perious and grumbling temper, the favour which he had enjoyed and his subsequent loss of it, joined to attract odium, his character and his book were rather roughly handled in his lifetime. Marbault secretary to Du Plessis-Mornay, Sully’s chief rival, wrote a very caustic criticism of the *Memoirs,* from which, though it re­mained in MS. till the 19th century, Tallemant des Réaux, the insatiable scandal-monger, compiled a not unamusing but distinctly calumnious article on Sully. Most of the stories it contains may be unhesitatingly disbelieved. At the same time Sully was by no means the ideally wise and good minister that he has not unfre­quently been represented as being. He was as faithful as a dog, and as surly. He grasped wealth and place to an extent not quite compatible with the idea of pure devotion to his king or his country, and his jealousy of all other ministers and all other favourites was extravagant and unceasing. Still there is no doubt that he was an excellent man of business, that, if not exactly what would be now called an incorruptible minister, he made no gains not sanctioned by the customs of the time, that he was inexorable in interfering with peculation and malversation on the part of others, that he opposed the ruinous personal expenditure which was the bane of almost all European monarchies in his day, and that he did much both as a man of war and as a man of peace to make France strong, united, and happy. His literary power, moreover, was far from small. Although the fantastic form of his *Memoirs,* after being diverting for a time, grows not a little wearisome, they have phrases and passages of great vivacity, which it is reasonable to attribute to Sully himself rather than to his spokesmen, and they show much grasp of administrative business.

The arrangement of the *Memoirs* so shocked the 18th century that in 1745 the abbé de l’Écluse re-edited or rather rewrote them in the ordinary form of narrative. This text has of course no interest ; the proper version with the commentary of Marbault may be found in the collection of Michaud and Poujoulat (vols. xvi. and xvii.).

SULMONA, or Solmona, a city of Italy, in the province of Aquila (Abruzzo Ulteriore), now reached by a branch line from the railway between Pescara and Aquila, lies, at a height of 1575 feet above the sea, at the junction of the Vella with the Gizio (a tributary of the Pescara), which supplies water-power to its paper-mills, fulling-mills, copper- works, &c. Besides its cathedral (S. Panfilo), rebuilt by Bishop Walther of Ocre (Frederick II.’s grand chancellor) in 1119, and several times remodelled in the 15th and 16th centuries, Sulmona has in Santa Maria della Tomba a good example of pure Gothic, and in Corpus Domini a striking instance of the vagaries of Gothic in its decay. The com­munal buildings are half Gothic, half Renaissance. A statue of Ovid, the most celebrated native of the city (which also gave birth to Innocent VII.), stands in front of the cancellaria. In the vicinity of the town is Monte Morrone, where Celestine V. lived as a hermit and founded a monastery of “ Celestines,” which remained till 1870, when it was transformed into a penitentiary. The popu­lation of Sulmona was 12,594 in 1861 and 14,171 in 1881 (commune, 17,601).

Sulmo, a city of the Peligni, is first mentioned during the Second Punic War (211 B.c.). It became a Roman colony probably in the reign of Augustus, and as a municipium it continued to flourish throughout the empire. Charles V. erected it into a principality, which he bestowed on Charles Lannoy of “Pavia” celebrity. It ultimately passed to the Corno and Borghese families. The bishopric is known as that of Valva and Sulmona.

SULPHUR.@@1 The sulphur minerals, which are very numerous and varied, arrange themselves under three heads,—(1) *metallic sulphates,* of which hydrated sulphate of lime, CaSO4.2H2O, gypsum, is the most abundant ; (2) *metallic sulphides,* a numerous family, including the majority of metallic ores, of which, however, only iron pyrites serves as a source for sulphur ; (3) *elementary sulphur.* In the organic world we meet with sulphur everywhere, this element forming an essential (though quantitatively subordinate) component of the albumenoids, a class of compounds contained in all vegetable and animal structures. Of organic materials rich in sulphur we may name animal hair (containing about 4 per cent.) and the essential oils of the onion, garlic, and mustard.

*Elementary Sulphur.*

This occurs as a mineral chiefly in the Upper Miocene deposits and in the Flötz, associated in general with gypsum, massive limestone, and marl. Commercially im­portant deposits are found in Sicily (provinces of Caltanis­setta, Girgenti, Catania), Italy (Latera and Scrofano, pro­vince of Rome), Spain (Teruel and Arcos), France (dept. Vaucluse), Transylvania, Poland (Swoszowice near Cracow), and Germany (Lüneburg, in Hanover). The exhalations of volcanoes include, as a rule, sulphurous acid, SO2, and sulphuretted hydrogen, H2S, which two gases, if moist, readily decompose each other into water and sulphur,—a circumstance which accounts for the constant occurrence of sulphur in all volcanic districts. Mt Purace in Colombia wears a cap of sulphur (derived from its own crater) which accumulates at the rate of about 2 feet per annum,— its superficial area amounting to 1435 square yards. The solfatara at Bahara Saphinque on the Red Sea is said to yield 600 tons of sulphur annually. The molten sulphur discharged from the crater of the Alaghez in the Armenian highlands forms solid excrescences, which the natives dis­lodge from their inaccessible positions by means of rifle­shots. A sulphur deposit near the Borax Lake in California is estimated to contain 20,000 tons. Most of the sulphur or brimstone of commerce comes from the rich fields of Sicily, where in 1884 the annual production had almost reached 400,000 tons. The mode of mining there adopted is by a network of horizontal galleries (tunnels) driven through the deposit ; the solid squares thus marked off are hewn out, a central pillar being left to support the roof. The total excavation is generally 100 feet high and from 25 to 50 wide ; not unfrequently the whole collapses. Down to a comparatively recent date all the work used to be done by hand, boys of eight to ten years of age being employed to carry the ore to the shaft and thence to the surface ; only where a mine has reached a depth of 325 feet or more is water-power, if available, resorted to. Since 1868, however, the ore at Grotta Calda at least has been raised by properly constructed shafts w’ith the help of steam-power, and this system is spreading.

The Sicilian ores are customarily classified as follows :—

Per 100 parts of ore Per 100 parts of ore

Sulphur present. Sulphur recovered.

Richest ores .... 30-40 20-25

Rich ores 25-30 15-20

Ordinary 20-25 10-15

The poor yield of actual sulphur is explained by the rather primi­tive method used for its extraction. A semicircular or semi-elliptical pit *(calcarone)* about 33 feet in diameter and 8 deep is dug into the slope of a hill, and the sides are coated with a wall of stone. The sole consists of two halves slanting against each other, the line of intersection forming a descending gutter which runs to the outlet. This outlet having been closed by small stones and sulphate of lime cement, the pit is filled with sulphur ore, whieh is heaped up considerably beyond the edge of the pit and covered with a layer of burnt-out ore. In building up the heap a number of narrow vertical passages are left to afford a draught for the fire. The ore is kindled from above and the fire so regulated (by making or unmaking air-holes in the covering) that, by the heat produced by the combustion of the least sufficient quantity of sulphur, the rest is liquefied. The molten sulphur accumulates on the sole, whence it is from time to time run out into a square stone receptacle, from whieh it is ladled into damp poplar-wood moulds and so brought into the shape of truncated cones weighing 110 to 130 lb each. These cakes are sent out into commerce. A calcarone with a capacity of 28,256 cubic feet burns for about two months, and yields about 200 tons of sulphur. The immense volumes of sulphurous acid evolved give lise to many complaints ; all the minor pits suspend work during the summer to avoid de­struction of the crops. A calcarone that is to be used all the year round must be at least 220 yards from any inhabited place and 110 from any field under cultivation.

The yield of sulphur, as seen from the table given above, is miser­ably small, but the scarcity of fuel in Sicily almost prohibits the introduction of any more rational method. As sulphur fuses at 114° C., high-pressure steam at once suggests itself as a suitable medium of heating. In the sulphur-works of Latera, in the pro­vince of Rome, the following apparatus (constructed by Gritti) is

@@@1 This chemical element has already been treated in its scientific aspects under Chemistry (vol. v. p. 498 *sq.).* The present article is intended to supplement what is there given, in the direction chiefly of practical applications.