :

“Jamque salutari properet lactuca sapore,
Tristia quæ relevat longi fastidia morbi;”

referring, no doubt, to the cure, which, according to Pliny (xix. 38), was effected, in the case of the emperor Augustus, by eating lettuces, administered by order of his physician Musa, whom Virgil is supposed to have celebrated under the name of Iapis (*Æn.* xii.), as one who

“Scire potestates herbarum usumque medendi
Maluit, et mutas agitare inglorius artes.” (396.)

16. *Lapathos*—“*lubrica*” (373)—is probably the sorrel (*rumex acetosa*) found by Sibthorp wild in Greece (*Fl. Gr.*), called *oxylapathos* by Pliny. But why *lubrica*? Does this apply to the character of the leaves, or, as Schneider suggests, to its effect in lubricating the bowels?

17. *Olus pullum* (123), enumerated amongst the herbs to be planted in spring, is a synonyme of *olus atrum*, the *Smyrnum odoratum* of modern botanists, corrupted in the vernacular tongue to Alexanders, formerly used as celery is at present, but now regarded as too biting and powerful to be agreeable.

18. *Sinapis*, the *sinapis alba*, or white mustard, cultivated in our gardens (*Fl. Gr.*), is from its acridity spoken of as

“Seque lacesenti fletum factura sinapis.” (122.)

19. *Staphylinus*,

“Mollemque sinum staphylinus inumbret,” (168.)

is more particularly described in book ix. c. 4,

amongst the plants which favour the production of wax in bees, and there defined as being the wild parsnip. Sibth. Pr. Fl. Gr. makes it the carrot.

20. Siser (114), commonly considered sium sesamum (skirret), from China, a pot-herb introduced into England in 1548, but not much used at present. Is not the siser of the ancients, rather sium nodiflorum, indigenous in Greece? (Sib. Fl. Gr.)

“ thymi referens thymbraëque saporem.” (223)

21. Satureia,

is probably the summer savory of our gardens, a plant indigenous in Italy, and used as a seasoning for culinary purposes. Thymbra, here mentioned, is regarded as another species of satureia, viz. *S. thymbra*. Both are aromatic plants.

Such were the pot-herbs which Columella directs to be cultivated in his garden; a list comprising the greater part of those in use at present, except the potatoe, and a few other solaneæ, which we owe to the discovery of America.

It is indeed rather remarkable, that the exploration of a new continent, and the continued demand for fresh luxuries and conveniences, should have added so little to the articles of human sustenance obtained from the vegetable kingdom; so that whilst the Eastern world has furnished us chiefly with tea and coffee, to the Western hemisphere we should be indebted for little more than for the potatoe and the tobacco.

We have indeed added to the number of our exotic fruits, as would be seen, were I to bring before you the meagre catalogue of those known to the ancients. This, however, together with an account of their medicinal plants, must be reserved till the following Lecture.

LECTURE VIII.

COLUMELLA.

BOOK X CONCLUDED.

I MENTIONED in my last Lecture, that the fruits known to the ancients, or at least in common use amongst them, were but few in number.

They comprehended indeed only those which are now generally diffused throughout Europe, whilst the productions of the warmer regions of the globe were known to them only by name, or at least were in the hands of very few.

Thus we find enumerated in the first place, several kinds of plum, viz. the Armeniaca or Apricot, brought from Armenia, of which indeed no mention is made by any author earlier than Columella; the Damascena, or Damson, from Damascus; the Persica, or Peach, from Persia^a;

^a Thus designated :

“ pomis, quæ barbara Persis

Miserat, ut fama est, patriis armata venenis,” (406.)

alluding to the fable, that the tree was poisonous in Persia, and had been sent into Egypt for the purpose of punishing the people, but that it lost its venomous properties when thus transplanted. Could this mistake arise from a knowledge of the poisonous properties of the prussic acid existing in the kernels of the peach ?

the Ceriola, the same no doubt as *cerea pruna*, (Virg. Ecl. 2), plums of a waxy yellow colour, the particular variety of which of course cannot be ascertained.

“ Armeniisque, et cereolis, prunisque Damasci
Stipantur calathi.” (404.)

2ndly, Figs of different kinds, such as *Arbos Livia*, called after Livia, the wife of the emperor Augustus; others of various colours, purple, red, and yellow, (413.)

3dly, “ *Punica*,

quæ rutilo mitescit tegmine grani.” (243.)

is the cultivated pomegranate; and *Balaustum*, called *sterile* (297), the wild one.

In Greece, at the present day, this tree goes by the name *ῥόα* or *ῥοδία*, as in ancient times. The island of Rhodes had upon its coins a representation of this tree, from which it appears to have derived its name.

As neither an olive plantation nor an orchard were to be included within the precincts of the garden, olives^b, apples, and pears^c, are not noticed; but it is rather remarkable, that no notice is taken of the *cerasus* or cherry, which was brought into Italy from Asia Minor by Lucullus.

4thly, There remains the *cucumis* and the cu-

^b Virgil distinguishes several kinds of olives, namely,

“ *Orchades, et radii, et amara pausia bacca.*” (G. ii. 86.)

^c Although *Achras*, or the wild pear, is mentioned in two places, verses 18 and 210, as growing spontaneously in such soils as are well adapted for a garden.

curbita (380), of which rather a long description is given :

Tum modo dependens trichilis, modo more chelydri
 Sole sub æstivo gelidas per graminis umbras
 Intortus cucumis, prægnansque cucurbita serpit.
 Una neque est illis facies. Nam si tibi cordi
 Longior est, gracili capitis quæ vertice pendet
 E tenui collo semen lege : sive globosi
 Corporis, atque utero nimium quæ vasta tumescit,
 Ventre leges medio, sobolem dabit illa capacem
 Naryciæ picis, aut Actæi mellis Hymetti
 Aut habilem lymphis hamulam, Bacchove lagœnam.
 Tum pueros eadem fluviis innare docebit.
 Lividus at cucumis graviora qui nascitur alvo,
 Hirtus, et ut coluber nodoso gramine tectus
 Ventre cubat flexo, semper collectus in orbem,
 Noxius exacuit morbos æstatis iniquæ.
 Fœtidus hic succo, pingui quoque semine fartus,
 At qui sub trichila manantem repit ad undam,
 Labentemque sequens nimio tenuatur amore,
 Candidus, effœtæ tremebundior ubere porcæ,
 Mollior infuso calathis modo lacte gelato,
 Dulcis erit, riguoque madescit luteus arvo,
 Et feret auxilium quondam mortalibus ægris.

(378-399.)

From this it appears that there were three kinds of cucurbita ; the first, mentioned as hanging down from the arbours, which was either of a tapering or a globular form, according as it was propagated by seed, taken nearest to the neck of the plant, or from its middle. If from the latter, Columella says, we obtain a fruit, which after the interior is scooped out, may serve as a vessel for holding pitch, honey, or even wine, and

from which you may construct a bottle for teaching boys to swim.

The second sort, which grovels along the ground, is venomous and unwholesome, and contains a fetid juice.

The third kind, which, if water is placed near it, creeps towards it from the corner in which it grows, and thus becomes lengthened in an extraordinary manner, is white, but becomes of a golden yellow colour when ripe. This sort is refreshing and salubrious.

Now the first of these species of *cucumis* or *cucurbita*, (for Columella, it is to be observed, mentions them all under the same name,) would seem to correspond with some species of *Lagenaria*, or bottle gourd.

This indeed is a native of India, but it has been introduced into Europe from a very early period, and was used in times far back by pilgrims, to hold the water they carried on their backs. The lines in Columella above cited, together with the mention made of it in Pliny, lib. xix. c. 5, who says, that from it were constructed "*cadi ad vina condenda*," make one conclude, with Alphonse Decandolle, that the bottle-gourd was known to the ancients, and that it was introduced into America from the old continent.

In the second kind, Columella would seem to allude to some poisonous sort, as to the elaterium or squirting cucumber (*Momordica*), common in

the south of Europe; or else to the colocynthis, found more rarely there, and a doubtful native.

The drawing however of *σίκυς ἄγριος*, in the V. MS. of Dioscorides, of which I have given a lithograph, evidently indicates the former plant, to which the description in Columella sufficiently well corresponds.

Nevertheless, an Italian variety of cucumeris, called *cocomero serpentino*, which tastes, Tenore says, like a melon, has very much the character which is here ascribed to the second kind, mentioned by Columella.

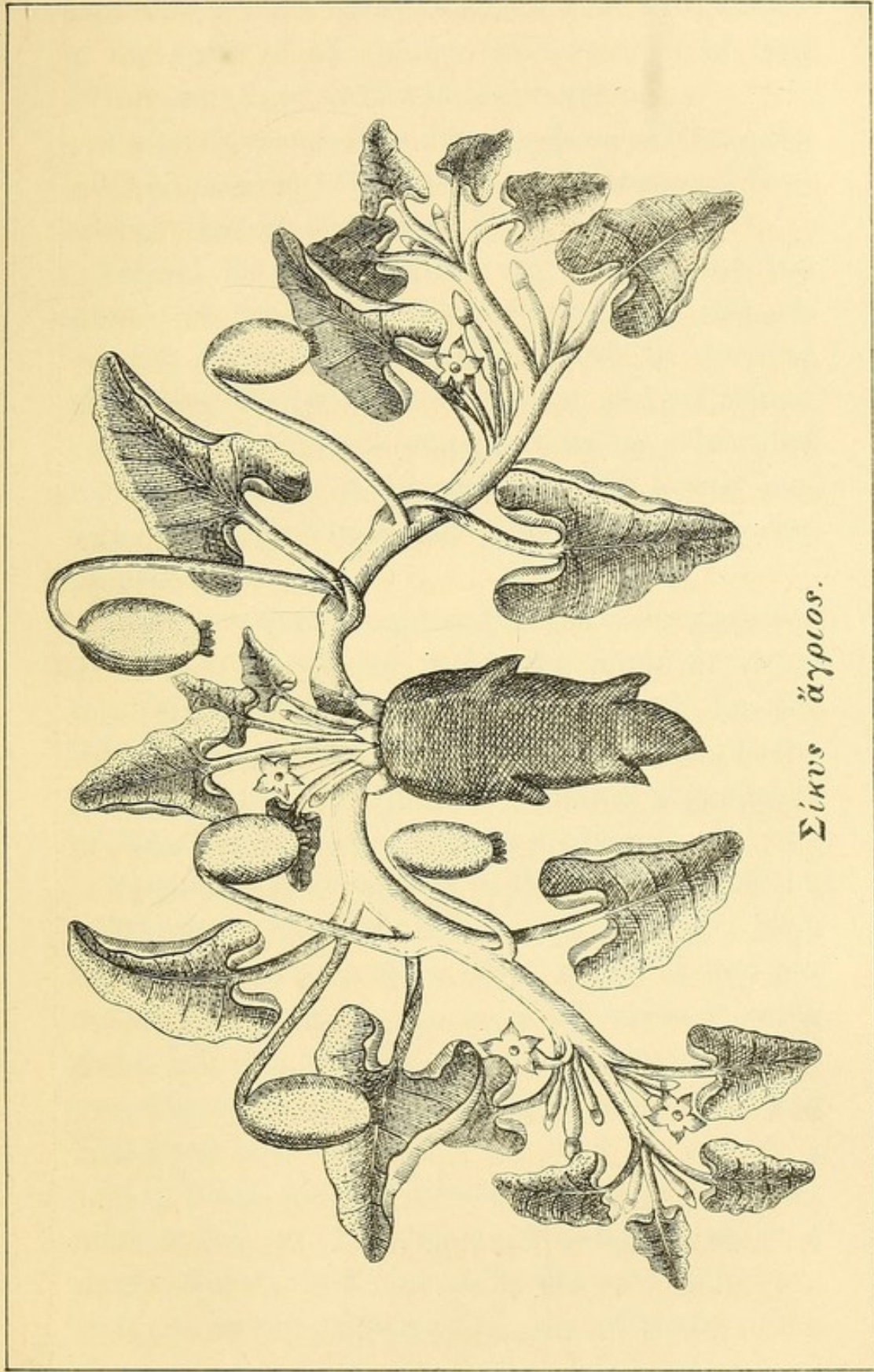
The identity of the third kind noticed with the melon, has been maintained by some, but has been questioned by others.

Pliny describes a variety of cucumeris or pepo, (for these terms were applied, not to different plants, but to different stages of growth in the same,) to which he gives the name of *melo pepo*.

He says, it is of a round form, like the quince, but that instead of hanging from trellis, it trails upon the ground.

So far this description answers well with the melon, but some doubt is cast upon his interpretation, by his adding, that it sprung accidentally in Campania, within his own recollection.

The only inference, however, I should be disposed to draw from this latter statement is, that the melon was at that time of recent introduction, and known to but few; and this appears to be confirmed by a passage in Plutarch, who states,



Sicyos ägyptos.

From a Drawing in the V. M. S. of Diosc.

that in his time, many old men were as ignorant of the taste of the melon, as they were of that of the orange, or of the Indian pepper.

Σικίου δὲ πεπονός, καὶ μήλου μηδίκου, καὶ πεπερεῶς, πολλοῦς ἴσμεν ἐπὶ τῶν πρεσβυτέρων γεύσασθαι μὴ δυναμένους. (Symp. lib. i. c. 9.)

Indeed it seems difficult to account for the silence of writers of the Augustan age respecting this fruit, if it had been known to them at that time; for its delicious flavour and refreshing coolness would have caused it to be celebrated by the poets, quite as much as the *Citrus medica*, of which Virgil and others have sung the praises.

It is true, that Theophrastus has been supposed to refer to the Melon under the name of *σικῦος*, but this was far more probably meant for the Cucumber; and an equal uncertainty attends the passage in Eubulus, quoted by Suidas, who speaks of *πέπονα νεκταροστάγη*, (nectar-dropping.)

Salmasius also appeals to the anecdote told by Plutarch of Democritus, who, being struck with the sweetness of a *σίκυος πέπων*, which he had put before him at a tavern, inquired where it came from, and was told by the waiting maid, that it grew up from a seed planted in a jar that had contained honey.

But these isolated passages are not to be set against the general silence of antiquity as to a fruit, which from its exquisite flavour would have been as much celebrated as any of those which

one sees so frequently noticed in the writers of that day.

Alphonse Decandolle also observes, that Galen makes a remark, which is not applicable to the melon; namely, that the melopepos do not excite vomiting like the pepos; and hence, whilst in the latter we avoid the inner portion of the flesh, where the seeds are, in the former we eat this part.

Upon the whole then, I conclude, that the melon was just begun to be known in the age of Pliny and Columella; and therefore that the latter writer has made a confusion between the cucumber and the melon, inasmuch as the line

“Candidus et fœtæ tremebundior ubere porcæ”

applies best to the latter; whereas it is hardly to be supposed that he should have meant to describe this, to the exclusion of a fruit so much more familiar to his countrymen as was the edible cucumber.

Still less reason is there to believe that the water melon (*citrullus*) was known in ancient times. Had it been so, the readiness with which it admits of being cultivated must have rendered it as common in the markets of Greece and Rome, as it is in these countries at the present day.

The writers of the 16th century called it *citrullus*, from its analogy to the fruits of the *Citrus*. It was probably introduced during the middle ages from the East, but its native place is not exactly ascertained.

It appears, however, from Charlemagne's *Capitularia de Villis*, edited by Eckhardt, that melons were amongst the plants ordered to be cultivated in the gardens of his country houses; and it is conjectured, that pits were made use of for the purpose^d.

Lastly, we find mentioned the Vine; of which, however, I shall say nothing, as a more complete account of its culture has been already given.

Some little addition to this list of fruits is made by Virgil, who in his *Eclog.* speaks of *Fraga* as

“humi nascentia fraga,” (iii. 92.)

probably meaning wild strawberries.

2. *Morum*—used both for the mulberry, “*mora cruenta*” (21),

“jamque videnti
Sanguineis frontem moris et tempora pingit,”

and for the blackberry; the latter being the *mora* of which Pliny speaks, when he says, “*Mora nascuntur et in rubis*,” (xv. 27.)

3. *Sorbus*—the service-tree, the fruit of which, when ripe, is sub-acid, and not disagreeable. Hence it was used for acid drinks, as Palladius indeed states, and as Virgil notices in his *Georgics* (iii. 379):

“Hic noctem ludo ducunt, et pocula læti
Fermento atque acidis imitantur vitea sorbis.”

^d See Sprengel, *de Re Herb.*, on this subject; and Schneider's notes on Columella (lib. x.) may be consulted. See also Decandolle *Geogr. Bot.*, vol. ii. p. 908.

4. *Vaccinium*. If we adopt Fée's suggestion, and regard this as *vaccinium myrtillus*, or bilberry, we should add another to our catalogue of wild plants; but it seems more probable that the verse

“*Et nigræ violæ sunt, et vaccinia nigra*”

is the translation of a line in Theocritus; namely,

Καὶ τὸ ἴον μέλαν ἐστὶ, καὶ ἂ γράπτα ὑάκινθος

in which case, *vaccinium* would be the same as hyacinthus: to which it may be added, that Dioscorides tells us, the Romans call the hyacinth by the name of *vaccinium*.

5. The only other fruit named in Virgil is the Lemon, which is well described in the following lines:

“*Ipsa ingens arbos, faciemque simillima lauro ;
Et si non alium late jactaret odorem,
Laurus erat : folia haud ullis labentia ventis ;
Flos apprima tenax ; animas et olentia Medi
Ora fovent illo, et senibus medicantur anhelis.*”

This however is noticed only as a foreign fruit; nor does it appear that it was cultivated at that time in Italy, for Pliny says that it will grow only in Media and Assyria; though Palladius^e, in the fourth century, seems to have been familiar with it, and it was known in Greece at the time of Theophrastus.

Such then were the contents of an ancient garden, in so far as relates to esculent fruits and vegetables. But a somewhat longer list remains of those which were cultivated for other objects

^e Lib. 4. Tit. x.

of utility; as for economical uses, or as condiments in cookery; or else in medicine, as simples.

Thus we may mention, in the first place, Cerinthe, noticed by Virgil amongst the plants which should be placed near a bee-hive, and designated under the name of

“Cerinthæ ignobile gramen.”

This latter description renders it difficult to identify the plant with the cerinthe of Pliny, which he states to be a plant, with a white leaf bent inwards, the stem a cubit in height, and having on the top a flower, presenting a concavity full of a juice like honey.

It was this account, probably, which led the old Botanists to identify the plant with the Greater Honey-wort, belonging to the family of Boragineæ, reputed to yield much honey; to which they therefore applied the name of *cerinthe major*.

But Dr. Sibthorp was of a different opinion. He states, in his MS. notes, that he believes the *τελέφιον* of Dioscorides to have been the cerinthe minor, and probably the cerinthe major of modern Botanists; fortifying his opinion by the drawing of that plant attached to the V. MS., which bears a considerable resemblance to the above plant.

Undoubtedly the term “ignobile gramen” cannot apply to a large and handsome boragineous plant like the cerinthe, which moreover does not grow in the south of Italy; but we have no very certain grounds to go upon in deciding what Virgil really intended.

Tenore suggests *satureia thymbra*; but this also can hardly be compared to a grass. Rapin, in his poem on Gardens, regards it as *chrysanthemum leucanthemum*, to which there are equal objections: and, upon the whole, the suggestion of a French writer, which has been adopted by M. Du Molin, that it is a species of *bedstraw*, "*galium verum*," seems the most probable; for this little plant might be called a grass; it is small and insignificant; and it exhales an aromatic odour which resembles that of honey.

The saccharine principle, however, which it contains, undergoes during drying a sort of fermentation, and passes into vinegar. Hence the plant has been used in Cheshire for curdling milk in the process of making cheese.

2. The *Cytisus*, alluded to in a former Lecture, was planted along with the *cerinthe* just mentioned and the *melissophyllum*, (*melissa officinalis*, the *apiastrum* of Pliny), for the sake of their bees, which are particularly fond of these flowers. Hence Virgil:

"huc tu jussos asperge sapos,
Trita melisphylla, et cerinthæ ignobile gramen."

(GEORG. iv. 62.)

3. *Ferula* too was used, as birch is with us, for twigs,

"Florentes ferulas et grandia lilia quassans,"

(ECL. x. 25.)

and probably was the Giant Fennel, "*ferula communis*" of Linnæus. Hence Columella (x. 118) speaks of "*Ferulæ minaces*," from which, in Apu-

lia, Tenore says, walking-sticks are at present made, which are light and strong.

4. Lappa—

“ subit aspera sylvæ,
Lappæque, tribulique.” (GEORG. i. 152.)

This plant, in the above and in another passage of the Georgics, is associated with tribuli.

The lappa of Pliny is the ἀπαρίνη of Theophrastus, who speaks of it as having a square stem, verticillated leaves, and white flowers. This description leads Linnæus to identify it with galium aparine, goose-grass, or cleavers; but Sibthorp, in his MS. notes, states that it is more likely to have been galium verrucosum, as the latter is much more common in Greece than the former species^e.

5. Paliurus—

“ Carduus et spinis surgit paliurus acutis.”
(ECL. v. 39.)

This plant has been considered the Christ's thorn (paliurus aculeatus Dec.), although the descriptions given by Theophrastus, Dioscorides, and Pliny, of the tree called by that name, do not coincide with its known characters.

Theophrastus, the most accurate of these writers, and the most precise in his description, states, that all the kinds of it bear a fruit, which consists of three or four seeds inclosed in a berry; and Dioscorides adds, that the seed is fat (λίπαρον), and fit for making demulcents.

^e See Fl. Gr. t. 133, for G. verrucosum, now called *saccharatum*, and common in Italy; and for ἀπαρίνη, V. MS.

Now the Christ's thorn has no berry, but only an indehiscent seed-vessel, with borders like the brim of a hat, and which, being dry, could not serve the medicinal purpose indicated; on which account Sibthorp regards the *παλίουρος* of the Greek writers as the *rhamnus zizyphus*, or *zizyphus vulgaris* of Dec.

Nevertheless, inasmuch as both trees are spinous, it is very possible they may have been confounded; and seeing that the term *παλίουρι* is given to the Christ's thorn at the present day in Greece, it seems the more probable that both this and the *zizyphus* may have passed under this same name.

6. *Rhododaphne*, mentioned in Virgil's *Culex*,

“*Laurus item Phœbi surgens decus; hic Rhododaphne,*”

Sibthorp, in accordance with all other authorities, considers as the *Nerium oleander*, known in Greece by the name of *Νηρίου*. It is one of the most ornamental plants of Greece, and occurs frequently in moist situations. It is still called, he says, *ρόδοδάφνη*, and, more corruptedly, *ἀραδαφ*, in most of the Greek islands.

7. *Ruscus*,

“*hirsuto sepes nunc horrida rusco,*” (374.)

appears to have been the butcher's broom (*ruscus aculeatus*), which is employed at present for hedges, its leaves being armed with spines. Owing to a fancied resemblance to the myrtle, Dioscorides calls it *μυρσίνη ἀγρία*, and Pliny, *chamæmyrtus*.

8. Sabina, mentioned in Virgil's *Culex*,

“Herbaque thuris opes priscis imitata Sabina,”

was the *juniperus sabina*.

Pliny, in accordance with Virgil, states that it was used as a substitute for frankincense, lib. xxiv. c. 60.

9. Tamni — “jam tamni sponte virescunt.”

Tamnus is probably the same as *tamus*. It is mentioned as one of the plants that spring up of their own accord by Pliny (lib. xxi. c. 56), who in another place speaks of it as a kind of vine.

It is therefore probably the black bryony, which is named accordingly by Botanists *tamus communis*.

10. Tribulus,

“primum aspera silva,

Lappæque tribulique absint.” (GEORG. iii. 384.)

The tribulus is identified by Linnæus with the *tribulus terrestris* or caltrops, which in the south of Europe is so troublesome to cattle, by its sharp thorns wounding their feet.

The above plants, enumerated by Columella and Virgil, are of a miscellaneous character, as to their uses or properties. But the greater number mentioned are medicinal herbs, or, at least, plants to which some influence, good or bad, upon the animal economy was attributed.

Taking them in alphabetical order, I will begin with

1. Amaracus,

“ Sicubi odoratas prætexit amaracus umbras ;”

(C. x. 296.)

to which Virgil adds,

“ ubi mollis amaracus illum

Floribus et dulci adspirans complectitur umbra.”

(ÆN. i. 693.)

Dioscorides and Pliny both tell us, that amaracus was the same plant as lampsana, and the latter is considered by Sibthorp to be our marjoram, (*Origanum marjorana*.) a native of Egypt and Crete.

A figure of *σάμψυχον*, without fruit or flower, representing only the radical leaves, is given in V. MS. pl. 298. That marked *ἀμάρακον*, pl. 29, in the same work, does not at all correspond with it, being very probably intended for *matricaria parthenium*, which Dioscorides indeed says (lib. 3. c. 155) was also called *ἀμάρακον*.

2. Anethum,

“ Bene odoratum”

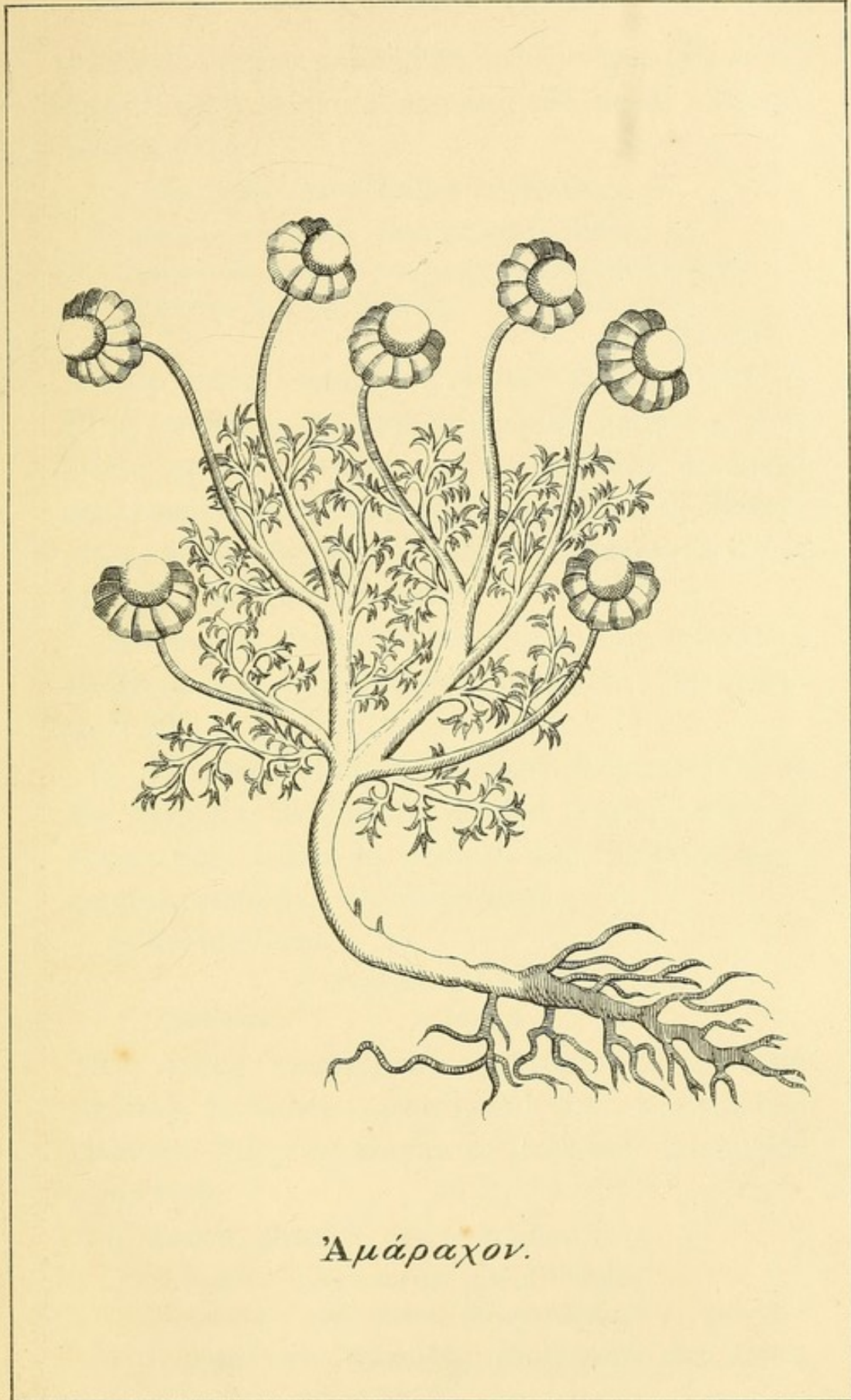
Is *anethum graveolens* L. (or Dill.), common in the South of Europe, and used in Italy as a sauce, its seeds being aromatic and stimulant.

“*Ανυσον*” of Dioscorides, Sibthorp says, is clearly *pimpinella anisum*, and the drawing in the V. MS. was no doubt intended for this plant.

3. Balsama,

“ Cum casia nectens.” (302.)

The passage does not imply that this plant was cultivated in the garden, for it was probably brought from the east, along with casia with



Ἀμάραχον.

From a Drawing in the V. M. S. of Diosc.

which it is here associated. It is supposed to be amyris opobalsamum, or balm of Gilead. (Pliny, lib. xii. c. 54.)

4. Bryonias, described as follows :

“ Quæque tuas audax imitatur Nysie viteis,
Nec metuit senteis ; nam vepribus improba surgens
Achradas, indomitasque bryonias alligat alnos ;”

(C. 248.)

is the white bryony, *bryonia alba*, to which Pliny ascribes sundry medicinal qualities, but which at the present day is regarded as acrid and poisonous. Whereas ἄμπελος λεύκη, of Dioscorides, is the bryonia dioica, or perhaps bryonia cretica. Fl. Græc. t. 940.

The tender shoots of bryonia cretica are eaten, Sibthorp says, as asparagus is with us. See plate to V. MS.

5. Chærophyllum, designated as *breve* (110), is the *Scandix carifolium*, garden chervil, used in soups and salads in France, and likewise as a pectoral remedy. Seeds aromatic.

6. Coriandrum,

“ Famosaque tunc coriandra
Nascuntur.” (244.)

This plant (*coriandrum sativum* of modern authors) is rather a condiment than a medicine, although Pliny attributes to it sundry medicinal properties.

7. Eruca, *brassica eruca*, rocket,

“ Et quæ frugifero seritur vicina Priapo ;
Excitet ut veneri tardos eruca maritos,” (108.)

This plant was formerly much used as a salad

herb, but is now rejected on account of its unpleasant smell. Pliny, xix. 44, speaks of its stimulating action upon the system.

8. *Inula tristis*, so called from its bitter flavour, is the inula helenium or elecampane of modern botanists. Its mucilage was used in ancient times, as it is at present, in pectoral complaints. (Pliny xx. 29.)

9. *Lepidium*, *lepidium latifolium* L., dittander.

The following lines in Columella relating to this plant,

“ Lactis gustum quæ condiat herba
Deletura quidem fronti data signa fugarum
Jamque suam idcirco profitetur nomine Graio,”

are explained, by the property attributed to it of removing the scars left by wounds or ulcers. Pliny, xx. 70.

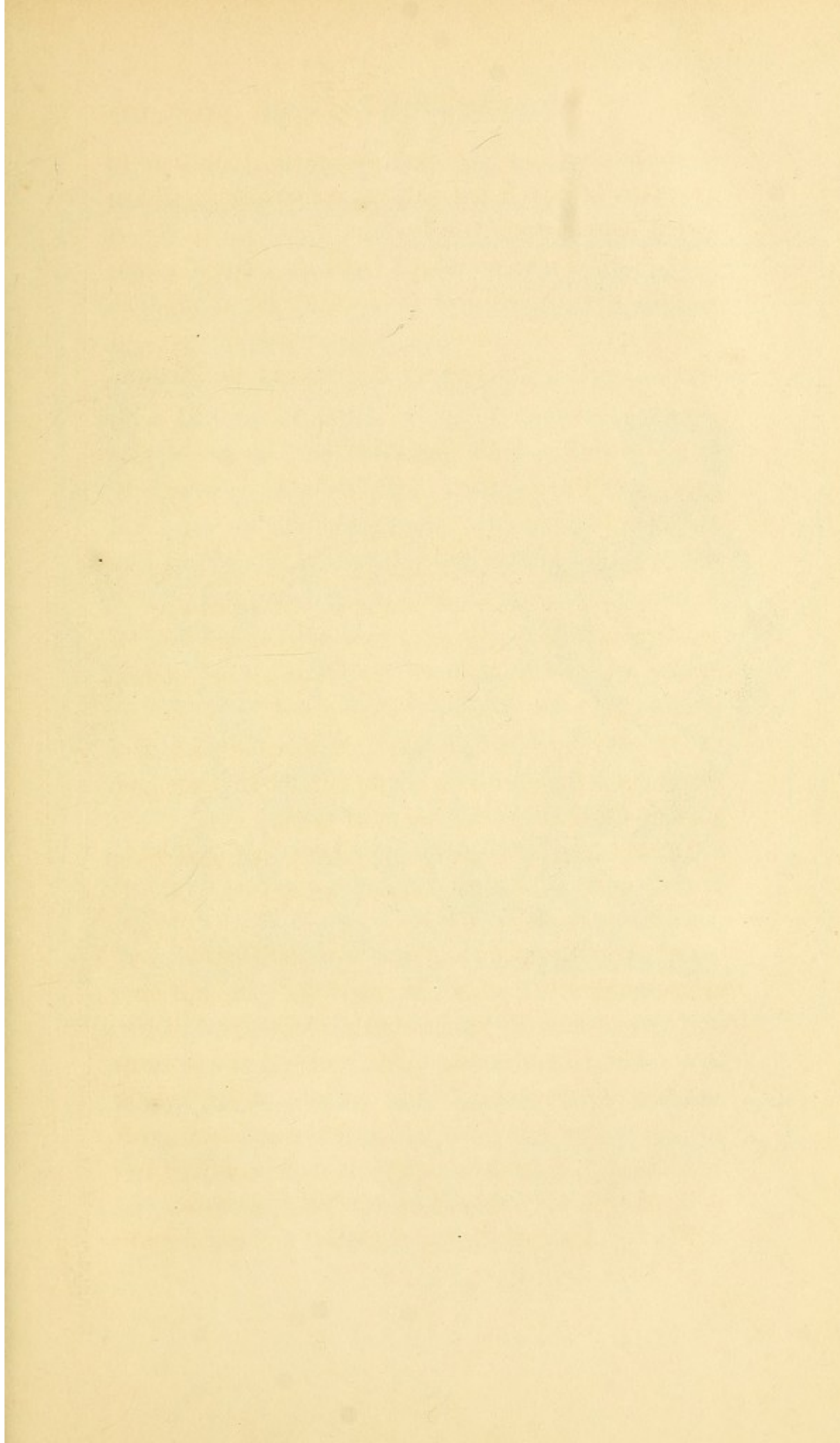
The plant, Sibthorp says, is common on the road sides and amongst rubbish in Greece, and goes at present by the name of *λεπίδι*.

10. *Mandragora*, *atropa mandragora*, mandrake,

“ Quamvis semihominis vesano gramine fœta,
Mandragoræ pariat flores,” (20.)

is mentioned, not as a plant to be cultivated, but as growing wild; which is the case with it at present very generally in the south of Europe. Fl. Gr. 232. The resemblance of its roots to the human figure has given rise to the various superstitious notions concerning it, which have existed both in ancient and modern times. It is poisonous however, purges violently, and acts as a narcotic.

Dioscorides mentions a male and a female





Κύων λησπῶν τὸν μαγεβαλόσταν ἔπειτ' ἀποθνήσκων. 2.
Dioscorides receiving a root of the Mandrake from
the Goddess of Discovery.

kind, which, Sibthorp says, are merely varieties, the male being larger and more downy than the female; but Pliny distinguishes the male as the white variety, and the female as the black, corresponding with the spring and autumnal mandragora of modern Botanists.

In the V.MS. of Dioscorides, so often alluded to, is a curious drawing, which I have transferred to this work^c; representing *Εὐρησις*, the Goddess of Discovery, presenting in triumph to Dioscorides the root of this mandrake, which she has just had pulled up, whilst the unfortunate dog, which had been employed for that purpose, is depicted in the agonies of death.

This is an evident allusion to one of the superstitious notions, which Josephus, amongst others, has recorded (Wars of the Jews, lib. 7. cap. 6.) respecting this plant. After mentioning the danger of taking it up, he says, "there is one way however in which this may be done with safety. That is as follows: They dig all round the root, so that it adheres to the earth only by its extremities. Then they fasten a dog to the root by a string, and the dog, striving to follow his master who calls him away, easily tears up the plant, but then dies upon the spot; whereas the master can take this wonderful root in his hand without danger." Josephus adds, that the great use of this plant is to dispel demons, who cannot bear either its smell or its presence.

^c See plate annexed.

11. *Mentha*, mint,

“serpentia gramina mentæ.” (119.)

What species is referred to may be doubtful, but perhaps *m. pulegium* or pennyroyal, not unfrequent in Italy, is intended.

12. *Myrica*,

“Non omnes arbusta juvant, humilesque myricæ.”

(ECL. iv. 2.)

Fée mentions four sorts of plants designated by this name: 1st, the *μυρίκη* of Theophrastus, having cottony fruit, which corresponds with one kind mentioned in Dioscorides: this he considers to be *tamarix Gallica*, an opinion confirmed by Dr. Sibthorp's authority, and by the drawing contained in the V. MS., which is a fair representation of the plant in question.

2nd, *μυρίκη* of Dioscorides, with fruit like a gall nut. Perhaps *tamarix Africana*.

3rd, *myrice* of Pliny, in which are included, not only several kinds of *erica*, but also *tamarix Gallica*.

4th, *myrica* of Lenæus and Favorinus, as cited by Pliny, which comprehends several of the smaller kinds of *erica*.

13. *Molochæ*,

“Et molochæ, prono sequitur quæ vertice solem.”

(247.)

μαλάχη Diosc. (see Fl. Gr.) probably *malva sylvestris*. Pliny says the cultivated mallow is called *malope*, the wild one *molochæ*, (xx. 84.)

He attributes sundry virtues to it, but the

moderns only regard it as an emollient and demulcent, and employ it chiefly as an external application.

14. *Megaridis bulbi*,

“*Jam Megaris veniant genitalia semina bulbi.*” (106.)

From the virtues here attributed to this plant, it has been thought that some kind of orchis is intended, but the bulbs of the orchis do not contain seeds.

Pliny, in his 19th Book, c. 30, alludes to the *bulbi Megarei*, which Cato also had mentioned in his 8th chapter, unaccompanied however with any description.

Nicander praises the *Μεγαρήνας βολβοὺς*, whilst Ovid condemns them as aphrodisiac; but this is nearly all we know respecting their qualities, and it is therefore rather precipitate to set them down as orchises, especially when Pliny associates them with squill in the passage above cited. Schneider regards the plant as more probably the *arum italicum*. Dioscorides only says, that these bulbs are known to every one, but unluckily the knowledge the ancients had on the subject has not been handed down to us.

15. *Ocimum*,

“*Tum quoque proscisso riguoque inspersa novali
Ocima comprimite,*” (318.)

was therefore a weed apt to spring up amongst grass, and must not be confounded with the *ocimum* or *ocinum* spoken of by Cato, which, as I explained in a former Lecture, was a forage herb;

whereas this is rather the condiment now used in foreign cookery, although the medicinal virtues attributed to the plant by Pliny have led me to place it among simples. It is probably the *ocymum basilicon* of modern botanists.

16. *Papaver*. The poppy spoken of by Columella, seems to have been the *p. rheas*, or corn poppy,

“*cereale papaver* ;” (314.)

though possibly *glauceum luteum* may be intended, when he speaks of

“*vinctura papavera somnos
Glaucea.*” (104.)

Virgil, however, probably has in his eye the *papaver somniferum*, where he speaks of

“*lethæa papavera.*” (GEORG. iv. 545.)

17. *Panax*,

“*Medica panacem lachryma.*” (103.)

probably *opopanax chironium*, ‘*Umbelliferæ*.’ A gum resin is obtained from this plant by incisions into the root, a milky excretion flowing out (*medica lachryma*) which, like other juices of the kind, possesses stimulant properties. See Pliny xii. 57.

18. *Ruta*,

“*Palladiæ baccæ jutura saporem,*” (121.)

is *ruta graveolens* L., a plant with a strong disagreeable smell, which, however, the ancients appear to have relished. It is a powerful stimulant and narcotic, but is not much used in modern practice.

19. *Scilla*, squill, *scilla maritima*, the medi-

cinal virtues of which plant were well known to the ancients. Virgil couples it with hellebore and pitch,

“ Scillamque, helleborosque graves, nigrumque bitumen,”
(GEORG. iii. 451.)

as a remedy for scabies in sheep.

20. Sampsucum I have already alluded to under the name of amaracus, of which it appears to have been a synonyme.

To this list of medicinal herbs, the following additions may be made from Virgil :

21. Aconitum of the poet was aconitum napellus, or Monk's hood of modern botanists, a violent poison ;

“ Nec miseros fallunt aconita legentes :”

(GEORG. ii. 152.)

but the *ἀκόνιτον* of Dioscorides comprises two plants, of such very different characters, that it is difficult to understand how they could have been called by the same name.

The first, *παρδαλιάγχης*, is the *Doronicum pardalianches*, a composite plant, which, Sibthorp says, grows abundantly on mount Parnassus. It has a root like a scorpion, and accordingly is called at present *Σκορπίδι*. But the second, called in V. MS. *ἀκόνιτον ἕτερον*, Sibthorp says is our *aconitum lycoctinum*, which he considers only a variety of *napellus*, but which is regarded as a distinct species by modern botanists. The V. MS. gives a plate of the first mentioned aconitum,

which does not indeed correspond with *doronicum*, but still less with *aconitum*; whereas the plate of *ἀκόνιτον ἕτερον* more resembles our present aconite.

22. *Baccaris*^f,

“Errantes hederas passim cum baccare tellus.”

(ECL. iv. 19.)

This plant is mentioned in Pliny, xxi. 18, as having the smell of cinnamon. Fée regards it as *digitalis purpurea*; Sprengel as *valeriana celtica*; Tenore as *asarum Europæum*; Du Molin as *salvia sclarea*, which had been already suggested by Gaspar Bauhin in his *Pinax*, and really appears the most probable conjecture after all.

Dioscorides describes it as a shrubby and fragrant plant, of which chaplets are made; its leaves rough, of a size intermediate between the violet and the *verbascum*; its stem angular, about a cubit high, rather rough; its flowers purple, mixed with a shade of white, and fragrant; its roots very like the black *veratrum*, and with the odour of cinnamon; its habit, that of growing in a rough and dry soil.

He then proceeds to describe its medicinal virtues, in which the ancients had great faith, just as some of the moderns appear to have had in

^f This name is applied to an extensive Genus of Composite plants, one species of which (now removed to the Genus *Pluchea*) was called by Linnæus *Baccharis Dioscoridis*, from the notion that this was the plant intended by that old author under the name of *βακχάρης*. It is however now generally admitted, that there is no probability in favour of this opinion.

the virtues of "Clary;" as appears from the lines in the Schola Salernitana :

" Cur moriatur homo cui salvia crescit in horto ;
Contra vim mortis non est medicamen in hortis."

Many of the poets speak of the oil or essence of *baccaris*, as we do of that of the *salvia sclarea*.

All these properties agree with those of the latter plant, and therefore, in spite of the authority of Sibthorp, who inclines to believe the *βακχάρις* of Dioscorides to be a *scutellaria*, I should revert, as Du Molin has done, to the old opinion of G. Bauhin, who believes it to be the *salvia sclarea*.

23. *Centaurea*, *graveolentia centaurea*, *Centaurea chironium*, the great centaury.

24. *Cicuta*. This term seems to be used indiscriminately for several *umbelliferae*, as well as for *cicuta virosa*, or *conium maculatum*, the two poisonous plants, with one or other of which it is usually identified.

Pliny says the stems of *cicuta* are eaten; although he speaks of the poisonous quality of its seeds^g, evidently confounding *conium maculatum* with *apium petroselinum*.

Virgil does not seem to allude to a poisonous plant, in the only two places in which he mentions the *cicuta*, viz.

" Est mihi disparibus septem compacta cicutis
Fistula." (ECL. ii. 37.)

" Hac te nos fragili donabimus ante cicuta." (ECL. v. 55.)

^g The poisonous principle in the *Umbelliferae* resides in the stem and roots, and not in the seeds.

25. Dictamnus, Origanum dictamnus, Dittany of Crete,

“ Puberibus caulem, foliis et flore comantem
Purpureo.” (ÆN. xii. 412.)

Pliny notices the fable, that if a wounded animal eats this herb, the weapon immediately falls from the body, (lib. xxv.) In allusion to this supposed virtue, Venus employs it, in the passage cited, to cure the wound of Æneas.

26. Galbanum, an African plant with a strong disagreeable smell,

“ Galbaneoque nidore.” (GEORG. iii. 415.)
“ Galbancos odores.” (ID. iv. 264.)

27. Helleborus, Helleborus niger, L.

“ Scillamque, elleborosque graves,”

is the *ἑλλέβορος μέλας* of Dioscorides, the *H. officinalis* of Sibthorp, found by him in Bithynia, near Constantinople, on mount Athos, &c.; but not about the site of the ancient Anticyra, near the straits of Thermopylæ, where it was formerly so abundant, although roots of it are collected on the opposite coast. It is reckoned a drastic purgative. See Fl. Gr. t. 523. The figure in V. MS. has not much resemblance to this plant.

28. Herba Sardoia.

“ Imo ego Sardois videar tibi amarior herbis.”
(ECL. vii. 41.)

Dioscorides, lib. ii. c. 206, in speaking of the different kinds of *βατράχιον* or ranunculus, of

which he enumerates four, mentions that one which abounds in Sardinia is the most acrid of any, that it is more woolly and has a longer stem than the others, and that it is called wild parsley. He also in another place states, that it acts as a poison, and produces in the person affected a kind of grin, which is known by the name of *Risus Sardonicus*.

From its being likened to the parsley, Haller supposed it was some poisonous umbelliferous plant, such as *œnanthe crocata*; but it is stated by Moris in his *Flora Sardoæ*, Turin 1837, that a species of *ranunculus*, which has been known within the present time to have poisoned two persons in Sardinia, with symptoms similar to those described by Dioscorides, is called by the peasants *apio burdo*, spurious parsley.

Moris enumerates no less than 21 species of *ranunculus* as indigenous in Sardinia, but of these only two are highly poisonous, namely *R. sceleratus*, and *R. philonotis*, and of these the latter is by far the most common.

It is therefore most probable, that the *Herba Sardoæ*, which produced in those who partook of it the *Risus Sardonicus*, was the last mentioned species of *ranunculus*.

29. *Melisphyllum* has been already mentioned, as the *Apiastrum* of Pliny, and as the plant called *Melissa officinalis*, or balm by the moderns. It is fragrant, and was formerly in repute for nervous affections.

30. *Rosmarinus, R. officinalis*, Rosemary, a favourite plant with bees :

“ *Apibus casias roremque ministrat.*” (G. ii. 213.)

31. *Serpyllum*, wild thyme, *Thymus serpyllum* :

“ *Allia, serpyllumque, herbas contundit olentes.*”

(ECL. ii. 11.)

32. *Viscum*,

“ *Quale solet sylvis brumali frigore viscum,*

Fronde virere nova, quod non sua seminat arbos,”

(ÆN. vi. 205.)

is generally interpreted the misletoe (*ἰξος* of Dioscorides), but it is more probable that it is the *Loranthus Europæus*^g, which, as Walpole states, (p.283), grows on the oaks in Arcadia, and is there called *ῶξος*.

Our misletoe, on the other hand, is termed *μέλλα*, and grows upon the silver fir, but not upon the oak.

The *Loranthus* is met with in Hungary, but its western limit in Austria is Schönbrunn near Vienna. It occurs however in various parts of Italy, as on the Apennines, growing upon the oak ; and an ingenious speculation has been thrown out, that the reason of its non-occurrence in the western parts of Europe is, that it was eradicated, with the other emblems of the Druidical worship, in those countries where that superstition had prevailed, and where it was afterwards suppressed.

^g For a drawing of *Loranthus*, see Jacquin's *Flora Austriaca*.

The following list will then comprise the plants mentioned by Columella in his 10th Book, and by Virgil in his various poems :—

1st. Ornamental Plants.

Caltha	C. and V., ^h Marygold.
Lilium	C. and V., Lily.
Melanthium	C. Nigella.
Narcissus	C. and V., Narcissus.
Rosa	C. and V., Rose.
Viola	C. and V., Violet.
Amaranthus	C. Love lies bleeding (?)
Hyacinthus	C. and V., Lilium martagon (?)
Leo	C. Snapdragon (?)
Ligustrum	C. and V., Privet (?) or Convolvulus (?)
Leucojum	C., Cheiranthus cheiri (?)
Acanthus	V., Acanthus, Acacia, Spartium.
Amellus	V., Aster amellus.
Hibiscus	V., Malva sylvestris.
Saliunca	V., Valeriana celtica (?)
Thymus	V., Thymus serpyllum.
Verbena	V., Vervain.

Pot-Herbs.

Allium	C. Garlic.
Cepa	C. Leek.
Porrum	C. Onion.
Ulpica	C. Onion.
Anethum	C. Anise.
Apium	C. Parsley.
Asparagus	C. Asparagus (wild).
Beta	C. Beet.
Brassica	C. Cabbage.
Crambe	C. Ditto (?)
Cynara	C. Artichoke (?)
Capparis	C. Caper plant.

^h Viz. Columella and Virgil.

Faselus	C.	Kidney-bean.
Intybum	C.	Endive.
Lactuca	C.	Lettuce.
Lapathos	C.	Sorrel.
Olus pullum or	}	C. Alexanders.
Olus atrum		
Sinapis	C.	Mustard.
Staphylinus	C.	Parsnip.
Siser	C.	Skirret.
Satureia	C.	Savory.

Fruits.

Prunus	C.	Plum.
Ficus	C.	Fig.
Punica	C.	Pomegranate.
Cucumis	C.	Cucumber
Melopepo	C.	Melon (?)
Cucurbita	C.	Pumpkin.
Fragaria	V.	Strawberry.
Morum	V.	Mulberry, Blackberry.
Sorbum	V.	Medlar.
Vaccinium	V.	Bilberry (?)
Pomum medicum	V.	Lemon.
Cerasus	V.	Cherry.
Malum	V.	Apple.

Trees and Shrubs noticed for their beauty or for some useful property.

Cytisus	V.	Medicago arborea.
Laurus	V.	Bay Laurel.
Myrtus	V.	Myrtle.
Myrica	V.	Heaths.
Viburnum	V.	Clematis (?)
Cerinthe	V.	Galium verum.
Ferula	V.	Fennel.
Ruscus	V.	Butcher's broom.
Tamus	V.	Black bryony.
Andrachne	C.	Arbutus andrachne.

Medicinal Herbs.

Amaracus	C.	Marjoram.
Anethum	C.	Anise.
Balsamum	V.	Balm of Gilead.
Bryonias	V.	White bryony.
Eruca	C.	Rocket.
Inula	C.	Elecampane.
Lepidium	C.	Dittander.
Mandragora	C.	Mandrake.
Mentha	C.	Pennyroyal.
Moloche	C.	Wild mallow.
Megaribulbi	C.	(doubtful)
Ocymum	C.	Basil.
Papaver	C.	Poppy.
Panax	C.	Opoponax.
Ruta	C.	Rue.
Scilla	C.	Squill.
Aconitum	V.	Aconite.
Baccaris	V.	Clary.
Centaurea	V.	Centaury.
Dictamnus	V.	Dittany.
Galbanum	V.	Galbanum.
Helleborus	V.	Hellebore.
Rosmarinus	V.	Rosemary.
Serpyllum	V.	Wild thyme.

The small number of plants, especially of an ornamental description, which are noticed as being cultivated in a Roman garden, may at first sight occasion some surprise; but several reasons may be assigned, why they should have been less numerous than in modern times.

In the first place, since botany was not studied as a science, since the microscope was unknown, and since the public cared little, except for plants

remarkable for their fragrance, their size, or their brilliant colours, many wild flowers, which are now looked upon with interest, would be passed over unnoticed. The little adoxa, the veronicas, the polygala, the myosotis, would fall under this category, and are accordingly scarcely mentioned, if at all, in the writings of the ancients.

2nd, the plants and flowers actually recognised by the ancients really exceeded greatly the number to which distinct names were given, because the latter were applied by them in most cases to the genus, and not to the species. This indeed is the case in all unscientific descriptions of external objects, arising from the mind seizing at first upon the broader distinctions, and viewing the minor ones, rather as indicative of varieties, than of species, in the sense in which we now understand them.

Thus when Columella mentions the different kinds of lactuca, or of papaver, there is no reason to suppose that he regarded them as more distinct, than the different kinds of vine or apple, which he elsewhere enumerates, although in the former he designates what we know to be species, in the latter merely varieties.

Indeed it would often happen, that the same term would be applied to two plants altogether different in structure, from some fancied resemblance between them, or some analogy in points not affecting their general organisation, as in the case of the acanthus, the vine, and the myrtle ;

just as the early settlers in the United States gave the name of poplar to the liquidambar, of acacia to the robinia, of wild orange to the cherry tree of Carolina, and of laurel to the magnolia.

The terms *rosa*, *viola*, *lilium* &c. are therefore to be regarded as indicating genera only, and not species.

3rdly, in the genial climate of Greece and Italy there would be much less temptation to hunt over distant countries for exotic embellishments to their gardens and pleasure grounds, when nature herself had supplied them so liberally at home.

The Roman indeed might well entertain the sentiment so eloquently expressed by the Mantuan bard in his 2nd Georgic; when, after describing the productions of other lands, he adds,

“ Sed neque Medorum silvæ, ditissima terra,
Nec pulcher Ganges, atque auro turbidus Hermus,
Laudibus Italiæ certent: non Bactra, neque Indi,
Totaque thuriferis Panchaia pinguis arenis.”

(GEORG. ii. 139.)

It is this feeling, prevailing also amongst the modern Italians, which renders it far more rare to see amongst them conservatories or stoves, than in the less favoured regions of Germany or France.

For, whilst the flora of other countries known to them, which were situated in nearly the same parallel, presented characters almost identical with their own, they were at the same time precluded in a great degree from gaining accessions, either

from the north or from the south; from the former, because their plants could scarcely bear the scorching heat of an Italian summer; from the latter, because as we approach the tropics, the vegetable productions assume more of an arborescent character, and contain a greater predominance of evergreens.

Now whilst herbaceous plants die down to their roots, and therefore escape in a great degree the severity of the winter's cold; arborescent ones, and especially evergreens, are destroyed, whenever during any portion of the year the temperature falls below a certain point. Accordingly, whilst we are able without difficulty to transport to our gardens the choicest herbaceous plants of Greece and Italy; the Romans would have been baffled, if they had attempted to naturalise in theirs the shrubs and trees, of Northern Africa, or of the warmer regions of Asia.

When to this we add, the smaller range over which their explorations had extended, and the greater difficulties of bringing over plants from distant countries than we ourselves experience, the limited extent of their knowledge with respect to the vegetable kingdom may perhaps be sufficiently accounted for.

But might not, it may be said, the ancients have had at their command those appliances, which modern horticulture possesses, for preserving the plants of tropical or semi-tropical regions from the cold of their winters?

Doubtless there are in ancient writers some notices of contrivances which had in view these or similar objects.

Thus Martial (lib. viii. 14) tells us of a friend of his, in whose garden

“ Pallida ne Cilicum timeant pomaria brumam
Mordeat et tenerum fortior aura nemus ;
Hybernis objecta notis specularia puros
Admittunt soles, et sine fæce diem :”

and then goes on to complain, that the person in question took so much less care of his visitors, that, for his part, he had rather be the guest of his fruit trees, than an inmate of his dwelling-house :

“ At mihi cella datur, non tota clausa fenestra,
In qua nec Boreas ipse manere velit,
Sic habitare jubes veterem crudelis amicum,
Arboris ergo tuæ tutior hospes ero.”

So also, in lib. viii. ep. 68 :

“ Qui Corcyræi vidit pomaria regis,
Rus, Entelle, tuæ præferat ille domus.
Invida purpureos urat ne bruma racemos,
Et gelidum Bacchi munera frigus edat ;
Condita perspicuâ vivit vindemia gemmâ,
Et tegitur felix, nec tamen uva latet.
Fœmineum lucet sic per bombycina corpus :
Calculus in nitida sic numeratur aqua.
Quid non ingenio voluit natura licere ?
Autumnus sterilis ferre jubetur hyems.”

Seneca likewise, (Epist. 90,) mentions, that within his recollection the use of specularia in gardens had been introduced, which transmitted the clear light through a translucent shell : “ Specularium

usum perlucente testâ clarum transmittentium lumen;" and Columella gives in his 11th book a detailed description of the method of raising cucumbers, as follows:

He who wishes, he says, to have the fruit of the cucumber before its season should, after the winter is over, introduce well-manured soil into baskets, and slightly water it. Then, when the seeds have come up, on warm and sunny days, he should place them in the open air near his house, so as to shelter them from all cold blasts. But in cold and windy weather he should bring them under cover, and continue this position until the vernal equinox. He should let the baskets altogether into the ground; and he will thus obtain a precocious fruit. Wheels also may, if it be thought worth while, be placed under the larger vessels, in order that they may be drawn backwards and forwards with less labour. But in any case they must be covered with *specularia*, that even in calm but cold days they may be safely brought out into the sun. It was in this way that Tiberius Cæsar got cucumbers almost all the year round.

"Sed qui præmaturum fructum cucumeris habere volet, confecta bruma stercoratum terram inditam cophinis obserat, modicumque præbeat humorem, deinde cum enata semina fuerint, tepidis diebus et insolatis juxta ædificium sub divo ponat, ita ut ab omni afflatu protegantur, ceterum frigoribus ac tempestatibus sub tectum referat:

idque tamdiu faciat, dum æquinocmium vernum confecit, postea totos cophinos demittat in terram. sic enim præcoquem fructum habebit. Possunt etiam, si sit operæ pretium, vasis majoribus rotulæ subjici, quo minore labore producantur et rursus intra tecta recipiantur. Sed nihilo minus specularibus integri debebunt, ut etiam frigoribus severis diebus tuto producantur ad solem. Hac ratione fere toto anno Tiberio Cæsari cucumis præbebatur." (Colum. xi. 3. 51.)

Pliny alludes to this mode of ripening cucumbers in lib. xix. 23, and nearly in the same terms.

Martial also mentions the forced roses which the emperor obtained in winter :

"Dat festinatas, Cæsar, tibi bruma coronas
Quondam veris erat, nunc tua facta rosa est ;"

where Becker rightly observes, that real flowers, and not wax imitations (as Böttiker had supposed), were designed.

Nevertheless, these passages—and they are the only ones bearing upon the subject which are known to me—although proving that the Romans had forcing houses, or at least forcing pits, discountenance the idea, that they employed these methods to any extent for the preservation of plants of warmer climates than their own.

Pliny indeed tells us, that he had the advantage of visiting the garden of Antonius Castor, who is said to have been the first Roman, that possessed what we might call a botanic or physic garden. The plants however of which he makes

mention are almost all such as might be cultivated in the open air, and few, if any, are natives of tropical regions.

One does not see the use of a hothouse, for grapes, and still less for apples, in the climate of Rome; unless indeed pomaria may stand for orangeries, as poma medica are supposed to be lemons or oranges.

Setting these aside, as doubtful or exceptional cases, the only objects for which (as far as we know) the stove-houses of the ancients were designed, would be, for the production of early cucumbers and perhaps melons, and for a supply of winter roses.

Moreover, we do not read that their windows were ordinarily furnished with glass, or with any better material than talc or lapis specularis. We can hardly interpret the words *lapis specularis* otherwise; and we are expressly told by Pliny, that this was the material, of which the windows of dwelling houses were at that time usually made.

Now it can scarcely be imagined, that if glass, of a kind suitable for windows, had been cheaply and easily attainable, talc would still have continued to be employed for such purposes.

The first mention of glass windows in any ancient author, is at the end of the third century, by Lactantius:

“Cum autem videamus eodem momento temporis, plerumque vero aliud agentis, nihilominus tamen universa, quæ contra sunt posita intuea-

mur, verius et manifestius est mentem esse, quæ per oculos ea quæ sunt opposita, transpiciat, quam per fenestras lucente vitro, aut speculari lapide obductas." (De Opificio Dei c. 8.)

It is indeed somewhat perplexing to reconcile this, with the skill which the ancients evidently manifested in producing objects of an ornamental nature from glass, and with the discovery of plates of glass at Pompeii apparently intended for windows.

But the art of rendering glass perfectly transparent would seem to have been known only to a few, as we may infer, from Pliny's account of the enormous price paid by Nero for two goblets of moderate size, viz. 6000 sesterces, £1167, and from the esteem in which, as he says, perfectly pure glass was held: "Maximus tamen honos in candido translucentibus, quam proxima crystalli similitudine." (Lib. 36. c. 67.)

Indeed, that their ordinary glass was more or less opaque, may be inferred from the story told of the artificer, who brought Tiberius a cup of what he called flexible glass, and which, after being bent by a blow, was hammered back, without breaking, into its original shape. This vessel must have been composed of horn silver, or some other similar material, and could at most have only been translucent, for flexibility seems incompatible with perfect transparency.

Its being mistaken for glass therefore shews that the latter was usually in part opaque, for no

one accustomed to the transparency of the drinking vessels at present in common use could be so taken in.

I do not know, whether the plates of glass found at Pompeii contradict this inference, as it is long since I have seen them ; but that which was found covering the aperture in the roof of the baths at Stabiæ, described by Gell, was not transparent, and therefore would have been unfit for windows, however well adapted it might be, for the purpose of admitting a certain amount of light, without rendering objects within the chamber visible from without.

Mazoisⁱ indeed has shewn, that frames, evidently intended to contain windows, 20 inches wide and 28 high, and even provided with turn buckles to keep the plates in their proper place, have been discovered at Pompeii.

The latter however, even if made of glass, which is not proved, need not have been transparent, as, like the former, they were only designed to supply the light wanted in a public bath.

On the other hand, the general adoption of talc for windows, wherever any thing else than shutters were employed for closing them in, seems inconsistent with the idea of the Romans having at their command a ready supply of pure transparent glass ; and we must recollect, that even in the eleventh century glass windows must have

ⁱ See his *Ruines de Pompeii*, vol. iii. ; and also his *Palais de Scaure*.

been rare, as the cathedral of Torcello, near Venice, rebuilt at that period, had its windows closed with nothing but stone slabs, which are now preserved.

Nero, Pliny says, glazed the windows of one of his temples with a stone called Phengites, remarkable for its translucency.

I conclude therefore, that the want of pure transparent glass would alone have been an obstacle to the construction of greenhouses, adapted for tropical plants; and this inference accords with the total silence of the ancient writers respecting such exotic luxuries.

After all, however, the strange difference between the refinement and skill of the Romans in some respects, and their barbarous and clumsy workmanship in others^a, can only be explained by reference to their social state and condition.

It must be recollected, that none of the mechanical or chemical arts were accounted liberal, or their practice otherwise than degrading to men of education.

Pliny says of dyeing, that he should not have passed it over if it had been one of the liberal arts. Hence these trades were carried on by slaves, who pursued an established routine of operations, without the wish or the ability to improve upon them.

The inventions themselves were therefore the results of accident, and the improvements which

^a As in the locks and keys found at Pompeii.

took place from time to time in their manipulations rather proceeded from that superior adroitness which was the consequence of carrying on the same operations again and again, than from the exercise of the reasoning powers in suggesting new and analogous processes.

The remarkable advance which the mechanical arts have experienced in modern times arises from nothing more than from the fact, that they employ a numerous gradation of operatives, of every shade of intellect and capacity, from the master who supplies the capital, down to the humblest artisan who performs from day to day the same mechanical offices; all of whom are interested, more or less, in suggesting improvements, and all possess motives for intellectual and physical exertion, by which the slave could not be actuated.

Accordingly, whilst the fine arts, which depend upon individual genius and energy, were brought to a high pitch of perfection; the useful ones, which require the co-operation of many hands, were in general in a very backward condition.

And thus we are brought back to the subject from which we digressed, namely, husbandry—for of all the useful occupations, this was the only one thought worthy of a Roman gentleman or patrician^b, and the only one of the peaceful arts

^b See, amongst other proofs of this, Cicero de Senectute, where the delights and advantages of Agriculture are so eloquently expressed.

which seemed to thrive in the hands of the sovereign people.

Even this indeed in later times experienced the baneful effects of slave labour; for, as Pliny remarks, it is not wonderful that the earth does not give us the same recompense when worked by gangs of slaves, as she used to bestow upon the labours of free men and of warriors. (xviii. 4.)

Still, however, husbandry suffered from this cause in a less degree than other arts, because the operations of a farm are not equally dependent upon those niceties of manipulation which require the constant exertion of ingenuity and intelligence on the part of those engaged in them; but can be carried on by gangs of field labourers, directed only by a single bailiff, or overseer, in the absence of the proprietor. As in the United States of America the slave proprietors are unable to compete with the free population in manufactures, and are compelled to content themselves with the cultivation of cotton, or tobacco; so the Roman acquired, from his very inability to succeed in the useful arts, a contempt for every kind of employment, except that of war and agriculture.

His feeling was that expressed by Virgil in the lines,

“ Excudent alii spirantia mollius æra :
Credo equidem, vivos ducent de marmore vultus :
Orabunt caussas melius; cœlique meatus
Describent radio, et surgentia sidera dicent :

Tu regere imperio populos, Romane, memento ;
 Hæ tibi erunt artes ;" (ÆN. lib. vi. 848.)

and in the epigram of Hybrias preserved by Athenæus, which has been translated with so much spirit by the late Sir Daniel Sandford :

"Ἔστι μοι πλοῦτος μέγας, δόρυ καὶ ξίφος.
 (ATHENÆUS, book v. c. 50. §. 696.)

“ My wealth is here, the sword, the spear, the breast de-
 fending shield,
 With this I plough, with this I sow, with this I reap
 the field,
 With this I tread the luscious grape, and drink the
 blood-red wine,
 And slaves around in order wait, and all are counted
 mine.
 But he that will not rear the lance upon the battle field,
 Nor sway the sword, nor stand behind the breast de-
 fending shield,
 On lowly knee must worship me with servile kiss adored,
 And peal the cry of honour high, and hail me mighty
 Lord.”

Hence while no treatises have come down to us relating to those manufactures and arts which ministered to the comforts and conveniences of daily life, Agriculture alone has been honoured by the notice of the Poet, and has been thought worthy of the attention of some of the most eminent Prose Writers of antiquity.

A P P E N D I X.

ALTHOUGH it would be rash to assume, that the plants alluded to by Dioscorides were in all cases the same as those designated by Pliny, Virgil, and Columella under the same name, yet, considering how much one ancient writer borrowed from another, and how large a proportion of the contents of the works of each was derived from common sources of information, it is conceived, that some assistance towards the identification of the plants named by Roman writers may be obtained, by appealing to those Botanists who have investigated for us the Flora of ancient Greece.

This is my principal reason for appending to the present volume a Catalogue of the plants named by the Greek Writer, who, of all others, has given us the most copious information on the subject, excluding, of course, such names, as have hitherto baffled the attempts which have been made to identify them with modern plants.

Those introduced have been classified according to the Natural System; in which undertaking I have availed myself of the kind assistance of Mr. Maxwell Masters, Lecturer on Botany to St. George's Hospital, who till lately filled the post of Sub-Curator to the Fielding Herbarium, now attached to the Botanic Garden at Oxford.

It has been thought useful to point out in what degree, and in what cases, the conjecture formed as to the plant intended derives confirmation from the drawings accompanying

the most ancient known MS. of Dioscorides, which has been done, by noticing briefly the character of the figure therein given. When the term *fictitious* is attached, the meaning is, that the artist, in ignorance of the plant named, has given a representation of some other, totally unconnected with the real one, if indeed he has not in this instance drawn from his own fancy alone. In other cases, the figure given, however bad, rude, or inaccurate, is conceived to have been taken, either from the plant itself, or from some drawing of it to which the draughtsman had had access.

I may remark, that within the last few months another MS. of Dioscorides was sold in London for a considerable sum at Christie's, and is now in the possession of Sir Thomas Phillips of Middle Hill in Worcestershire.

This latter MS. had been originally procured from the East by a Florentine nobleman named Rinuccini; in whose family it had remained for more than a century, before it was brought into the market.

This also was accompanied with coloured drawings, and it was interesting to me to find on inspecting them, that the designs, in most instances, although not in all, were the same as those attached to the MS. of the fifth century, preserved in the Library of Vienna, of which the Botanic Garden at Oxford is so fortunate as to possess the unique engravings so often referred to.

Catalogue of the Plants noticed by Dioscorides, which have been determined with some degree of probability by Sibthorp, Lindley†, and others, arranged according to the natural system, with references to the Drawings which accompany the names of the Plants in question, in the Vienna Manuscript of Dioscorides.

N. B. The plants figured in Sibthorp's *Flora Græca* are marked thus *.

DICOTYLEDONE Æ.

RANUNCULACE Æ.

Name given by Dioscorides.	Reference to Diosc. lib. cap.	Modern Botanical Name.	Character of the Drawing of the Plant in the Vienna MS.
Ακονιτον έτερον	4.77	{ Aconitum Lycoctonum, vel } napellus	No resemblance
Ανεμωνη	2.207	Anemone	Tolerably like
Αργεμωνη	2.208	Thalictrum flavum	Figure good
Βατραχιον*	2.206	Ranunculus	
—— έτερον*	——	—— lanuginosus	
—— τριτον*	——	—— muricatus	
—— τεταρτον	——	—— aquatilis	
Δελφινιον*	3.84	Delphinium peregrinum	Tolerably like
—— έτερον	3.85	—— consolida	Ditto
Έλληβορος μελας*	4.151	Helleborus officinalis, Salisb.	Bad
Θαλικρον*	4.94	Thalictrum minus	
Κληματιτις*	4.182	Clematis cirrhosa	Figure fictitious
—— έτερα*	——	——	Ditto
Μελανθιον*	3.93	Nigella sativa	Ditto
Παιονια αρρηνη	3.157	Pæonia corallina	Good
—— θηλεια	3.157	—— officinalis	Good
Σταφισαγρια*	4.156	Delphinium Staphisagria	Fictitious
Χελιδωνιον τομικρον	2.212	Ranunculus Ficaria	Ditto

BERBERIDACE Æ.

Λεοντοπεταλον	3.110	Chrysogonon L.	Fictitious
Λυκιον	1.132	{ Berberis vulgaris, secundum } Roylium; Rhamnus infecto- rius, Sibth.	
Χρυσογονον	4.56	Leontice Leontopetalum L.	Fictitious

NYMPHÆACE Æ.

Νουφας	3.149	Nuphar luteum	
Νυμφαια	3.148	Nymphæa alba	Bad
—— αλλη	3.149	Nuphar luteum	Fictitious

† See his Appendix to the *Flora Græca*.

PAPAVERACEÆ.

Name given by Dioscorides.	Reference to Diosc. lib. cap.	Modern Botanical Name.	Character of the Drawing of the Plant in the Vienna MS.
Μηκων αγριος*	4.65	Papaver somniferum	Figure pretty good
— ημερος*	4.65	Ditto	Ditto
— κερατιτης	4.66	Glaucium luteum	Ditto
— ροιας.	4.64	Papaver Phæas	Ditto
Χελιδονιον το μεγα	2.211	Chelidonium magus	Good

FUMARIACEÆ.

Καπνος*	4.110	Fumaria parviflora	Good
Υπηκοον*	4.68	Hypecoum procumbens	Fictitious

CRUCIFERÆ.

Αλυσσον	3.105	Alyssum clypeatum	Bad
Γογγυλη αγριη*	2.135	Condylocarpus lævigata	Ditto
Ευζωμον*	2.170	Brassica Eruca	Ditto
Ερυσιμον	2.188	Sisymbrium polyceratium	Pretty good
Θλασπι	2.186	Thlaspi bursa pastoris	Indifferent
Ισατις*		Isatis	Indifferent
— αγρια*	2.216	— Lusitanica	Pretty good
Καρδαμον	2.185	Lepidium sativum	Ditto
Κραμβη αγρια*	2.147	Brassica cretica	Ditto
— ημερος	2.146	— oleracea	Ditto
Λαμπσανη	2.142	Sinapis arvensis	Ditto
Λευκοιον	3.138	Cheiranthus cheiri	No resemblance
— θαλασσιον*	3.138	— tricuspidatus	Pretty good
Μυαγρος.	4.117	Myagri species?	Fictitious
Ραφανις	2.137	Raphanus sativus	Good
— αγρια	2.138	— Raphanistrum	Pretty good
Σινηπι αγριον*	2.154	Sinapis	Ditto
— κηπαιον.		Sinapis	Ditto
Σισυμβριον ετερον	2.156	Sisymbrium nasturtium	Doubtful
Βουνιας	2.136	Bunias Erucago or Brassica	
Δραβη	4.187	Lepidium Draba	
Ιβηρις*	1.188	— graminifolium vel L. Iberis	
Λεπιδιον.	2.205	— latifolium	

CAPPARIDEÆ.

Καππαρις*	2.204	Capparis spinosa	Good
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VIOLEACEÆ.

Ιον πορφυρον	4.122	Viola odorata	Good
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CISTACEÆ.

Κυστος αρρην	1.126	Cistus villosus	
— θηλυς*	1.126	— salviaefolius	
Λαδανον*	1.128	— creticus	

CARYOPHYLLÆ.

Name given by Dioscorides.	Reference to Diosc. lib. cap.	Modern Botanical Name.	Character of the Drawing of the Plant in the Vienna MS.
Λυχνις αγρια	3.115	Agrostemma githago	Figure doubtful
— στεφανωματικη*	3.114	Lychnis coronaria	Ditto
Μηκων αφρωδες	4.67	Silene inflata	Fictitious
Στρουθιον	2.193	Saponaria officinalis	Pretty good
Φυτευμα	4.130	Silene	Good
Ωκιμοειδες	4.28	Cerastium aquaticum ?	Ditto

LINACEÆ.

Λινον	2.125	Linum usitatissimum	Good
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MALVACEÆ.

Αλθαια	3.163	Althea officinalis	Fictitious
Κανναβις αγρια	3.166	— cannabina	Pretty good
— ημερα	3.165		Ditto
Μαλαχη αγρια	2.144	Malva sylvestris	Very rude
— κηπαια*	2.144	Alcea rosea	Pretty good

VITACEÆ.

Αμπελος αγρια*	5.2	Vitis vinifera	Pretty good
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HYPERICACEÆ.

Ανδροσαιμον	3.173	Hypericum perforatum L.	
Ασκυρον	3.175	— perforatum L.	
Κορις*	3.174	— Coris L.	
Παναξ χειρωνιον	3.57	— organifolium ? L.	
Τραγιον*	4.49	— hircinum L.	
Υπερικον*	3.171	— crispum L.	Pretty good

GERANIACEÆ.

Γερανιον*	3.131	Geranium tuberosum	Pretty good
— ετερον*	—	Erodium malachoides	Ditto

RUTACEÆ.

Πηγανον αγριον*	3.53	Peganum Harmala L.	Pretty good
— το κηπαιον	3.52	Ruta graveolens L.	Ditto
— το ορεινον	3.52	— montana L.	Ditto
Τριβολος*	4.15	Tribulus terrestris L.	Some resemblance

TEREBINTHACEÆ.

Ρους*	1.147	Rhus coriaria L.	
Σχινος*	1.89	Pistacia Lentiscus L.	
Τερμινθος*	1.91	— Terebinthus L.	

RHAMNACEÆ.

Name given by Dioscorides.	Reference to Diosc. lib. cap.	Modern Botanical Name.	Character of the Drawing of the Plant in the Vienna MS.
Παλιουρος*	1.121	Zizyphus vulgaris.....	
Ῥαμνος τρισσος*	1.119	Paliurus aculeatus.....	

LEGUMINOSÆ.

Αναγυρις*	3.167	Anagyris foetida.....	Figure good
Ανωις.....	3.21	Ononis arvensis.....	
Ασπалаθος*	1.19	{ Cytisus lanigerus, or Genista acanthoclada	
Αστραγαλος.....	4.120	Astragalus Christianus L.	Pretty good
Αφακη.....	2.178	Lathyrus Aphaca L.	Bad
Γλυκυριζα*	3.7	Glycyrrhiza echinata.....	Doubtful
Ερεβινθος*	2.125	Cicer arietinum.....	Good
Ἡδύσαρον*	3.146	Securigera coronilla.....	
Θερμος αγριος*	2.133	Lupinus augustifolius.....	Ditto
——— ἡμερος*	2.132	——— pilosus?.....	Ditto
Κερατια.....	1.158	Cerantonia siliqua.....	
Κορωνωπους.....	2.158	Lotus ornithopodioides.....	Ditto
Κναμος.....		Vicia Faba.....	Ditto
Κυτισος*	4.113	Medicago arborea.....	Some resemblance
Λιθοσπερμον.....	3.158	Lathyrus Aphaca?.....	Doubtful
Λωτος.....	1.177		Fictitious
Λωτος αγριος*	1.171	Trigonella elatior L.....	Pretty good
Μελιλωτος.....	3.48	{ Trifolium officinale, vel T. italicum.....	Ditto
Μηδικη.....	2.177	Medicago sativa.....	
Ονοβρυχis.....	3.170	Vicia Onobrychis.....	Doubtful
Οροβος*	2.132	Ervum Ervillia.....	Pretty good
Πολυγαλον.....	4.142	Astragali sp. incert.....	Ditto
Ποτηριον*	3.17	Astragalus creticus.....	
Σπαρτιον*	4.158	Spartium junceum.....	Pretty good
Τηλις*	2.124	Trigonella fœnum græcum ...	Good
Τραγακανθη*	3.23	Astragalus aristatus L.....	
Τριφυλλον*	3.123	Psoralea bituminosa.....	Ditto
Φακος.....	2.129	Cicer Lens.....	Pretty good
Φασιολος.....		Phaseolus nanus.....	Good

ROSACEÆ.

Αγριομηλα.....	1.163	Pyrus malus.....	
Αμυγδαλη.....	1.176	Amygdalus communis.....	
Αχρας.....	1.168	Pyrus communis.....	
Βατος.....	4.37	Rubus fruticosus.....	Good
——— Ιδαia.....	4.38	——— Idæus.....	
Κερασια.....	1.157	Prunus Cerasus.....	
Κοκκυμηλια.....	1.174	——— domestica.....	
Κυδωνια.....	1.160	Cydonia vulgaris.....	
Κυνοσβατον.....	1.123	Rosa sempervirens, nec R. canina	
Μελιμηλα.....	1.161	{ Pyri mali fructus in Cydo- niam insiti.	

R O S A C E Æ (CONTINUED).

Name given by Dioscorides.	Reference to Diosc. lib. cap.	Modern Botanical Name.	Character of the Drawing of the Plant in the Vienna MS.
Μεσπιλον	1.169	{ Cratægus tanacetifolius, vel C. Azarola	Figure good fol 282 Pretty good
— έτερον	1.170	Mespilus Germanica	
Μηλια	1.159	Pyri mali fructus	
Οξυακανθα	1.122	Cratægus pyracantha	
Ουα	2.182	Pyrus domestica	
Πενταφυλλον	4.42	Potentilla reptans	
Ροδον*	1.130	Rosa	
Σιδηριτις έτερα	4.34	Sanguisorba officinalis	

H A L O R A G E Æ.

Μυριοφυλλον	4.115	Myriophyllum spicatum	Doubtful
Πολυγονον θηλυ	4.1	Hippuris vulgaris	Good
Τριβολος ενυδρος	4.15	Trapa natans L.	Slight resemblance

O N A G R A C E Æ.

Οναγρα	4.118	Epilobium angustifolium
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L Y T H R A R I E Æ.

Βεττονικη	4.2	Lythrum salicaria?
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M Y R T A C E Æ.

Βαλανστιον*	1.154	Punicæ granati flores
Κυτινοι*	1.152	— — — — — culti flores
Μυρσινη*	1.155	Myrtus communis
Ροα*	1.151	Punica granatum
Σιδια*	1.153	Punicæ granati putamina

T A M A R I S C I N E Æ.

Μυρικη*	1.116	Tamarix Gallica	Good
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C U C U R B I T A C E Æ.

Κολοκυνθα	2.162	Cucumis sativus	Good
Κολοκυνθις	4.178	— — — — — colocynthis	
Πεπων	2.164	Cucurbita pepo	
Σικυς αγριος*	4.154	Momordica Elaterium	
— ήμερος	2.163	Cucumis melo?	

P O R T U L A C C A C E Æ.

Ανδραχνη αγρια*	2.150	Portulacca oleracea	Good
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PARONYCHIACEÆ.

Name given by Dioscorides.	Reference to Diosc. lib. cap.	Modern Botanical Name.	Character of the Drawing of the Plant in the Vienna MS.
Επιπακτις	4.119	Herniaria glabra, Sp.	
Παρωνυχία*	4.54	Illecebrum Paronychia, L.	

CRASSULACEÆ.

Αειζωον το μεγα*	4.89	Sempervivum arboreum	Figure good
Αειζωον το μικρον	4.90	Sedum ochroleucum	Good
Κηπαία*	3.168	————— Cerpæa	
Κοτυληδων		Cotyledon umbilicus	

UMBELLIFERÆ.

Αμμι	3.70	Æthusa Ammi?	Good
Αμμωνιακή*	3.98	Ferula orientalis, or F. tingitana	Good
Ανηθον	3.67	Anethum graveolens	Good
Ανισον	3.65	Pimpinella Anisum	Bad
Δαυκος*	3.83	Athamanta Cretensis?	Pretty good
Δαυκος έτερος*	—————	————— cervaria	
————— τριτος	—————	Seseli ammoides	
Ελαφοβοσκον	3.80	Pastinaca Græca	Pretty good
Έλειοσελινον	3.75	Apium graveolens	Pretty good
Έρρυγγιον	3.24	Eryngium campestre	Good, except root
Θαψία*	4.157	Thapsia garganica	Pretty good
Ίππομαραθον	3.82	Cachrys sicula	Very doubtful
Ίπποσελινον	3.78	Smyrniolum olusatrum	
Καυκαλις	2.169	Hasselquistia Ægyptiaca	Pretty good
Κοριαννον*	3.71	Coriandrum sativum	Slight resemblance
Κραμβη θαλασσία	2.148	Crithmum maritimum	Doubtful
Κριθμον	2.157	————— maritimum	
Κυμινον αγριον*	3.69	Lagæcia cuminoides	Doubtful
————— ήμερον	3.68	Cuminum sativum	
Κωνειον	4.79	Conium maculatum	Slight resemblance
Λαγωπους*	4.17	Trifolium arvense L.	Pretty good
Λιβανωτις έτερα*	3.89	Ferula nodiflora, nec Rosmarinus	
Λιγυστικον	3.58	Laserpitium cicer	Slight resemblance
Μαραθρον	3.81	Anethum Fœniculum	Pretty good
Μηρον	1.3	Meum Athamanticum	
Μυρρις	1.116	Myrrhis odorata, Gaertner	Doubtful
Ναρθηξ	3.91	Ferula communis	Good
Ορειοσελινον	3.76	Apium petroselinum	Doubtful
Παναξ ασκληπιον*	3.56	Echinophora tenuifolia	
Πετροσελινον	3.79	Athamanta Macedonica	
Πευκεδανον	3.92	Peucedanum Alsaticum	Doubtful
Σελινον αγριον	3.74	—————	Fictitious
————— κηπαιον	—————	Apium graveolens	Slight resemblance
Σεσελι Λιθιοπικον*	3.61	Bupleurum fruticosum	Doubtful
————— Μασσαλεωτικον*	3.60	Echinophora tenuiflora	Pretty good
————— Πελοποννησιακον	3.62	Angelica sylvestris	Pretty good
Σιον το εν ύδασι	2.114	Sium nodiflorum	Slight resemblance
Σισαρον	2.139	Pastinaca sativa	
Σκανδυξ	2.168	Scandix pecten Veneris	Good

UMBELLIFERÆ (CONTINUED).

Name given by Dioscorides.	Reference to Diosc. lib. cap.	Modern Botanical Name.	Character of the Drawing of the Plant in the Vienna MS.
Σμυρνιον*	3.79	Smyrnium perfoliatum	Slight resemblance
Σταφυλινος αγριος*	3.159	Daucus guttatus	Figure pretty good
— κηπαιος	3.15	— carota?	Doubtful
Στοιβη*	4.12	Pimpinella spinosa	Pretty good
Σισων	3.64	Sison amomum	
Σφονδυλιον	3.90	Heracleum sphondylium	Pretty good
Τορδυλιον*	3.63	Tordylium officinale	
Τραγιον αλλο	4.50	Tragium columnæ	

LORANTHACEÆ.

Ιξος	3.103	{ Viscum album? Loranthus Europæus	
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ARALIACEÆ.

Κισσος	2.210	Hedera helix	Good
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CORNACEÆ.

Κρανια*	1.172	Cornus mascula	
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CAPRIFOLIACEÆ.

Ακτη	4.174	Sambucus nigra	Good
Χαμαιακτη	4.175	— Ebulus L.	Ditto

RUBIACEÆ.

Απαρινη*	3.104	Galium verrucosum	Some resemblance
Γαλλιον	4.96	— luteum	Good
Ερυθροδανον*	3.160	Rubia tinctorum	Pretty good

VALERIANACEÆ.

Ναρδος ορεινη	1.8	Valeriana tuberosa	
Φου*	1.10	{ Valeriana Dioscoridis nec V. officinalis	

DIPSACEÆ.

Διψακον	3.13	Dipsacus sylvestris	Bad
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COMPOSITÆ.

Αβροτανον	3.29	Artemisia abrotanum	
Αγηρατον	4.59	Achillea viscosa	Pretty good
Ακανθα αγρια*	2.122	Cnicus syriacus	Ditto

COMPOSITÆ (CONTINUED).

Name given by Dioscorides.	Reference to Diosc. lib. cap.	Modern Botanical Name.	Character of the Drawing of the Plant in the Vienna MS.
Σογχος τρυφερος	2.159	Sonchus oleraceus	Figure pretty good
Τραγοπωγων	2.173	Tragopogon villosus	Ditto
Χαμαιλεων ο λευκος*	3.10	Acarna gumnifera	Ditto
— ο μελας*	3.11	Carthamus corymbosus	Ditto
Χαμαιλευκη	4.127	Chamæpeuce mutica ?	
Χρυσανθεμον*	4.58	Chrysanthemum coronarium ..	Fictitious
Χρυσανθον, or Ελιχρυσον*	4.57	Gnaphalium Stœchas	Good
Χρυσοκομη*	4.55	Chrysocoma Linosyris	Doubtful

CAMPANULACEÆ.

Μηδιον	4.18	Campanula laciniata.	Fictitious
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ERICACEÆ.

Ερεικη	1.117	Erica herbacea, vel E. arborea	
Κομαρος*	1.175	Arbutus Andrachne	

STYRACEÆ.

Στυραξ*	1.79	Styrax officinalis	
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OLEACEÆ.

Ελαια*	1.138.140	Olea Europæa	
Μελια*	1.108	Ornus Europæa	
Φιλλυρεα*	1.125	Phillyrea latifolia	

ASCLEPIADEÆ.

Αποκυνον*	4.81	{ Cynanchum erectum or mars- denia erecta }	Pretty good
Ασκληπιας*	3.106	Asclepias vincetoxicum	Pretty good
Κιρκαια	3.134	Cynanchum nigrum	

APOCYNACEÆ.

Κληματις	4.7	Vinca minor	
Νηριον*	4.82	Nerium oleander	

GENTIANACEÆ.

Κενταυριον το μικρον . . .	3.9	Chironia centaurium	Good
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BORAGINACEÆ.

Αγχουσα*	4.23	Anchusa tinctoria	Good
— έτερα*	4.438	Echium creticum	Good

BORAGINACEÆ (CONTINUED).

Name given by Dioscorides.	Reference to Diosc. lib. cap.	Modern Botanical Name.	Character of the Drawing of the Plant in the Vienna MS
Βουγλωσσον*	4.128	<i>Anchusa paniculata</i>	Figure bad
Εχιον	4.27	<i>Echium vulgare</i>	Good
Ἡλιοτροπιον μεγα	4.193	<i>Heliotropium Europæum</i>	Pretty good
Κυνογλωσσον	4.129	<i>Cynoglossum officinale</i>	Bad
Λυκοψις	4.26	<i>Echium Italicum</i>	Good
Μυοσωτις	2.215	{ <i>Lithospermum purpureo cæ-</i> ruleum	
Ονοσμα	3.147	<i>Onosma Sp. incert.</i>	Pretty good
Σκορπιοειδες*	4.195	<i>Lithospermum apulum</i>	Ditto
Σκορπιουρον†		<i>Boraginea quædam</i>	Ditto
— — — — — ετερον		Ditto	Ditto
Συμφυτον	4.9	<i>Symphytum Sp.?</i>	Ditto
Τηλεφιον*	2.217	<i>Cerithe minor</i>	Good

CONVOLVULACEÆ.

Δορυχνιον*	4.75	{ <i>Convolvulus Cneorum, or C.</i> <i>Dorycnium</i>	
Ελξινη κισσαμπελος*	4.39	<i>Convolvulus arvensis</i>	
Επιθυμον	4.179	<i>Cuscuta Epithymum</i>	<i>Cuscuta omitted</i>
Κλυμενον	4.13	<i>Convolvulus Sepium</i>	Figure bad
Περικλυμενον	4.14	— — — — — <i>arvensis</i>	Good
Σκαμμωνια	4.171	— — — — — <i>farinosus</i>	Fictitious

SOLANACEÆ.

Μανδραγορας*	4.76	<i>Atropa Mandragora, L.</i>	Like nature
Μανδραγορας μοριον	4.76	— — — — — <i>Belladonna?</i>	
Ῥαμνος*	1.119	<i>Lycium Europæum</i>	Pretty good
Στρυχνος αλικακαβος*	4.72	<i>Physalis alkekengi?</i>	Good, for somni-
— — — — — <i>μανικος</i>	4.74	<i>Solanum Sodomeum</i>	[<i>fera</i> ‡]
— — — — — <i>μελας κηπαιος</i>	4.71	— — — — — <i>nigrum</i>	Good
— — — — — <i>υπνωτικος*</i>	4.73	<i>Physalis somnifera</i>	
Ῥοσκυαμος μελας	4.69	<i>Hyoscyamus niger</i>	Pretty good
— — — — — <i>λευκος*</i>	4.69	— — — — — <i>albus, L.</i>	
— — — — — <i>μηλοιδες*</i>	4.69	— — — — — <i>aureus, L.</i>	
Φυσαλις*		<i>Physalis alkekengi</i>	Good ‡

SCROPHULARINEÆ.

Αντιρρινον	4.133	<i>Antirrhinum Orontium</i>	
Γαλιοψις*	4.95	<i>Scrophularia peregrina</i>	Figure pretty good
Ελατινη	4.40	<i>Linaria spuria</i>	
Ἐλληβορος λευκος*	4.150	{ <i>Digitalis ferruginea, Vera-</i> <i>tium album, L.</i> }	Pretty good
Ελξινη κισσαμπελος	4.39	— — — — — <i>Ægyptiaca, Sibthp.</i>	
Σιδηριτις τριτη*	4.35	<i>Scrophularia lucida?</i>	
Φλομος*	4.104	<i>Verbascum</i>	Pretty good
— — — — — <i>λευκη αρρηνη*</i>	4.104	— — — — — <i>plicatum</i>	
— — — — — <i>λευκη θηλεια</i>	4.104	— — — — — <i>Thapsus</i>	
— — — — — <i>μελαινα*</i>	4.104	— — — — — <i>nigrum</i>	

† N. B. Where no reference to Diosc. is given, as is the case here, the reader may conclude, that in the V. MS. a plate to the name attached occurs, although the latter has not been found in the edition of Diosc. in my possession.

‡ More like this plant than the drawing of *Σ. αλικακαβα*.

OROBANCHACEÆ.

Name given by Dioscorides.	Reference to Diosc. lib. cap.	Modern Botanical Name.	Character of the Drawing of the Plant in the Vienna MS.
Οροβαρχη*	2.172	Orobanche caryophylla	

ACANTHACEÆ.

Ακανθα ερπεκανθα*	3.15	Acanthus spinosus	Good
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LABIATÆ.

Αγριοριγανος		Origanum vulgare	
Αιθιοπις	4.105	Salvia Æthiopis	
Ακινος*	3.50	Thymus Acinos	Pretty good
Βαλλωτη	3.117	Lamium striatum?	Pretty good
Γληχων	3.36	Mentha pulegium.	Some resemblance
Δικταμνον	3.37	Origanum Dictamnus	Fictitious
— αλλο	3.39		Fictitious
Ελελισφακον	3.40	Salvia officinalis	Good
Έρπυλλος	3.46	Thymus Serpyllum	Bad
— ζυγισ*	3.46	— striatus (? T. Tygris)	
Έδουοσμον αγριον	3.42	Mentha gentilis	Pretty good
— ημερον	3.41	— sativa	Pretty good
Θυμβρα*	3.45	Satureia Thymbra	Slight resemblance
Θυμος*	3.44	— capitata	Pretty good
Καλαμινθη*	3.43	{ Mentha sylvestris, vel Me- lissa altissima }	Pretty good
Κεστρον	4.1	Betonica alopecurus	Doubtful
Κλινοποδιον	3.109	{ Melissa Clinopodium, (Cli- nopodium vulgare }	
Λευκας	3.113	Lamium maculatum	
Λιβανωτις*	3.89	Rosmarinus officinalis	Slightly resembling
Μαρον*	3.49	Origanum sipyleum	Pretty good
Μελισσοφυλλον	3.118	Melissa officinalis	Pretty good
Οριγανος ήρακλεοτικη	3.32	Origanum heracleoticum	Good
— ονιτις*	3.33	— onites	Good
Όρμινον ήμερον	3.145	Salvia horminum	Fictitious
Πολιον*	3.124	Teucrium Polium	Pretty good
Πρασιον	3.119	Marrubium vulgare	Slightly resembling
Σαμψυχον	3.47	Origanum Marjorana	Doubtful
Σιδηριτις*	4.33	Sideritis Romana	Pretty good
Σισυμβριον	2.155	Mentha hirsuta	Doubtful
Σκορδιον	3.125	Teucrium Scordium	Doubtful
Σταχυς	3.120	Stachys Palæstina	Fictitious
Στιχας*	3.31	Lavandula Stœchas	Pretty good
Τραγοριγανος*	3.35	Thymus graveolens	Doubtful
— αλλος*	3.35	{ Micromeria Juliana (Sibthp.) vel Thymus Tragoriganum (Sprengl.) }	
Υσσωπος*	3.30	Thymbra spicata	Pretty good
Φλομος αγρια*	4.104	Phlomis fruticosa	

LABIATÆ (CONTINUED).

Name given by Dioscorides.	Reference to Diosc. lib. cap.	Modern Botanical Name.	Character of the Drawing of the Plant in the Vienna MS.
Χαμαιδρυσ	3.112	Teucrium Chamædrys	Figure doubtful
Χαμαικισσος	4.126	Glechoma hederacea	Fictitious
Χαμαιπιτυς	3.175	Ajuga Chamæpitys	Pretty good
——— τριτη	3.176	——— Chamæpitys	
Ψευδοδικταμνον*	3.38	Marrubium pseudo-Dictamnus	Fictitious

VERBENACEÆ.

Αγνος*	3.29	Vitex agnus castus	Good
Ίερα βοτανη	4.61	Verbena officinalis	
Περιστερεων ὀρθος	4.60	Verbena, Sp.	
——— ὀ ὑπτως	4.60	Verbena, Sp.	

PRIMULACEÆ.

Αναγαλλις	2.209	Anagallis arvensis	Good
Κυκλαμινος	2.194	Cyclamen hederifolium	Good
——— ἕτερα	2.195		Doubtful
Λυσιμαχιον	4.3	Lysimachia vulgaris	Doubtful

PLANTAGINEÆ.

Αρνογλωσσον	2.153	Plantago major et P. Lagopus	Good
——— μικρον	2.153	——— Lagopus	
Ψυλλιον	4.70	——— Psyllium, L.	Good

AMARANTHACEÆ.

Βλιτον	2.143	Amaranthus Blitum	Good
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CHEIROPODIACEÆ.

Αλιμος	1.120	Atriplex hortensis	
Ατρακτυλις	3.107	——— hortensis, Sprengel	
Βοτρυσ	3.130	Chenopodium Botrys	
Τευτλον μελαν αγριον	2.149	Beta vulgaris	

POLYGONACEÆ.

Ίππολαπαθον	2.141	Rumex aquaticus	Pretty good
Κυναια		Thelygonum Cynocrambe	Bad
Λαπαθον	2.140	Rumex patientia	Pretty good
——— μικρον	2.140	{ ——— bucephalophorus, or R. scutatus	
——— οξυλαπαθον	2.140	{ ——— crispus, acetosa, aceto- sella, or acutus aliorum	
Πολυγονον αρρεν	4.4	Polygonum aviculare	Pretty good
Ίρα, ορ Ίροιον	3.2	Radix Rhei Rhapontici	Tolerable
Υδροπεπερι	2.191	Polygonum hydropiper	

THYMELACEÆ.

Name given by Dioscorides.	Reference to Diosc. lib. cap.	Modern Botanical Name.	Character of the Drawing of the Plant in the Vienna MS.
Δαφνοειδης.....	4.148	Daphne Mezereon, L.	Figure doubtful
Θυμελαια*.....	4.173	———— Gnidium.....	Ditto
Χαμελαια.....	4.172	———— oleoides.....	Fictitious

ASARINEÆ.

Asarou.....	1.9	Asarum Europæum.....	Good
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SANTALACEÆ.

Osuris*.....	4.143	Osyris alba	
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CYTINACEÆ.

Υποκυστις*.....	1.127	Cytinus hypocistis.....	Pretty good
———— έτερα.....		Cynomorium coccineum	

ARISTOLOCHIÆ.

Αριστολοχια κληματιτις	3.6	Aristolochia baetica	
———— μακρα*.....	3.5	———— parvifolia.....	Good
———— στρογγυλη*.....	3.4	———— pallida.....	Ditto

EUPHORBIACEÆ.

Απιος.....	4.177	Euphorbia Apios	
Κροτων η κικι*.....	4.164	Ricinus communis.....	Good
Λαθυρος.....	4.167	Euphorbia Lathyris.....	Bad
Λινοζωστις.....	4.192	Mercurialis annua.....	Pretty good
Πεπλιον.....	4.169	Euphorbia Peplis.....	Ditto
Πεπλος.....	4.168	———— falcata	
Πιτυουσα.....		———— sp.....	Fictitious
Τιθυμαλος δενδριτης*.....	4.165	———— dendroides.....	Good
———— ήλιοσκοπιος.....	4.165	———— helioscopia.....	Answers to paralias
———— κυπαρισσιος.....	4.165	———— aleppica, or Cyparissias	Pretty good
———— μυρσινιτης*.....	4.165	———— myrsinites.....	Ditto [copia
———— παραλιος.....	4.165	———— paralias.....	Answers to helios-
———— πλατυφυλλος.....	4.165	———— pilosa.....	Fictitious
———— χαραχιας.....	4.165	———— characias.....	Good
Τραγιον.....		———— officinalis.....	Ditto
Φυλλον.....		Mercurialis?.....	Fictitious

URTICACEÆ.

Ακαλυφη.....	4.94	Urtica pilulifera	
———— έτερα.....	4.94	———— urens	
Ελξινη.....	4.86	Parietaria.....	Fictitious
Λωτος.....	4.112	Celtis australis	
Συκη αγρια.....	1.184	Ficus Carica	

ULMACEÆ.

Name given by Dioscorides.	Reference to Diosc. lib. cap.	Modern Botanical Name.	Character of the Drawing of the Plant in the Vienna MS.
Πτελεα	1.111	Ulmus campestris	

CUPULIFERÆ.

Δρυς	1.142	Quercus Ægilops	
Καρνα ποντικά	1.179	Corylus Avellana	
Καστανον	1.145	Castaneæ vescæ nux	
Κοκκος βαφικη	4.48	Quercus coccifera	
Κυπαρισσίας	1.102	Cupressus sempervirens	
Πρινος	1.144	Quercus Ilex? Q. coccifera	
Φηγος	1.144	———— Æsculus	

SALICACEÆ.

Λευκας	3.113	Populus alba	
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PLATANACEÆ.

Πλατανος*	1.107	Platanus orientalis	
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CONIFERÆ.

Αρκευθος μεγαλη	1.103	Juniperus phœnicea?	Figure pretty good
———— μικρα	1.103	———— communis?	Ditto
Κεδρος	1.105	{ ————— oxycedrus, or J. phœ-	
———— μικρα	1.105	nicea	
Πευκη*	1.86	———— communis	
Πιτυς	1.86	Pinus maritima	
Τραγος*	2.115	———— pinea	
		Ephedra distachya	Doubtful

MONOTOCYLEDONEÆ.

ALISMACEÆ.

Αλισμα	3.169	Alisma Plantago	
Δαμασονιον		———— Plantago	Fictitious
Στρατιωτης ο εν τοις υδασι	4.102	Stratiotes aloides	Pretty good

POTAMOGETONEÆ.

Ποταμογειτων	4.101	Potamogeton	Doubtful
———— ετερος		———— natans	Ditto

ARACEÆ.

Name given by Dioscorides.	Reference to Diosc. lib. cap.	Modern Botanical Name.	Character of the Drawing of the Plant in the Vienna MS.
Ακορον	1.2	Acorus Calamus	Figure pretty good
Αρισαρον*	2.198	{ Arum arisarum, or Arisarum vulgare	
Αρον*	2.197	— Dioscoridis	
Δρακοντιον μεγα*	2.196	— dracunculus	Ditto
— μικρον	2.196	— maculatum	Ditto
Σπαργανιον	4.21	Sparganium ramosum	Ditto
Τυφη	3.133	Typha latifolia	Ditto
Φακος ό επι των τελματων	2.129	Lemna minor	Fictitious

ORCHIDEÆ.

Έλλεβορινη		Orchis ?	Fictitious
Λογχιτις*	3.161	Serapias lingua	Pretty good
Ορχις	3.141	Orchis rubra	
Σατυριον		Ophrys	Pretty good
— ερυθρονιον*	3.144	Serapias cordigera	Ditto
— έτερον		Ophrys	Ditto
Σεραπιας		Orchis	Ditto

IRIDACEÆ.

Ιρις*	1.1	Iris Germanica, L.	Good
Κροκος	1.25	Crocus sativus	Slight resemblance
Ξιφιον*	4.20	Gladiolus communis	Pretty good
Ξυρις	4.102	Iris fœtidissima	Good

AMARYLLIDACEÆ.

Βολβος εμετικος	2.201	{ Narcissi species, forsan N. Jon- quilla	
Ηρακλειον ή πανκρατιον*		Pancreatium maritimum	Doubtful
Ναρκισσος*	4.161	Narcissus poeticus, or Tazetta	Pretty good

MELANTHACEÆ.

Ιδαια ρίζα		Uvularia amplexifolia	
Κολχικον	4.84	Colchicum autumnale	

LILIACEÆ.

Αλοη	3.25	Aloe vulgaris	Good
Ασπαραγος*	2.152	Asparagus acutifolius	
Ασφοδελος	2.199	Asphodelus ramosus	Ditto
Βολβος εδωδιμος	2.200	Hyacinthus comosus	Doubtful
— εμετικος	2.201	Ornithogalum stachyoides	
Δαφνη	1.106	Ruscus aculeatus	
— αλεξανδρεια	4.147	— hypoglossum	
Ελαφοσκοροδον*	2.182	Allium subhirsutum	Pretty good
Ήμεροκαλλισ	3.136	Lilium chalconicum	Some resemblance
Κρινον βασιλικον	3.116	— candidum	Ditto
Κρωμμνον*	2.181	Allium cepa	Pretty good
Λευκοσκοροδον*	2.182	— ampeloprasum	Ditto

LILIACEÆ (CONTINUED).

Name given by Dioscorides.	Reference to Diosc. lib. cap.	Modern Botanical Name.	Character of the Drawing of the Plant in the Vienna MS.
Μυρσίνη αγρία	4.182	Ruscus aculeatus	
Μώλυ	3.54	Allium Dioscoridis	Figure fictitious
Ορνιθογαλον	2.174	Ornithogalum umbellatum	
Οφιοσκοροδον	1.	Allium Scorodoprasum	Pretty good
Παγκρατιον*	2.202	{ Scilla Pancratium, alias Pan- cratium maritimum, nec S. maritima	
Πολυγονατον	4.6	Convallaria Polygonatum	Fictitious
Πρασον	3.119	Allium Porrum	Pretty good
Σκιλλα	2.202	Scilla maritima	No flower shewn
Σκοροδοπρασον*	2.183	Allium descendens	Figure pretty good
Σκοροδον	2.182	—— sativum	Pretty good
Σμιλαξ λεια*	4.80	Smilax ——	Fictitious
—— τραχεια	4.144	—— aspera	Pretty good
Υακινθος	4.63	Scilla bifolia?	More like S. amoe-
Ίππογλωσσον	4.132	Ruscus hypoglossum	[na
Φαλαγγιον*	3.122	Anthericum Græcum	Fictitious
Χαμαιδαφνη	4.129	Ruscus hypophyllum, L.	Good

JUNCACEÆ.

Οξυσκοινος	4.52	Juncus acutus	Pretty good
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CYPERACEÆ.

Κυπειρος	1.4	Cyperus rotundus	Pretty good
Ολοσχοινος	4.52	{ Scirpus mucronatus, or Cla- dium Germanicum	
—— ακαρπος	4.52	Eleocharis palustris	
Σχοινος	4.52	Isolepis holoschœnus	

GRAMINEÆ.

Αγρωστις*	1.135	Panicum dactylum	Good
Αιγίλωψ*	4.139	Ægilops ovata	Pretty good
Αιρα	2.122	Lolium timulentum	Pretty good
Βρομος	4.140	Avena fatua	Good
Δοναξ	1.114	Arundo Donax	
Ελυμος	2.120	Panicum Italicum	Good
Ζεια	2.111	Triticum Spelta	
Καλαμαγρωστις	4.31	Cynosurus Ægyptiaca	Pretty good
Καλαμος συριγγιος*	1.114	Erianthus Ravennæ	
Κεγχρος	2.119	Panicum miliaceum	Good
Ναστος	1.114	Cenchrus frutescens	
Ολυρα	2.113	Tritici Speltæ varietas	
Ορυζα	2.117	Oryza sativa	
Φαλαρις*	3.119	Phalaris canariensis	Pretty good
Φραγματις	1.114	Phragmites communis	
Φοινίξ	4.43	Hordeum murinum?	Pretty good
Χονδρος	2.118	Hordeum?	Good

FILICES.

Name given by Dioscorides.	Reference to Diosc. lib. cap.	Modern Botanical Name.	Character of the Drawing of the Plant in the Vienna MS.
Αδιαντον	4.136	Adiantum capillus veneris	No resemblance
Ασπληνιον	3.151	Gymnogramma ceterach	
Δρυοπτερις	4.189	Asplenium adiantum nigrum ?	Doubtful [drium
Θηλυπτερις	4.187	Pteris aquilina	Like a Scolopen-
Ίππουρις	4.46	Equisetum sylvaticum	Doubtful
— έτερα	4.47	— arvense	Like Hippuris
Λογχιτις έτερα	3.162	Aspidium Lonchitis	Pretty good
Πολυποδιον	4.188	Polypodium vulgare	Pretty good
Πτερις	4.186	Aspidium aculeatum	Good
— έτερα		Scolopendrium vulgare	Good
Σκολοπενδριον		Gymnogramma ceterach	Pretty good
Τριχομανες	4.137	Asplenium Trichomanes	
Φυλλιτις	3.121	Scolopendrium vulgare	Fictitious

LICHENES.

Λιχην ό επι των πετρων..		Lichen		Pretty good
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FUNGI.

Αγαρικον		Boletus laricis		
Μυκητες		Fungi varii		
Ύδνον	2.175	Tuber cibarium		

ALGÆ.

Φυκος θαλασσιον	4.100	Fucoidearum species variae		
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