through the very variable species *Spongilla lacustris* and *S. fragilis*, in *Meyenia fluviatilis*, in *Heteromeyenia argyrosperma* and *H. Ryderi*, and, lastly and most conspicuously, in *Tubella pennsylvanica*. The extremes in this last series differ so widely that they would hardly be taken to belong to the same species; but the intermediate grades have all been collected largely from the same stream, and as a result several species named in this and other cases have relapsed into synonyms.

V.—*Notices of Fungi in Greek and Latin Authors.* By the Rev. William Houghton, M.A., F.L.S.

It may perhaps interest some of the readers of 'The Annals and Magazine of Natural History' if I bring before them in a collected form all that I have been able to gather on the subject of fungi from the writings of the ancient Greeks and Romans. I am not aware whether anything of this kind has been hitherto attempted by any English writer; but in Germany Dr. H. O. Lenz, in his useful 'Botanik der alten Griechen und Römer' (Gotha, 1859), has collected together the scattered notices of fungi which appear in classical authors, and has added footnotes containing his own observations. The late Dr. Badham, in his 'Treatise on the Esculent Funguses of England' (London, 1863), gives a short account of their classical history; but no systematic collection has, so far as I know, been hitherto made. Although, perhaps, the subject is not one of very great importance, still it is one to which a certain degree of interest attaches itself both for the general reader and for the mycologist.

The earliest Greek writer who takes any notice of fungi is Theophrastus (circ. B.C. 300); there is no allusion to these plants in the works of Homer and Hesiod. The word μύκης indeed occurs in Herodotus (iii. 64), but it there means the cap of the sheath of a sword, from its conical or fungus-like form. Theophrastus (Hist. Plant. i. 1, § 11) speaks of the μύκης and the ὕδνον as having neither root, stem (καυλός), branch, bud, leaf, flower, nor fruit, neither again bark, pith, fibres, nor veins; but in i. 5, § 3, he speaks of the stem (καυλός) of the μύκης as being of uniform structure or evenness, without knots, prickles, or divisions. In i. 6, § 5, the ὕδνον, μύκης, πέζις, and γεράνειον (κεραύνιον) are mentioned as having no root. The μύκητες in iii. 7, § 6, are said to

grow out of and near the roots of oaks and other trees. In his treatise on odours ('De Odoribus,' Frag. iv. 3, ed. Schneider) Theophrastus notes that the μύκητες which grow in dung have no bad smell. This is all that Theophrastus has said concerning fungi, and it is worth while to remark that this most ancient Greek writer, who professedly discourses on plants, has absolutely not left us anything sufficiently descriptive to enable us to know definitely what most of the above-named plants respectively denote. He seems to have taken it for granted that the people of his time knew what particular plants he was speaking of, and that therefore there was no need of particular definite description. We have to learn what fungi the Greek names really denote by comparing what Theophrastus has said with what other Greek and Roman writers have recorded. The question of identity of these names therefore shall wait until we have brought forward further evidence.

After Theophrastus comes Nicander (B.C. circ. 185), a physician, grammarian, and poet, who wrote on various subjects; but most of his works have been lost. His two poems, the 'Theriaca' and the 'Alexipharmaca,' in hexameter lines, have been preserved to us. In the first-mentioned poem Nicander discourses of venomous animals and the wounds inflicted by them; there is much absurd fable mixed up with his zoological remarks, and perhaps Haller was not far wrong when he described this treatise of nearly a thousand hexameter lines as being "longa, incondita, et nullius fidei farrago." The 'Alexipharmaca,' of about six hundred lines in the same metre, treats of poisons and their antidotes, and is about as valuable as his other poem. His Greek is obscure and full of out-of-the-way words. Bentley, with great truth, called Nicander "antiquarium, obsoleta et casca verba venantem, et vel sui sæculi lectoribus difficilem et obscurum."

As Nicander is very seldom read and his works are in few private libraries, it may be well to quote his lines on fungi as a sample of his style and diction :—

Μὴ μὲν δὴ ζύμωμα κακὸν χθονὸς ἀνέρα κήδοι
πολλάκι μὲν στέρνοισιν ἀνοιδέον, ἄλλοτε δ' ἄγχον,
εὖθ' ὑπὸ φωλεύοντα τραφῇ βαθὺν ὁλκὸν ἐχίδνης,
ἰὸν ἀνικμαῖνον στομίων τ' ἀποφώλιον ἆσθμα·
κεῖνο κακὸν ζύμωμα, τὸ δή ῥ' ὑδέουσι μύκητας
παμπήδην, ἄλλῳ γὰρ ἐπ' οὔνομα κέκριται ἄλλο.
Ἀλλὰ σύ γ' ἢ ῥαφάνοιο πόροις σπειρώδεα κόρσην,
ἢ ῥυτῆς κλώθοντα περὶ σπάδικα κολούσας,
πολλάκι καὶ χαλκοῖο πάλαι μεμογηότος ἄνθην·
ἄλλοτε κληματόεσσαν ἐν' ὄξεϊ θρύπτεο τέφρην·
δήποτε ῥιζάδα τρίβε πυρίτιδα βάμματι χραίνων

ἢ λίτρον, τοτὲ φύλλον ἐναλδόμενον πρασιῇσι
καρδαμίδος, Μῆδόν τε καὶ ἐμπρίοντα σίνηπυν.
σὺν δὲ καὶ οἰνηρὴν φλογιῇ τρύγα τεφρώσαιο
ἠὲ πάτον στρουθοῖο κατοικάδος· ἐκ δὲ βαρεῖαν
χεῖρα κατεμματέων ἐρύγοι λωβήμονα κῆρα.—*Alexiph.* 521–536.

"Let not the evil ferment of the earth, which often causes swellings in the belly or strictures in his throat, distress a man; for when it has grown up under the viper's deep hollow track it gives forth the poison and hard breathing of its mouth; an evil ferment is that; men generally call the ferment by the name of fungus (*μύκης*), but different kinds are distinguished by different names; but do thou take the many-coated heads of the cabbage, or cut from around the twisting stems of the rue or old copper particles which have long accumulated, or pound clematis into dust with vinegar, then bruise the roots of pyrethrum, adding a sprinkling of vinegar or soda, and the leaf of cress which grows in gardens, with the medic plant and pungent mustard, and burn wine-lees into ashes or the dung of the domestic fowl; then, putting your right finger in your throat to make you sick, vomit forth the baneful pest."

The expression "evil ferment of the earth," to denote the general name of fungus represented by the Greek word *μύκης*, is, I think, peculiar to Nicander. The scholiast explains it in various ways, which are unsatisfactory; *e. g.* "he calls the *μύκης* a ferment because it is like the ferment of the earth, that is, clay, for it is like a clod of earth;" or, "it is called a ferment because when undigested the fungus causes fermentation in the bowels." Perhaps Nicander was referring to the white mass of mycelium from which the plant grows; and the term ferment for a fungus is not far amiss. Some of the antidotes he recommends to persons who have been poisoned by fungi will be found in later writers; as Nicander was greatly esteemed as a physician in his day, his prescriptions naturally remained long in vogue; the pharmacopœia of the ancients did not admit of much variation from the old receipts. The recommendation to take vinegar after fungus-poisoning would doubtless be of use in the case of fungi containing poisonous alkalies, and no one can doubt that his proposed emetic, if taken in time, would prove efficacious.

There is no mention by Greek writers of fungi, as far as I can learn, from the date of Nicander to that of Dioscorides, the Cilician physician who probably lived in the second century of the Christian era; the word *μύκης* occurs neither in the Greek poets, tragic or comic, nor in the historians.

Athenæus, however, has preserved to us a few quotations relating to μύκητες from older authors, which I will notice by and by. The Latin word *fungus*, which may be taken to be the representative of the Greek μύκης, "a fungus of any kind," is by no means of common occurrence in Roman authors. Virgil once uses the term, but not in reference to the plant, but to the well-known growth on the wick of the lamp, which was supposed to forbode rain; and Aratus long before had spoken of these fungoid excrescences, λύχνοιο μύκητες. Ovid, in a little picture which he draws of the daily work of a frugal peasant woman ("parca colona") and her hardy husband, represents the former sweeping out the cottage, setting hens on eggs, and gathering green mallows and white fungi:—

"Aut virides malvas aut fungos colligit albos."—*Fast.* iv. 697.

Ovid has one more reference to fungi. With ourselves the expression "mushroom origin or birth" is and has long been proverbial to denote one of recent date, in allusion to the rapidity with which these things spring up in our fields in favourable weather; with the people of Corinth, on the contrary, a mushroom origin went back to the earliest period—

"Hic ævo veteres mortalia primo
Corpora vulgarunt pluvialibus edita fungis."—*Met.* vii. 392–3.

"Here (in Corinth) the ancients record that in the first age of the world mortal bodies were produced from fungi which spring up after rains." Considering the licentious nature of the people and the extent to which the worship of Aphrodite prevailed in the city of Corinth, which in all probability was introduced by the Phœnicians, is it possible that the *Phallus impudicus* suggested the mythological tradition?

Horace, in a well-known line, refers once only to fungi:—"Pratensibus optima fungis natura est; aliis male creditur;" "Fungi which grow in meadows are the best; it is not well to trust others" (Sat. ii. 4. 20). He is evidently alluding to those which grow in woods as those not to be trusted, being probably poisonous. The meadow fungi may perhaps have been the common mushroom (*A. campestris*) and the fairy-ring champignon (*A. oreades*).

There is no doubt that the common mushroom is eaten at this day in Italy, and doubtless it was used by the ancient Romans. It is a fallacy of the late Dr. Badham to suppose that the *A. campestris* was prohibited by the market inspectors. In an interesting paper on the edible fungi of Italy, read at

the Woolhope Field-club meeting at Hereford last October, Mr. A. S. Bicknell remarked:—"Perhaps the most startling statement to be found in Badham's book is the passage where he says that almost the only fungus condemned as poisonous in Rome is our common mushroom; the words of Sanguinetti, his authority, are 'The sale is absolutely prohibited of the so-called Prateroli.' Evidently the question turns upon whether *pratiolo* means *A. campestris*. In Bologna, long a pontifical town, I saw mushrooms selling in the market for 40 c. the kil. (less than twopence per pound); but they are not abundant in Italy, for there are few meadows."

Celsus, who lived about the time of Augustus and Tiberius, briefly alludes to unwholesome fungi ("fungi inutiles"):—"If any one shall have eaten noxious fungi let him eat radishes with vinegar and water ("posca"), or with salt and vinegar; these may be distinguished from the wholesome kinds by their appearance, and can be rendered serviceable by a mode of cooking them; for if they have been boiled in oil or with the young twig of a pear-tree they become free from any bad quality" (De Med. v. 27. 17).

Dioscorides is somewhat more diffuse on fungi than all other ancient writers except Pliny. He mentions a practice in his time for causing edible fungi to grow:—"Some people say that the bark of the white and the black poplar when cut into small pieces and scattered over dunged spaces will produce edible fungi (*μύκητας ἐδωδίμους*) at all seasons" (Mat. Med. i. 109). Dioscorides appears to be the first writer who mentions the *Agaricum*, a word familiar to all mycologists under the name of agaric, though the original name stood for something quite different from the laminated agarics of modern systematists. Of the *agaricum* he writes:—

"Agaricum root is said to resemble the root of silphium (Assafœtida); it is not, however, thick in appearance, like silphium, but altogether slighter. One kind is male, the other female, which differs from the male in having straight fibres within (*κτηδόνας εὐθείας ἐντός*); the male is round and homogeneous in structure throughout; in taste both kinds are similar, at first sweet, then, after being swallowed, bitter. It grows in Agaria of Sarmatia; some people say that it is the root of a plant, others that it is produced in the trunks of trees that have become rotten like fungi (*μύκητες*); it grows also in Asia, viz. in Galatia and Cilicia, on cedar trees, but of a friable and weak nature. Its properties are styptic and heat-producing, efficacious against colic (*στρόφους*) and sores, fractured limbs, and bruises from falls; the dose is two obols weight with wine and honey to

those who have no fever; in fever cases with honeyed water; it is given in liver complaints, asthma, jaundice, dysentery, kidney diseases, where there is difficulty in passing water, in cases of hysteria, and to those of a sallow complexion in doses of one drachma; in cases of phthisis it is administered in raisin-wine, in affections of the spleen with honey and vinegar. By persons troubled with pains in the stomach and by those who suffer from acid eructations, the root is chewed and swallowed by itself without any liquid; it stops bleeding when taken with water in three-obol doses; it is good for pains in the loins and joints, in epilepsy when taken with an equal quantity of honey and vinegar; it assists menstruation and relieves flatulence in women when taken with equal proportions of honey and vinegar. It prevents *rigor* if taken before the attack; in one- or two-drachm doses it acts as a purgative when taken with honeyed water; it is an antidote in poisons in one-drachm* doses with dilute wine. In three-obol doses with wine it is a relief in cases of bites and wounds caused by serpents. On the whole it is serviceable in all internal complaints when taken according to the age and strength of the patient; some should take it with water, others with wine, and others with vinegar and honey or with water and honey" (De Med. iii. 1).

There seems to be no reasonable doubt that the agaricum of Dioscorides is the *Polyporus officinalis* of modern mycologists, which grows on larches in subalpine places of Southern Europe. That which he calls the female is the *Polyporus* in question; and probably under the name of male other *Polypori*, as *P. quercinus*, are intended. The expression that the female has straight fibres within suits the *P. officinalis*, while the bitter taste to which Dioscorides alludes is very marked in this species. An objection, however, to this identification would seem to rest on his statement that the agaricum grows on cedars, whereas the *P. officinalis* is found on the larch alone; but it should be noted that instead of the reading ἐπὶ τῶν κέδρων, Oribasius reads δένδρων. Sprengel, in his commentary on Dioscorides (*l. c.* vol. ii. p. 490), expresses wonder why agaricum should have been brought by the ancients from the remote Agarum of Sarmatia when the Romans at least could have procured it much more easily from Rhætia, Vindelicia, and Noricum, Danubian provinces of the Romans; "still, even in our time," he adds, "agaricum is sent from the remote Ural Mountains, as well as from Syria, which Europeans consider to be of a most excellent

* A drachma=about 66 gr. avdp.; obol=$\frac{1}{6}$ of drachma.

kind." We shall cease to wonder at the esteem in which this medical commodity was held by the ancients when procured from the promontory of Agarum when we reflect that this was the country of the Agari, a people skilled in medicine and said to have been able to cure wounds with serpent's venom, and that some of them attended Mithridates the Great as physicians. Hence no doubt the value attached to the fungus from such a renowned district. This once famous cure for all diseases has long since fallen into disuse, and *Polyporus officinalis* will not be found in our modern pharmacopœias; whether herbalists still continue to employ it I know not.

On edible and poisonous fungi Dioscorides writes as follows:—"Fungi (*μύκητες*) have a twofold difference, for they are either good for food or poisonous (*βρώσιμοι ἢ φθαρμικοί*); their poisonous nature depends on various causes, for either such fungi grow amongst rusty nails or rotten rags, or near serpents' holes, or on trees producing noxious fruits; such have a thick coating of mucus, and when laid by after being gathered quickly become putrid; but others, not of this kind, impart a sweet taste to sauces; however, even these, if partaken of too freely, are injurious, being indigestible, causing stricture or cholera. As a safeguard all should be eaten with a draught of olive-oil, or soda and lye-ashes with salt and vinegar, and a decoction of savory or marjoram, or they should be followed with a draught composed of bird's dung and vinegar, or with a linctus of much honey; for even the edible sorts are difficult of digestion and generally pass whole with the excrement" (Mat. Med. iv. 83).

It need scarcely be observed that the different reasons here given for discriminating edible and poisonous fungi have no basis of fact; several perfectly wholesome fungi are covered with mucus. *Gomphidius glutinosus* and *G. viscidus*, for instance, are quite wholesome, and, I think, very good eating; the same might be said of *Boletus luteus*, *B. flavus*, and many others. Their growing amongst rusty nails and rotten rags would probably not affect their qualities in any way; while of course the idea that such kinds as grow near a serpent's hole, which, as we have seen, Nicander long before makes mention of, is simply a bit of old Greek folk-lore which is quite in harmony with popular belief and prejudice. With regard to the antidotes in case of poisoning by fungi, vinegar is still employed to neutralize poisonous alkalies; but perhaps the only safe remedy employed is an emetic.

Pliny has a good deal to say on fungi, and is the only ancient writer who has given so good an account of the *Boletus* of the Romans as to enable us to identify almost cer-

tainly the species intended. The famous or infamous case of the death of the emperor Claudius by means of a dish of boleti in which some poison had been placed by his wife Agrippina was fresh in Pliny's time, and afforded material for strong declamatory language. The excessive luxury of the wealthy people of the Roman empire, especially their love of eating and drinking the most rare and costly dainties *, helped to bring fungi more and more forward as a possible incitement to the appetite and a savoury article of diet; but still people had been both purposely and accidentally poisoned by fungi, so they were regarded as "ancipites," questionable food indeed. The most interesting bit of fungus-talk which Pliny treats us to is the following: —

"Among those things which are rashly eaten I shall rightly place *boleti*, excellent food no doubt, but which have been brought into reproach by an unparalleled instance; for by their means poison was administered to the emperor Tiberius Claudius by his wife Agrippina, by which deed she inflicted another poison on the world, and especially on herself, in the person of her son Nero. Some of the poisonous kinds are easily known by a dilute red colour ('diluto rubore'), a loathsome aspect, and internally by a livid hue; they have gaping cracks ('rimosa stria') and a pale lip round the margin. But these characters are not seen in certain kinds which are dry and like nitre, and which bear on their heads as it were spots formed from their own coating; for the earth first produces a wrapper ('volva') and afterwards itself (*i. e.* the boletus) within the volva, like the yolk in the egg; the young boletus with its volva is very good for food. As the boletus grows the volva is burst; by and by its substance is borne on the stem; there are seldom two heads on one stem. Their origin is from mud and the acrid juices of moist earth, or frequently from those of acorn-bearing trees; at first it appears as a kind of tenacious foam ('spuma lentior'), then as a membranous body; afterwards the young boletus appears, as we have said. Noxious kinds must be entirely condemned; for if there be near them a hobnail ('caligaris clavus') or a bit of rusty iron or a piece of rotten cloth, forthwith the plant, as it

* The Romans were not alone in their love of costly dainties; the Greeks shared with them in this respect. Plutarch speaks of the absurdity of indulging in meats and drinks simply because they are rare, costly, and accessible only to the rich, and instances among such articles of luxurious diet "sow's udders, Italian mushrooms (μυκήτων Ἰταλικῶν), Samian cakes, and snow from Egypt" ('De tuenda Sanitate præcepta,' vol. i. pt. 2, p. 491: ed. Wyttenbach). From this passage it appears that edible fungi were sometimes exported from Italy into Greece, which is very probable, for Greece to this day is poor in fungi.

grows, elaborates the foreign juice and flavour into poison; and to discern the different kinds country-folk and those who gather them are alone able. Moreover they imbibe other noxious qualities besides; if, for instance, the hole of a venomous serpent be near, and the serpent breathe upon them as they open, because, from their natural affinity with poisonous substances, they are readily disposed to imbibe such poison. Therefore one must notice the time before the serpents have retired into their holes. . . . The whole existence of a boletus from birth to death is not more than seven days" (Nat. Hist. xxii. 22).

The boletus of the ancients, from the above description of it by Pliny, clearly belongs to the genus *Amanita* of modern mycologists, and has nothing to do with the boletus as now applied to those fungi whose hymenium consists of tubes or pores. The genus *Amanita*, of which there are several British species, is characterized by the presence of a wrapper or *volva*, which at first envelopes the fungus, and which often remains in patches on the pileus, as mentioned by Pliny. Tradition has referred the species to *A. cæsareus*, so called as being that one which was instrumental in poisoning Claudius Cæsar; and there is no reason to doubt that this is the famed boletus of the ancient Romans. Mr. Bicknell says it is now universally called *uovolo*, and is to be seen in the markets of Milan, Bergamo, Brescia, Verona, Cremona, Bologna, and other Lombard cities from the middle of September to the middle of October. He usually had it cut up and stewed or fried in butter; at the commencement of the season it is worth about one shilling the pound. Lenz gives as the modern Italian names of this fungus, *uovolo*, *uovolo ordinario*, *uovolo commune*, *uovolo rancio* (orange-coloured); at Verona, *fongo ovo*, *fongo bolado*, and *bolè*, in which two latter instances the ancient Roman name still survives, while the ordinary name of *uovolo* reminds one of Pliny's words "like the yolk in the egg." In lib. xvi. cap. 8, Pliny, among the various products of the oak, mentions *boleti* and *suilli*, which he calls the most recently discovered stimulants for the appetite ("gulæ novissima irritamenta"), as growing around their roots; he says the quercus (*Q. robur*?) produces the best kinds, and that the robur (*Q. robur*, var.?), cypress, and pine yield noxious ones. From this it would appear that boleti (*A. cæsareus*) were not much used as food before the time of the empire; *boletus* as a Latin name occurs only in the writings of Pliny, Juvenal, and Martial, and the Greek βωλίτης does not occur before the time of Galen (A.D. 130); the noxious kinds of boleti may refer to *A. muscarius* or *A. phalloides*, but this is mere conjecture;

while the assertion that certain trees produce them is probably a mere popular notion of his time. Lenz gives *uovolo malefico* as one of the modern Italian names of *A. muscarius*. The suilli will be discussed by and by. Pliny distinguishes between boleti and fungi:—"The nature of fungi is more viscid than that of boleti; there are many kinds, and they originate only from the slimy moisture of trees. The safest are those which have a red skin, but of a darker hue than occurs in boleti; the next best are the white kind, with head-stems remarkable for their resemblance to the conical caps of the Flamens ('apice Flaminis'); and thirdly there is the kind called *suilli*, very convenient for poisoning. Lately they have killed whole families and all the guests at a banquet, as, for instance, Anneus Serenus, the prefect of Nero's guard, together with the tribunes and centurions. What so great pleasure can there be in doubtful food? Some persons have discriminated the kinds of fungi from the kinds of trees on which they grow, saying that the good kinds are found on the fig, the birch, and gummiferous trees, we that the noxious kinds grow on the beech, oak (robur), or cypress as aforesaid.

"But who will give security when these things are exposed for sale in the markets? All the poisonous fungi have a livid colour, while, on the other hand, a reason for suspecting poison will be absent from those kinds which grow on trees which resemble the fig. We have already spoken of remedies against fungus-poisoning; we will add a few more remarks, for even in these products there are medicinal properties. Glaucias thinks that *boleti* are good for the stomach; *suilli* are dried and hung up, being transfixed with a rush, as in those which come from Bithynia. These are good as a remedy in fluxes from the bowels, which are called rheumatismi, and for fleshy excrescences of the anus, which they diminish and in time remove; they remove freckles ('lentigines') and blemishes on women's faces; a healing lotion also is made of them, as of lead, for sore eyes; soaked in water they are applied as a salve to foul ulcers and eruptions of the head and to bites inflicted by dogs.

"I will now make some general observations on the cooking of fungi, because this is the only food which dainty voluptuaries themselves prepare with their own hands, and thus, as it were, by anticipation feed on them, using amber knives and silver service. Those kinds which remain hard after cooking are injurious, while those which admit of being thoroughly well cooked when eaten with saltpetre are harmless; they are rendered more safe still if they are cooked with meat ('cum carne cocti') or with pear-stalks; indeed it is good to

eat pears immediately after fungi. Vinegar being of a nature contrary to them neutralizes their dangerous qualities. All these products appear after showers" (xxii. 23).

Pliny mentions three different kinds of fungi which he considers to be the best for food; but identification is difficult owing to want of data. Those which Pliny calls "tutissimi qui rubent callo minus dilutorubore quam boleti" may possibly be *Russula alutacea*, as Lenz conjectures; in Verona he says this russula is still called *fungo rossetto*, and in Italy generally *rossola buona di gambo lungo*, "the good long-stemmed red fungus," which is still eaten in Italy; but as Pliny gives us no character except that of colour, which in the genus *Russula* is very variable, it is evident we cannot say what the species is. There is something more to guide us in Pliny's second-best kind, viz. "the white fungi whose head-stems are similar in form to the caps of the Flamens." Most of the forms of this cap (apex) as shown on coins or bas-reliefs of the Roman emperors are of a conical or cylindrical form, and remind one of the cylindrical pileus of the very excellent *Coprinus comatus* before it expands and deliquesces; at least I know of no other edible fungus that so much resembles the figures of these priestly caps. Badham says that *C. comatus* is "largely eaten" about Lucca; but this species is not named by Vittadini nor was it seen by Mr. Bicknell in the Italian markets. The *suillus* which we find mentioned by Martial—

"Sunt tibi boleti: fungos ego sumo suillos."—*Ep.* iii. 60—

in an epigram, in which he complains to Ponticus that when invited to dinner there were not set before him the choicest dainties, is generally supposed to be the *Boletus edulis* of modern mycologists. Its present Italian name of *porcino*, *bolè porcin*, answers to the old Latin name of *suillus*, which has something to do with "swine" *. Tradition has appa-

* The suillus in all probability was so called because swine were fond of it. Berkeley states that pigs devour both truffles and boleti as *B. edulis*. Whether the modern English pig of the farmyard will eat boleti I know not; but by the semi-wild swine of the ancient Romans boleti were probably eagerly devoured. Various boleti and agarics often bear the impress of the teeth of small Rodentia, as the squirrel and the rabbit, which latter animal I know will eat the *A. rubescens*. Cats are sometimes fond of fungi; I have a white Persian cat which I have tried with the following species of edible fungi, all of which it eats with evident relish:—*Agaricus pratensis* (mushroom), *A. melleus*, *A. personatus*, *A. virgineus* (*Hygrophorus*), *A. oreades*, *A. comatus*, *A. butyraceus*, *Boletus edulis* and *scaber*, *Hydnum repandum*. Some known unwholesome and poisonous kinds, as *A. semiglobatus*, *A. æruginosus*, *A. muscarius*, some of the *Cortinarii*, *Boletus luridus*, &c., the cat refuses. Another of my

rently identified the species as the *B. edulis*. Mr. Bicknell, who travelled in North Italy this last autumn, says this fungus is the one most commonly sold in Italy at present. In the market of Bergamo it was sold at 40 c. per pound; at Brescia it was ten cents dearer. In Florence and Parma there was no other fungus. He adds that when cooked they are usually filled with bread-crumbs, and that they may be bought in almost any grocer's shop. It is probable that the ancient *suillus* included, besides *B. edulis*, *B. scaber*, which is also very common in the Italian markets and is also known by the name of *porcinello*, or "the little-pig fungus."

The suillus has an historical interest attaching to it similar to that which attaches itself to the boletus. Pliny calls it a genus "venenis accommodatissimum," and refers to the case of the poisoning of Anneus Serenus and a whole lot of guests; it is probable that the suillus was the medium for introducing some poison of a foreign nature into the dish in which it appeared at table *, just as was the case with the boletus which poisoned Claudius Cæsar. Anneus Serenus was an intimate friend of Seneca, and his death is referred to in one of the moralist's epistles (Ep. 63) in very touching language; but he does not say a word about the cause of his friend's death. Tacitus speaks of the part which Serenus played in regard to Nero's passion for a freedwoman named Acte, which enraged Agrippina and filled her with burning hatred. Serenus took Nero's part. Tacitus says nothing about the death of Serenus. This rests on the sole authority of Pliny; but seeing that Agrippina had already poisoned her husband Claudius, it is quite probable that she resorted to a similar mode of getting rid of Serenus and the tribunes, and that she introduced poison into a dish of suilli or *Boletus edulis*. The picture which Pliny sarcastically draws of the voluptuaries of the day is very graphic. Amber knives and silver service alone were good enough for preparing or setting on table these fungi, the preparation of which by the hands of the rich magnates themselves afforded an anticipatory feast of the dainties!

If the fashion of eating these fungi arose, as Pliny seems to say, in the time of the Roman emperors, many of whom were always eager for any fresh introduction to the luxuries of

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cats (common variety) refuses all mushrooms and other fungi, and seems to say to its Persian companion "Persicos odi, puer, apparatus," when such "apparatus" is a fungus.

* Badham considers that this case of poisoning was accidental; I interpret Pliny's account as intimating determined purpose.

the table, it soon developed into something like a mania among the rich ; a passion for truffles and boleti betokened no good in the youth of those days. Hence Juvenal writes :—

> " Nec melius de se cuiquam sperare propinquo
> Concedet juvenis, qui radere tubera terræ,
> Boletum condire.....didicit."—*Sat.* xiv. 6–8.

" Nor will that youth allow any relative to hope better of him who has learnt to peel truffles and to pickle boleti." The great esteem in which boleti were held is shown by Martial in his 'Epigrams.' Special vessels for cooking boleti were in use called *boletaria*, and should not be applied to baser purposes ; hence one of these cooking utensils is represented as bewailing its changed lot in the functions of the Roman kitchen :—

> " Cum mihi boleti dederint tam nobile nomen,
> Prototomis (pudet heu) servio cauliculis."—*Ep.* xiv. 101.

" Although boleti have given me so noble a name, I am now used, I am ashamed to say, for Brussels sprouts."

Again, it was safer to send a messenger with gold or silver &c. than to send him with boleti, because he would probably have them cooked and eat them on the way * :—

> " Argentum atque aurum facile est, lænamque togamque
> Mittere : boletos mittere difficile est."—*Ep.* xiii. 48.

But to return to Pliny : of the Agaricum he says :—" The acorn-producing trees of the Gallic provinces more particularly produce agaricum ; it is a white fungus with strong odour, useful as an antidote ; it grows on the tops of trees and shines at night, by which fact its presence is known and it is gathered " (xvi. 8). This is the *Polyporus officinalis* of which Dioscorides speaks. I do not know whether luminosity has been observed in this fungus ; but it is well known that certain fungi, notably the *Pleurotus olearius*, which grows on olive and other trees in the south of Europe, emits phosphorescent light, and perhaps *Polyporus officinalis* or the decayed wood on which it grows may occasionally exhibit the same phenomenon. The German tinder or amadou of commerce, at present prepared from the pileus of *Polyporus fomentarius*, was not unknown to the ancient Romans, though it is not stated whether it was steeped in a solution of saltpetre as at present. Pliny thus speaks of obtaining fire from wood :—

* Or because the possessor of such delicacies would rather keep them himself than send them to a friend.

"One piece of wood is rubbed against another, and the friction sets them on fire, which is augmented by dry tinder ("aridi fomitis"), especially by that of fungi and leaves" (xvi. 40). The fungus was probably steeped in sulphur, sulphur-matches being known to the Romans under the name of *sulfurata ramenta* or *sulfurata* (*cf.* Mart. Ep. x. 3, and i. 42).

Pliny mentions the Agaricum again, in cap. xxv. 9, as growing as a fungus "on trees round the Bosphorus: it is of white colour; it is given in four-obol doses mixed with two cyathi of honey and vinegar. That which grows in Gaul is considered an inferior kind. The male is thicker and more bitter than the female; it cures headaches: the female, which is of looser texture, is at first sweet to the taste and as it is swallowed it leaves a bitter taste." This is nothing more than an abridgment of what Dioscorides has said. Of its use in medicine Dr. Badham writes:—"The *Polyporus laricis* [*P. officinalis*], the so-called Agaric of pharmacy, is a powerful but most uncertain medicine, and has been recommended in consumption. I once administered a few grains of it in this disease, when violent pains and hypercatharsis supervened, which lasted for several hours. MM. B. Lagrange and Braconnot found it to contain a large quantity of acrid resin, to which it no doubt owes its hypercathartic properties. To judge from this single case, which, however, tallies with the experience of others, I should say that this fungus was in medicine to be looked upon as a very suspicious ally" ('Esculent Funguses,' p. 26).

Pliny (xix. 3) mentions fungi known as *pezicæ* by the Greeks; they grow without root or stalk. The Greek forms of πέζις, ιος and πέζιξ, ικος occur in Theophrastus and Athenæus. The former says nothing whatever about the πέζις, except that it has no root; but Athenæus quotes Theophrastus as saying that the πέζις, together with the ὕδνον, μύκης, and γεράνειον, has a smooth skin, λειόφλοια. Lenz, in a footnote (Botanik der alt. Gr. u. R. p. 755), writes:—"The πέζις of Theophrastus and the pezica of Pliny are without doubt the bovista ('die Boviste')." He compares the modern Italian name *vescia*, both in sound and meaning, with the Greek πέζις. The λειόφλοια of Theophrastus would seem to point to the smooth-skinned *Lycoperdon giganteum*.

Juvenal's notices of fungi are chiefly confined to the boletus which was instrumental in poisoning Claudius Cæsar, viz. the *Amanita Cæsarea* of modern mycologists; he calls all other fungi "ancipites":—

"Vilibus ancipites fungi ponentur amicis,
Boletus domino; sed qualem Claudius edit
Ante illum uxoris, post quem nil amplius edit."—*Sat.* v. 146.

"Doubtful fungi shall be served to his clients, the boletus to the lordly patron; but such a one as Claudius ate before that one which his wife gave him, after which he ate nothing more." Again in Sat. vi. 619:—

"Minus ergo nocens erit Agrippinæ
Boletus: siquidem unius præcordia pressit
Ille senis, tremulumque caput descendere jussit
In cœlum, et longam manantia labra salivam."

"Therefore Agrippina's boletus will be less hurtful (than the love potions given by Cæsonia to Caligula), for it pressed the vitals of only one old man and commanded his trembling head to descend to heaven and his lips flowing with long streams of saliva." The expression here used by Juvenal of "descendere in cœlum" is said sarcastically; it conveys the idea of the usual apotheosis of the deceased to the heavens above; but implies also, by the exact contrary expression, that he went down to his proper abode in the infernal regions. Seneca, in his play 'De morte Claudii Cæsaris,' makes use of similar language: "Posteaquam Claudius in cœlum descendit." According to Dion Cassius, Seneca called this satirical play *Apocolocyntosis*, i. e. "Pumpkinification," from *ἀπό*, "set apart for," *κολόκυνθα*, "a pumpkin;" instead of using the term *ἀποθέωσις*, "deification," "set apart for the society of the gods," Seneca travesties this name, using instead that of *ἀποκολοκύντωσις*; a pumpkin, in Latin *cucurbita*, being sometimes taken to represent "a man of weak intellect," "a fool," which the Emperor Claudius was generally supposed to be. There is not a word, however, in this so-called play ("ludus") which has reference to this idea of a pumpkin denoting a fool, nor does the term *apocolocyntosis* occur once in this curious diatribe of the Roman philosopher*. There is no allusion to the means employed by

* This 'Ludus de Morte Cl. Cæsaris' is full of sarcastically expressed hatred of Claudius, who had rendered himself an object of loathing to the people generally and to Seneca in particular, who had been exiled to Corsica by Claudius for supposed intrigues with Julia, the emperor's niece; it appears to have been written with a view to please Nero and Agrippina. The 'Ludus' is written in prose, with occasional insertions of verses in the heroic and iambic metre; it has but little merit and the text is often corrupt. Claudius is represented as being received after death into the presence of the gods; the question arises among them whether he is a fit person for their company. A council of gods is held, and the matter is debated. Divus Augustus is strongly opposed to Claudius on account of his atrocities and murders, and Mercury takes

Agrippina of getting rid of Claudius; no fungus, no boletus, is once mentioned or hinted at. I noticed above that Seneca, in his lamentation over his deceased friend Anneus Serenus (Ep. 63), says nothing of his death by a poisoned dish of boleti, of which Pliny speaks. In both cases the absence of any remarks about the cause of the death of Serenus and of Claudius Cæsar is natural; it is notorious that Seneca was privy to Agrippina's design to poison the emperor, and so he carefully avoided the use of the word boletus, fungus, or suillus.

The accounts which have come down to us generally agree that the boletus was the vehicle in which the poison was administered to the emperor, although at the time various stories were told as to where and by whom poison was given. Suetonius and Tacitus both speak of medicated boleti, poison poured into a dish of boleti. The poison was believed by some to have been put into the dish by Agrippina's own hands. Tacitus says it was prepared by Locusta. Nero, the successor of Claudius, was of course privy to the plot, and even had the impudence to make no secret of the mode of poisoning, for he used to commend in a Greek proverb boleti as food of the gods (*βρῶμα θεῶν*), sarcastically referring to the apotheosis of Claudius.

The boletus was such a relished dainty with the Emperor Tiberius that, according to Suetonius, he presented a man of the name of Asellius Sabinus with 200,000 sesterces for composing a dialogue in which boleti, beccaficos, oysters, and thrushes were supposed to contend for the honour of being considered the best food (Suet. Tib. cap. xlii.). Martial (Ep. i. 21) represents a certain host, Cæcilianus, inviting a number of guests to dinner, and eating all the boleti himself:—

"Dic mihi quis furor est? turba spectante vocata,
Solus boletos, Cæciliane, voras.
Quid dignum tanto tibi ventre, gulaque precabor?
Boletum, qualem Claudius edit, edas."

"What brutishness is this? When friends you treat,
They looking on, alone you mushrooms eat.
What on such gluttony shall I implore?
May'st Claudius' mushroom eat, and ne'er eat more!"

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him by the neck and conducts him out of heaven down to the infernal regions, where he is punished in a Sisyphian-like way. He has to throw dice out of a perforated box, according to the sentence pronounced by Æacus:—"Tum Æacus jubet illum alea ludere pertuso fritillo; et jam cœperat fugientes semper tesseras quærere, et nihil proficere.

"Sic cum jam summi tanguntur culmina montis
Irrita Sisyphio volvuntur pondera collo.

Galen, the celebrated physician of Pergamus (born A.D. 130), seems to have regarded fungi generally as unwholesome diet, but the boletus as tolerably good and to be trusted, though even to the boletus (*βωλίτης*) he does not ascribe very tasty qualities. "Of fungi (*μύκης*) the *βωλίτης*, when well boiled, must be counted among insipid things; it is generally eaten with various kinds of spices, as is done with other insipid food. These fungi, after being eaten in large quantities, yield cold, clammy, noxious juices as their nourishing quantities (*φλεγματώδης δ' ἐστὶν ἡ ἐξ αὐτῶν τροφή, καὶ δῆλον ὅτι καὶ ψυχρά, κἂν πλεονάζῃ τις ἐν αὐτοῖς κακόχυμος*); the boleti are the most harmless and after them the amanitæ (*ἀμανῖται*); as for the rest, it is far safer to have nothing whatever to do with them (*μηδ' ὅλως ἅπτεσθαι*), because many persons have been poisoned by them. . . . I myself know the case of a man who ate a quantity of these badly cooked boleti, supposed to be wholesome, and was afterwards troubled with severe pains in the stomach, with difficulty of breathing, faintness (*λειποψυχήσαντα*), and cold sweats, and who was with difficulty saved by taking such remedies as are able to dissipate inspissated juices, such as vinegar and honey, either alone or with hyssop and origanum sufficiently boiled; the man partook of this remedy sprinkled with soda, and vomited up the fungi which he had eaten" (De aliment. facult. lib. ii. cap. 69).

Again, Galen remarks in his treatise 'De probis pravisque alimentorum succis':—"Of all such kinds of food fungi have the coldest, most viscid, and thickest juice; however, among them the boleti alone have never been known to cause any one's death; still, to some persons, even they cause cholera and indigestion . . . . . The best proof of the unwholesomeness of a fungus is the impossibility of drying and preserving it" (caps. iv., v., vol. vi. pp. 770, 785, ed. Kühn).

Epileptic patients must abstain from all bad food, such as fungi (*μύκης*), turnips, and other roots (Pro puero epilept. consilium, p. 368, ed. Kühn). The curious emetic which first appears in Nicander was employed sometimes by Galen. "I have heard of a physician in Mysia who administered fowl's dung to persons suffering from fungus-poisoning, and I have often myself experimented with this remedy. I have used finely powdered dung mixed with water or with honey and vinegar. The patients immediately on drinking this mixture vomited and recovered. One must observe that the dung of a fowl at liberty is more efficacious than that of one in confinement" (Simpl. Med. p. 303, ed. Kühn).

"Physicians (Æsclapiadæ) recommend the following remedies for fungus-poisoning: raw radishes in quantities, unmixed wine, lye-ashes of the vine, a mixture of soda and vinegar, ashes of burnt lees of wine mixed with water, wormwood and vinegar, rue either with vinegar or alone" (De antid. 2. 7, p. 140, ed. Kühn). Athenæus (A.D. 230), of course, has some chatty conversation about fungi, and gives quotations from authors whose works are not extant now. Most fungi require moist ground, and so Aristias says, "The stony plain stretches itself out (in vain) for fungi." Poliochus mentions, among other food, roasted fungi—*καὶ μύκης τις ἐνίοτ' ὠπτᾶτο*, "and sometimes some fungus would be roasted."

Antiphanes seems to have considered fungi hazardous food. "Who of us knows the future, what is fated for each of our friends to suffer, but quickly take and roast these two fungi gathered from the ilex." Cephisodorus quotes from the Proverbs of Antiphanes: "For I, if I eat any of your dishes, think that I am eating raw fungi or sour apples, or other choking food" (*εἴ τι πνίγει βρῶμά τι*). Athenæus continues, "Fungi are earth-produced (*γηγενεῖς*), and a few of them are good to eat; but most produce a choking sensation, hence Epicharmus joking says, 'You will be parched and choked as if by fungi.' Nicander mentions in his 'Georgics' [a lost work] some kinds that are deadly, and says that fearful calamities arise from eating from the olive, the ilex, and the oak, clammy choking lumps of fungi. He says moreover [in order to produce fungi artificially], bury the stump of a fig-tree in the ground with dung and moisten it with spring water; at the bottom harmless fungi will grow, of which you must not cut off from the root anything that is of inferior quality. And he says again, 'and then the fungi called amanitæ you may roast;' and Ephippus says, 'that I may choke you as fungi do.'"

Accidental poisoning by fungi was probably more common among the ancients than with us, who, as a rule, eat no single species except the common mushroom. From what has been said it is clear that the ancients ate various kinds, though often with hesitation and caution; accidental poisoning probably occasionally occurred from gathering the wholesome field-fungi in the dusk of the evening, as with us; the *A. semiglobatus*, known to be highly poisonous, grows frequently in the fields in close proximity to *A. campestris*, and a few of them carelessly mixed with the edible sorts would produce dangerous effects; or people may have been falsely allured into security by the smell and appearance of some particular

kind, as, for instance, the very poisonous *A.* (*Amanita*) *vernus*. According to Eparchides (*apud* Athenæus), when Euripides was on a visit at Icarus, a certain woman, with two full-grown sons and an unmarried daughter, gathered some fungi from the fields, and all the family partook of them and died. Whereupon the poet made the following epigram upon them:—

Ὦ τὸν ἀγήραντον πόλον αἰθέρος ἥλιε τέμνων,
ἆρ' εἶδες τοιόνδ' ὄμματι πρόσθε πάθος;
μητέρα παρθενικήν τε κόρην δισσούς τε συναίμους
ἐν ταὐτῷ φέγγει μοιριδίῳ φθιμένους.

"O Sun, that cleavest the undying vault of heaven, hast thou ever before seen such a calamity as this?—a mother and maiden daughter and two sons destroyed by pitiless fate in one day?"

With a view probably to destroy any dangerous properties it was sometimes recommended that they should be boiled; thus Diocles, in his first book on 'Wholesomes,' says, "Certain things which grow wild, as beet, mallow, sorrel, nettles, orach, bulbs, *ὕδνα* (truffles), and fungi (*μύκης*), should be boiled."

Diphilus, a physician who lived about the beginning of the third century B.C., and who wrote a book on 'Diet suitable for persons in good and bad health,' says that "fungi (*μύκητες*) are of good taste, and pass easily through the bowels, and are nourishing;" but still "that they cause indigestion and flatulence, especially those from the isle of Ceos; many, however, cause death: the wholesome kinds appear to be those which are easily peeled, are smooth and readily broken, such as grow on elms and pines; the unwholesome kinds are black, livid, and hard, and such as remain hard after boiling; such when eaten produce deadly effects. A remedy for this poison is a draught of honey and water, or honey and vinegar, or soda and vinegar; after the draught the patient should vomit. It is therefore always desirable to dress fungi with vinegar, or honey and vinegar, or with honey and salt, by which means the choking properties are destroyed." Athenæus adds, "Theophrastus, in his Treatise on Plants, writes, 'Plants of this kind grow both under the ground and on the surface, such as those which some people call *πέζεις*, which grow together with fungi (*μύκης*), for these are without roots; while the *μύκης* has at the beginning of its attachment to the ground a stalk of some length, from which roots [the mycelium] extend themselves. Theophrastus says also, that in the sea around the Pillars of Hercules, where there is much water, fungi are produced close to the sea, which people say have been turned into stone by the

sun." It is evident that he is speaking of the coral madrepores, the *Agaricia* (Lamouroux), or mushroom madrepore, from the resemblance to the fungus, or agaric with its laminated gills, which the people imagine to be a petrified fungus. It is curious to note that this reference to the madrepore is the only indication that the ancients noticed the beautiful form of the laminated hymenium of the modern genus *Agaricus*; the *suillus* is doubtless the *Boletus edulis*; but there is no notice of the porous hymenium which characterizes the genus in any of the ancient authors.

Athenæus quotes one more writer, Phanias, who wrote a book on plants: "Some kinds produce neither bloom nor any trace of generation by buds or by seeds, such as the μύκης, ὕδνον, πτερίς (fern), and ἔλιξ" (Deipnosoph. ii. 56–59).

Between the time of Athenæus (A.D. 230) and the Greek compilation known as 'Geoponica' (γῆ "the earth," and πόνος "labour") there is an interval of some hundreds of years. Neither the author nor the date of this work, which contains interesting matter on precepts relating to rural economy, is positively known. The date may be about A.D. 900. It is curious to note that there is not a single reference to any kind of fungus-plant in the works of the Roman writers on husbandry ("scriptores rei rusticæ"). In the 'Geoponica,' xii. 17. 8, it is said that if any one has eaten a poisonous boletus (βωλίτης φαῦλος), he must take as a remedy the juice of cabbage. The "many-coated cabbage" was recommended by Nicander, perhaps a thousand years before, and probably the prescription continued more or less in vogue for so many years. In another place (Geop. xiv. 24) myrtle-berries are recommended as an excellent remedy against poisonous fungi (θανατοποιὸς μύκης).

"In order to make fungi grow one must saw off the stump of a black poplar and pour sour dough dissolved in water upon the cut-off pieces. Black-poplar fungi soon appear; but if you would have fungi to grow from the ground you must select a spot of light soil on a hill where reeds grow; there you must collect together twigs and other inflammable materials, and set all on fire just before rain is expected; if the rain does not come you must artificially sprinkle the spot with pure water, but the fungi thus produced are of inferior quality." (Geopon. xii. 41.)

One is here reminded of what Dr. Badham himself witnessed at Naples. Here is his account:—"A third fungus, which we have the means of producing *ad libitum*, is that which sprouts from the pollard head of the black poplar (*Populus nigra*, var. *Neapolitana*). These heads it is usual

to remove at the latter end of autumn, as soon as the vintage is over, and thus marriage with the vine is annulled; hundreds of such heads are then cut and transported to different parts; they are abundantly watered during the first month, and in a short time produce that truly delicate fungus *Agaricus caudicinus*, the *Pioppini*, which during the autumn of the year make the greatest show in many of the Italian market-places. These pollard blocks continue to bear for from twelve to fourteen years. I saw a row of them in the Botanic Garden at Naples, which, after this period, were still productive, though less frequently, and of few agarics at a crop" (Escul. Fung. p. 50). The *A. caudicinus* here mentioned is perhaps the *A. ægerita* of Fries (Epicr. p. 219, 2nd edit.), the Champ. du peuplier of Paul. p. 301; of white flesh and pleasant odour; but the fungus appears to have been confused with the *A. melleus* ("Stockschwamm" of the Germans) and the *A.* (*Pholiota*) *mutabilis*.

Mr. Bicknell throws doubt on Dr. Badham's story; he says, "I have never seen either *A. melleus* or *Ph. mutabilis* for sale, neither do I expect I shall, if I have to wait till the poplar heads are amputated"*. These poplar fungi, whatever be the species, have been known from the times of Dioscorides, through that of the compiler of the 'Geoponica,' until this day. With respect to what is stated in the 'Geoponica,' about getting fungi to grow on spots where wood has been burnt, every fungus-collector knows how prone certain kinds are to grow on charcoal-rings where wood has been burnt.

Truffles.

The Greek name for a truffle is ὕδνον, a word which has several times occurred in the course of this paper. The Latin name is *tuber*, which mycologists still retain. Linnæus, without the slightest reason, appropriated the old Greek word for a truffle, and made it into a genus (*Hydnum*), to denote the fungi which have an awl-shaped hymenium; and this unfortunately selected word retains this meaning to this day. Equally unfortunate is the use of the word *Agaricus* by Linnæus to designate fungi whose fruit-bearing surface or hymenium is lamellose; and the same may be said of the application of the *boletus* of the ancients, which, as we have seen,

* Fries says that the "Stockschwamm" of the Germans is not *A. mutabilis*, but *A. melleus* (Epic. p. 225, 2nd edit.); but the figure which Schæffer (pl. ix.) gives of the Stockschwamm of the Bavarians is clearly *A.* (*Pholiota*) *mutabilis*. Lenz, without hesitation, refers the poplar-fungus to *A. mutabilis*, Schæff., and says that the people, to this day, water the old stumps, and that the fungus is known in Italy as the *famigliola buona* (Botanik, p. 764, note).

is a lamellose agaric at first enclosed in a volva, to denote fungi whose hymenium consists of tubes or pores.

But to return to the *ὕδνον*. Theophrastus (i. 6, § 9) speaks of the *ὕδνον* which some call *ἄσχιον*, and the *οὔϊγγον* and other such subterranean things, as having no root. In i. 6, § 13, he says, the *ὕδνον* is sometimes called *μίσυ*, and is very sweet with a fleshy odour; that in Thrace it is called *ἴτον*. "With regard to these things, peculiar beliefs are held, for they say that they are produced during autumn rains, and thunderstorms especially, which are the main reason of their growing, and that they do not last more than a year, and are best for food in the spring. Some think they are produced from seed, because those which grow on the shore of the Mityleneans only appear after floods, which bring down the seed from Tiara where many *ὕδνα* are found. They grow on the shore where there is much sand. They are found around Lampsacum of Abarnis, and in Alopeconnesus (Asia), and in Elis."

Dioscorides calls the *ὕδνον* a root, and says it is roundish, without leaves and stem, inclining to yellow; that it is dug out of the ground in the spring, and is eaten either raw or cooked" (Mat. Med. ii. 174).

With respect to the Greek words *ὕδνον*, *ἄσχιον* and the Thracian *ἴτον*, and the *μίσυ*, the name of the plant near Cyrene, there is no clear etymology forthcoming. If *οἶδνον* is another form of *ὕδνον*, according to Liddell and Scott's Lexicon (but I can find no authority for its use in Theophrastus), then one would naturally refer the name to *οἰδέω* or *οἰδάνω*, "to swell," and the etymology would be sufficiently exact, answering to the Latin *tuber*. Aëtius and later Greek writers use the word *ἴτνον* for the truffle. Sibthorpe found the names *ὕδνος* and *ἴκνος* to denote this fungus in Greece, and Heldreich ('Die Nutzpflanzen Griechenlands,' p. 2) gives *ὔδανον* or *ὕδνον* for the *Tuber cibarium* in Peloponnesus, and *χοιρόψωμα* in Crete, adding that truffles occur in woody places in Greece, but are not much sought after. According to the last-named authority the ancient Greek name *ἄσχιον* for a truffle is now used for a polyporus or a fungus generally, under the form of *ἴσκα*, Pelasg. *eské*, *éska*. The *μίσυ* must remain quite unexplained. Another Greek name is apparently used by Theophrastus to signify a truffle, viz *κεραύνιον*, but given by Athenæus, who is quoting Theophrastus, as *γεράνειον*. I suspect *κεραύνιον* is the proper reading, and that it refers to the popular idea that such plants appeared chiefly after thunderstorms.

The truffle was a source of wonder to Pliny, who considered it one of the marvels of nature. "Since we have

begun to speak of these marvels we shall follow them in order. Among the most wonderful of all things is the fact that anything can spring up and live without a root. These are called truffles (*tubera*); they are surrounded on all sides by earth, and are supported by no fibres or hair-like root-threads (*capellamentis*); nor does the place in which they are produced swell out into any protuberance or present any fissure; they do not adhere to the earth; they are surrounded by a bark, so that one cannot say they are altogether composed of earth, but are a kind of earthy concretion; they generally grow in dry sandy places which are overgrown with shrubs; in size they are often as large as quinces and weigh as much as a pound. There are two kinds: one is sandy and injures the teeth, the other is without any foreign matter (*sincera*); they are distinguished by their colours being red, or black, or white within; those of Africa are most esteemed. Now, whether this imperfection of the earth (*vitium terræ*)—for it cannot be said to be anything else—grows, or whether it has at once assumed its full globular size, whether it lives or not, are questions which I think cannot easily be explained. In their being liable to become rotten these things resemble wood. The following accident happened a few years ago to Lartius Licinius, a person of prætorian rank, and a minister of justice at Carthage, in Spain, as I myself know: he was biting a truffle and a denarius inside it bent his front teeth, from which circumstance it is evident that this natural production of the soil had originally assumed a globular shape, as is the case with those things which grow of themselves and are not able to arise from seed. Of a similar nature is that which is produced in the province of Cyrenaica called 'misy;' it is noted for the sweetness of its smell and flavour, and is more fleshy than the other kinds mentioned; that which is called 'ceraunium,' in Thrace, is of a similar nature" (xix. 3). Pliny then adds what has been already given from Theophrastus, mentioning the kind of fungi known by the Greeks as "pezicæ," which have no root nor stalk.

We are not anywhere informed whether dogs or pigs were ever employed in ancient times as aids in finding truffles. Dr. Badham refers to Dioscorides as stating that pigs dig up truffles in spring; but Dioscorides nowhere mentions pigs; he says simply that these products were dug up in the spring; had either of these animals been ever used in truffle-hunting we should most likely have had a notice to this effect amongst the fungus literature of the classical authors. Athenæus quotes a few words from Pamphilus about a certain grass called ὑδνόφυλλον, which was supposed to grow above the truffle and which indicated its presence (Athenæus, ii. 60).

Sprengel, in his commentary on Dioscorides (ii. p. 472), says that truffles are frequent in Laconia, and, referring to Walpole's Memoirs, states that the divining-rod used to be employed in their search. The story about the hydnophyllum is, of course, a mere fancy.

That thunder exercised some peculiar power in producing truffles was an opinion current among the ancients, and Plutarch has given us quite a long and curious dissertation in his 'Symposiacs' (book iv.) on the question, *διὰ τί τὰ ὕδνα δοκεῖ τῇ βροντῇ γίνεσθαι*, "Why truffles are thought to be produced by thunder." At a certain supper in Elis, where, as we have seen, large truffles were found, some of extraordinary size were set on the table; many of the guests seemed to wonder, whereupon some individual jokingly referred to the thunderstorms which had lately happened as being the cause of their appearance, meaning to deride the popular opinion as absurd; whereupon Agemachus, the worthy host, prayed the company not to conclude a thing was incredible because it was strange and wonderful, "for this ridiculous bulb, which has become quite a proverb for absurdity, does not escape the lightning on account of its small size, but because it has a property the exact opposite to it, just as the fig-tree and the skin of the sea-calf, as they say, and that of the hyena have, with which things sailors clothe the ends of their sailyards." After a little more dinner-talk, in which it was satisfactorily proved that truffles grow by means of a certain generating fluid contained in the thunder (*ὕδωρ γόνιμον*), which, being mixed with heat, pierces into the earth, turning and rolling it round, and produces these tubers; just as certain tumours called glands arise in the human body from some bloody humour or other; and that truffles do not resemble plants, are not nourished by rain, and have neither root nor sprout, but are quite free in the ground, and that, in consequence, they have the nature of earth which has been altered and changed in substance; after all this it was determined to change the subject of conversation from truffles, "lest," it is added, "that happen to us which once befell the painter Androcydes, for when he painted the gulf Scylla he represented the fishes with more artistic effect than anything else, so that people thought he cared more for the fishes than for his art; in like manner they will say of us, that we have discoursed about the origin of truffles simply because we take the greatest pleasure in eating them."

The influence of thunder-rains on truffles is referred to by Juvenal, who also speaks of the great estimation in which they were held:—

"Post hunc tradentur tubera, si ver
Tunc erit et facient optata tonitrua cœnas

Majores. Tibi habe frumentum, Alledius inquit,
O Libye; disjunge boves, dum tubera mittas!"—*Sat.* v. 116–119.

"Then if the spring its genial influence shed
And welcome thunders call them from their bed,
Large truffles enter; ravish'd with their size,
'O Libya, keep your grain!' Alledius cries,
'O bid your oxen to your stalls retreat,
Nor, while you boast such truffles think of wheat!'"

If Libya will only supply its splendid and far-famed truffles, Alledius cares nothing for its corn. African truffles, as we have seen, were supposed to be of the best quality.

Martial says that truffles are inferior only to boleti:—

"Rumpimus altricem tenero quæ vertice terram
Tubera, boletis poma secunda sumus."—*Ep.* xiii. 50.

"We who, with tender head, burst through the earth that nourishes us are truffles, a fruit second only to boleti." But here one would rather suppose that *tubera* denotes some fungus, not entirely subterranean, but growing, partly at least, on the surface.

Apollonius (Hist. Mir. 8. 46) quotes Theophrastus as saying that truffles (ὕδνον) grow harder in continued thunder weather.

Galen (De alim. facult. 2. 68, and elsewhere) says that truffles must be considered to be roots or bulbs, and that they possess little flavour, should be eaten with spices, and are harmless; have a thick but not a noxious juice. Different species of truffles were doubtless known to and eaten by the Greeks and Romans, among which, most probably, would be *Tuber æstivum*, *T. magnatum*, *T. bituminatum*, and, perhaps, *Melanogaster variegatus* (*Hypogæi*), which grows half out of the soil, and is eaten at Bath under the name of the "red truffle," and *Terfeyia Leonis**.

Mr. Bicknell often noticed truffles in the markets in N. Italy, as the *T. æstivum*, and the "Tartufi bianchi," "white truffle," which at Bologna was selling at 4 francs per pound, and is highly esteemed; this, he says, is the *T. magnatum*, Pico.

Cœlius Apicius, whoever the author of the work 'De Re Coquinaria Libri Decem' may have been, or whenever he may have lived, has not omitted fungi from his treatise. We have seen that both among the Greeks and Romans fungi

* The tubera of the ancients doubtless included subterranean or semi-subterranean edible fungi which do not belong to the order Tuberacei. Tulasne is inclined to refer the *misu* to the *Terfeyia Leonis*, which grows in April and May in oak-woods of the promontory Circeium, in Campania, which the people dig for and eat approvingly under the name of "Tartufo bianco:" it occurs plentifully in the sandy seashores about Terralba and Oristano in Sardinia. Tulasne adds, "Nil nisi radix quædam crassa fere videtur et veresimiliter immerito pro Tubere s. fungo subterraneo nonnullis habetur." *Hydnotrya Tulasnei* is dug up and eaten near Prague.

were usually eaten with various condiments; Apicius, however, is the only author who has mentioned the kinds of condiments used, and his work in filling up a gap in the domestic habits of the Romans is very valuable, notwithstanding his obscurities and the solecisms of his style. For an insight into the details of the Roman kitchen we shall look elsewhere in vain. Although his work is one of comparatively recent date, there is no reason to doubt that his cooking receipts may fairly be taken as specimens of those in use amongst the ancient Romans. He mentions *Fungi farnei* *, perhaps such as grew near ash-trees (*farnei=fraxinei*), *Boleti* and *Tubera*. Here are his receipts for cooking *Fungi farnei*:—(1) Boil them, dry hot, and serve with wine-sauce (*œnogarum*) and pepper pounded in liquor; (2) Use pepper, sweet boiled wine (*carœnum*), vinegar, and oil; (3) Another receipt:—boil in salt and serve with oil, wine, and pounded coriander seed.

For Boleti:—(1) Pour over them sweet boiled wine and add a bunch of green coriander; after boiling take out the bunch of coriander and serve. (2) Another receipt:—serve their stalks in liquor with salt. (3) Place the cut-off stalks (*tirsos*) on a dish, pour echinus eggs (?) (*uvam*) over them with pepper, lovage, a little honey, and oil.

For Tubera:—(1) Peel, boil, sprinkle with salt, and transfix with a twig (*surculo infigis*); partly roast, and place in a cooking-vessel with oil, liquor, sweet boiled wine, unmixed wine, pepper and honey; while boiling, beat up with fine flour, take out the twigs and serve. (2) Another receipt:—Boil, and sprinkle salt, transfix with twigs, partly roast, place in a cooking-vessel with liquor, oil, greens, sweet boiled wine, a small quantity of unmixed wine, pepper and a little honey, and let it boil; while boiling beat up with fine flour; prick the tubers that they may absorb, take out the twigs and serve. If you like you may surround the tubers with the omentum of a pig, then roast and serve.

Four other receipts for cooking truffle are give—mint, rue, leeks (?), cummin, seseli, and parsley being the ingredients not mentioned in the above receipts (Apicius, 'De Re Coquin. Lib. X.,' pp. 154–156, ed. Chr. T. Schuch, 1874).

Under the name of *sfonduli*, *funguli*, or *spongioli* Apicius is supposed by some writers to be referring to the Morel (*Morchella*), the modern Italian name "spongiole" preserving to us the tradition of its identity. This is most probable. Apicius gives several receipts for cooking morels, which do not differ in any particulars from those he gives for serving funguli fainei (see p. 65 of Schuch's edition).

The following Table, in which I have given the various Greek and Latin names of fungi, may be found useful:—

* Some editions read *faginei* instead of *farnei*.

Greek and Latin Names of Fungi, &c.

Greek.	Latin.	Derivation.	Species or meaning.
ἀμανῖται, ῶν (*m.*), Galen.	.....	Unknown.	The general name of *A. pratensis* and other edible fungi. Mod. Grk. μανιτάρια.
ἀγαρικόν (*n.*).	agaricum.	From Agarum in Sarmatia.	*Polyporus officinalis*.
ἄσχιον (*n.*)*.	.....	Of Lithuanian origin, Wászkas "a fungus." *Cf.* Mod. Greek ἴσκα, Pelasg. ἐské, a fungus. *P. fomentarius*.	A name of the truffle, generally called ὕδνον.
βωλίτης, ου (*m.*), Galen.	boletus.	βῶλος, "a clod," a round mass = Lat. *gleba*, perhaps in allusion to the ball-like form of the young fungus.	*Amanita Cæsarea*.
ἴτον (*n.*).	.....	Unknown.	A Thracian name of a truffle.
κεραύνιον, ου (γερράνειον?) Theophrastus.	ceraunium (Pliny).	κεραυνός, thunder.	A name of a truffle which was thought to grow more especially after thunder-showers.
μίσυ,υος, & εως (*n.*).	misy (Pliny).	Of Egyptian origin; the word also denotes metallic efflorescence of copper-ore of a golden or yellow colour (Dioscor. v. 116).	The name of some highly esteemed truffle in the province of Cyrenaica.
μύκης, ητος, or ου (*m.*) (ῠ).	fungus = sfungus = σπόγγος "a sponge," *cf.* spongiole, the present Italian name of the morel (*Morchella*).	akin to μῦκος (mucus), "slime."	The general Greek and Latin name of any kind of fungus.
πέζις, ιος (*f.*). πέζιξ, ικος (*f.*).	pezicæ (Pliny).	πέζα, "the foot," "bottom," "base," that which rests on its base, "sessile."	Various kinds of Puff-balls, *Bovista* and *Lycoperdon*. *Cf.* the modern Italian name of *vescia*, "toadstool," "puff-fist."

* According to Wharton ('Etyma Græca,' pp. 30 and 61), ἄσχιον is etymologically allied to ἰξός, "bird-lime," Lat. *viscum*, English "wax;" with this idea the Greek word μύκης, "a slimy sticky thing," may be compared.

One more Latin name, viz. Helvella, requires a short notice. Helvella or Helvela, which the grammarian Festus etymologically explains as "olera minuta," *i. e.* small garden herbs (helus=olus), is used by Cicero (Ep. ad Fam. vii. 26) apparently to denote some kind of fungus. From Cicero's letter to Gallus it would seem that the fashion of eating fungi, which, as we have seen, is considered by Pliny to have been one of rather recent date, originated from a desire to substitute some dainty kind of food for that which the "Lex sumptuaria" (the act which regulated the expenses of the table) forbade in the case of certain expensive articles of animal diet. Products of the soil were not included in the act; hence, as Cicero tells us, the dainty feeders of his day devised all modes of cooking vegetable food in order to make it tasty; and the great orator accounts for an illness which troubled him by a too free use of such rich diet. The "Lex sumptuaria," simple enough apparently, was, after all, a fraud in his case; he had abstained from oysters and murenæ, but not from highly-seasoned vegetables. "Nam dum volunt illi lauti terrâ nata, quæ lege excepta sunt, in honorem adducere, fungos, helvellas, herbas omnes, ita condiunt, ut nihil possit esse suavius." "While those elegant eaters wish to bring into high repute the products of the soil which are not included in the act, they prepare their fungi, helvellæ, and all vegetables with such highly seasoned condiments, that it is impossible to conceive anything more delicious." It is not improbable therefore that the extensive use of fungi as a favourite article of food among the rich Romans is to be attributed to some extent to the "Lex sumptuaria," which is ascribed by Aulus Gellius to M. Licinius Crassus in the year of Rome 643, and that in the time of the emperors the fashion became still more common.

The use of the word *helvella*, proposed by Linnæus and retained by modern mycologists, to denote the genus which it represents, is as arbitrary and irrelevant as the other words which he has transferred from classical writers.

VI.—*Descriptions of some new Asiatic Longicornia.*

By Francis P. Pascoe, F.L.S.

Mr. H. Pryer having recently sent a small collection of insects from Ellopura, in North Borneo, containing a few undescribed Longicorn beetles, I have taken the opportunity in publishing them of adding a few unnamed eastern species