and a measured volume, corresponding to exactly the quantity of extract used for the assay, tested with permanganate. The volume of reagent used this time is deducted from that used in the assay as a correction. From the net permanganate the weight of pure gallotannic acid which it would oxidize is calculated on the basis of standard experiments, and from this weight the “percentage of tannin” is deduced. The method is purely empirical, and the results are of no value unless obtained according to a rigorously prescribed mode of procedure. Of individual tannins that of the gall-nuts, known as *gallotannic acid,* is best known. For its pre­paration (according to Pélouze) powdered gall-nuts are placed in an apparatus for extraction "by displacement,” and in it soaked in a mixture of 9 parts of ether and 1 part of water for twenty-four hours. The liquid is then allowed to drain off, and the residue washed with aqueous ether. The liquid on standing separates into two layers,—a lower heavy layer, which contains the tannin, and an upper more purely ethereal layer, which contains gallic acid and other impurities. The lower layer is drawn off, washed once or twice with ether, and then evaporated to dryness at a gentle heat ; the tannin remains as a porous friable mass of a slightly greyish-yellow colour. This is the tannin of the pharmaceutist.

Such tannin is not by any means an absolutely unitary substance. Its solution, if allowed to stand in the presence of a ferment which is naturally present in gall-nut extract, or more readily if boiled with sulphuric acid, yields a large proportion of *gallic acid,* which is easily obtained in pure crystals. According to Strecker, glucose is formed at the same time, whence he viewed tannin as a glucoside (see Sugar). But this is now recognized as a mistake, since Hugo Schiff showed that *pure* tannin is only digallic acid, C14H10O9 = 2C7H6O5 (gallic acid) minus 1H2O. Pure tannin, according to Schiff, can be obtained by dehydrating pure gallic acid by means of chloride of acetyl. The tannin of the Chinese gall-nuts seems to be identical with gallotannic acid.

*Quercitannic Acid.—*The tannin of oak bark is certainly different from gallotannic acid, because it yields no gallic acid when boiled with dilute vitriol. Etti (*Jahresb. über die Fortschr. der Chemie* for 1880, p. 898) prepares it by extracting the powdered bark with dilute alcohol at a gentle heat, adding ordinary ether to the alcoholic extract, and shaking out the tannin with acetic ether. The acetic ether extract is distilled to recover the solvent, the residue filtered, and the filtrate evaporated to dryness to obtain the pure (?) tannin as a reddish-white powder of the composition C17H16O9. At 130- 140o C. it loses water and forms *phlobaphen,* C34H30O17, a brown solid insoluble in water but soluble in solution of the tannin. Quercitannic acid forms quite a series of such anhydrides : C34H30O17 ; C34H28O16; C34H26O15; C34H24O14. Some, if not all, of these are contained in aqueous oak-bark extract, and they play an important part in its application for tanning. According to Etti, quercitannic acid is a tri-methyl substitution-product of digallic acid, C14H10O9 minus 3H plus 3CH3=C17H16O9.

Besides these two tannins, those of coffee and cachou are the only ones which have been obtained in a relatively definite form.

TANNING. See Leather.

TANTALUM. A rare element closely allied to Niobium. See vol. xvii. p. 513.

TANTALUS, a hero of ancient Greek myth and legend. He was a son of Zeus and Pluto (“Wealth”), and became the father of Pelops, Proteus, and Niobe. He dwelt in splendour on Mount Sipylus near Smyrna, and was admitted to the table of the gods themselves. But he abused the divine favour by revealing to mankind the secrets he had learned in heaven, or by killing his son Pelops and serving him up to the gods at table. Another story was that he stole nectar and ambrosia from heaven and gave them to men. According to others, Pandareus stole a golden dog which guarded the temple of Zeus in Crete, and gave it to Tantalus to take care of. But, when Pandareus demanded the dog back, Tantalus denied that he had received it. Therefore Zeus turned Pandareus into a stone, and flung down Tantalus with Mount Sipylus on the top of him. The punishment of Tantalus in the lower world was famous. He stood up to his neck in water, which fled from him when he tried to drink of it ; and over his head hung fruits which the wind wafted away whenever he tried to grasp them. From this myth is derived the English word “tantalize.” Another story is that a rock hung over his head ready to fall and crush him. The tomb of Tantalus on Mount Sipylus was pointed out in antiquity, and has been in modern times identified by Texier with the great cairn beneath Old Magnesia; but Prof. W. Μ. Ramsay inclines to identify it with a remarkable rock-cut tomb beside Magnesia. The story of Tantalus contains a reminiscence of a semi-Greek kingdom which had its seat at Sipylus, the oldest and holiest city of Lydia, and one of the chief birthplaces of early Greek civilization. Of this ancient city the remains are still visible on the northern slope of Mount Sipylus, and about 4 miles east of Magnesia. They consist of sepulchral mounds, rock-cut tombs, and a small acropolis perched on an almost inaccessible crag which juts out from the nearly perpendicular limestone wall of Mount Sipylus. There was a tradition in antiquity that the city of Tantalus had been swallowed up in a lake on the mountain ; but the legend may, as Prof. W. Μ. Ramsay thinks, have been suggested by the vast ravine which yawns beneath the acropolis.@@1 This acropolis is too small ever to have been the seat of a great empire ; rather, like Pessinus and other great religious centres of Asia Minor, it may have been “ the seat of a priestly suzerainty maintained over the *hiero-douloi* [sacred slaves] of the surrounding district.” Connected as the city was on the one hand with the sea, and on the other with the capital of the ancient kingdom of Phrygia by means of the “royal road,” it was a natural meeting-place for Greek and Oriental culture. A com­parison of the art of Phrygia with the early art of Mycenæ and Olympia has fully confirmed the legend which con­nects the family of Tantalus with the Peloponnesus.

See Pelops, Phrygia, and a paper by Prof. W. Μ. Ramsay in *Journal of Hellenic Studies,* iii. p. 33 *sq.*

TAOISM. See Lâo-tsze.

TAORMINA (*Tauromenium*)*,* now an unimportant vil­lage of about 3000 inhabitants, is magnificently situated at the edge of a precipitous cliff 900 feet high on the east coast of Sicily, about 32 miles from Messina and the same from Catania. The original city was founded by a tribe of Siculi after the destruction of the neighbouring city of Naxos in 403 b.c. by Dionysius of Syracuse. It was built on the hill of Taurus, whence came the name *Tαυρομένιoν* (Diod., xiv. 58). In 358 b.c. the city was increased by the settlement of the exiled survivors from Naxos, which was only 3 miles distant ; and hence Pliny (*H*. *N.,* iii. 8) speaks of Naxos as having been the original name of Tauromenium. Owing to its commanding site, the city has frequently been the scene of important struggles. When with the rest of Sicily it passed into the possession of the Romans, it shared with two other Sicilian cities the privileges of a “civitas foederata.” During the Servile War (134-132 b.c.) Tauromenium was occupied by a body of rebel slaves, but was finally taken by the consul Rupilius, and the whole garrison slaughtered. In 36 b.c. it was one of Sextus Pompey’s chief strongholds in his war with Augustus, who after his victory established a Roman colony there. Under the empire it was a flourishing city, famed for its wine (Pliny, *H. N.,* xiv. 6) and red mullets (Juv., V. 93). In 902 a.d. it was taken from the Byzan­tine emperor by the Saracens, who called the place Moezzia. In 1078 it was captured by the Normans. A large number of ancient remains bear witness to its former importance. Fine autonomous silver coins of *c.* 300 b.c. exist, with *obv.* a laureated head of Apollo, and *rev.* a tripod, with the legend TAYPOMENITAN, and a magis­trate’s initials AT. The theatre is, next to that at Aspendus (Pamphylia), the best preserved in existence. It is Greek in plan, but the existing structure belongs mostly to the Roman period, and is specially remarkable for the preserva­tion of its lofty scena wall, and two large chambers which form entrance-porches to the cavea. It is excavated in an

@@@1 Legends of submerged cities and castles are common in different parts of Europe. It has been suggested that they are confused recol­lections of the ancient villages built on piles in lakes (Wood-Martin, *Lake Dwellings of Ireland,* p. 28).