masses which are evidently intrusive among other rocks, while elsewhere it occurs interbedded, usually in lenticular masses, associated with gneiss and crystalline schists. It is noteworthy that the serpentine is frequently crushed and brecciated, exhibiting polished slip-faces which are sometimes striated. The surface of an exposed mass of serpentine is generally barren, whence bosses of the rock are known in the Alps as “monts morts.” The origin of serpentine has been a subject of much dispute. It was pointed out by Sandberger and Tschermak that the altera­tion of olivine may give rise to this product, and pseudo­morphe of serpentine after chrysolite are well known to mineralogists. Professor Bonney and many other geo­logists regard serpentine as being generally an altered eruptive rock, due to the hydration of peridotites, such as lherzolite ; probably it may also result from the decom­position of olivine-gabbro and other rocks rich in mag­nesian silicates. Augite and hornblende may become altered to serpentine. On the contrary, Dr Sterry Hunt and certain other chemical geologists believe that serpentine has generally been formed as an aqueous sediment, prob­ably precipitated by the reaction of sulphate or chloride of magnesium upon the silicate of lime or alkaline silicates derived from the disintegration of crystalline rocks and found in solution in many natural waters. Serpentine is a rock of rather limited occurrence. Its principal localities in England are Cornwall, especially in the Lizard district, where it occupies a considerable area. The famous scenery of Kynance Cove owes much of its beauty to the vivid colours and brilliant surface of the serpentine. The rock is worked into vases, columns, mantelpieces, &c., and of late years has been used to a limited extent for the deco­ration of shop-fronts in London. The beauty of the Lizard rock is heightened by the white veins of steatite which traverse it, and in some cases by disseminated crystals of bastite, which glisten with metallic lustre. Much of the Lizard serpentine is of rich red and brown colour. Green serpentine is found near Holyhead in Anglesea. A singu­larly beautiful variety of mottled red and green tints, with veins of steatite, occurs near Portsoy in Banffshire, Scot­land. It is also found with chrome iron ore in the Shetland Islands. The green serpentine of Galway occurs in inti­mate association with crystalline limestone, forming the rock known as “ophicalcite” or “serpentinous marble.” Such an association is by no means uncommon ; but, though the beauty of the serpentine may thus be enhanced, its dura­bility seems to be impaired. On exposure to the weather the carbonate of calcium decomposes more readily than the silicate of magnesium, and hence the stone soon presents a rough eroded surface. The Galway rock comes into the market under the name of “ Irish green ” or “ Connemara marble.” Ophicalcites also occur in Ayrshire, Scotland, and in various parts of the Scottish Highlands; and the green pebbles found in Iona belong to this type of rock.

On the Continent serpentines are largely worked at Zöblitz and at Waldheim in Saxony. The famous rock of Zöblitz, mentioned by Agricola, is known to have been wrought for between three and four centuries, and is still extensively explored by open quarries and by subterranean galleries. The rock usually presents various shades of green and brown, red being very rare ; but its most in­teresting feature is the frequent presence of pyrope, or Bohemian garnet, which occurs scattered through the rock in dark red grains, that decompose on weathering to a green chloritic product. Very little of the Zöblitz serpentine comes to England, but it is common throughout Germany, and a good deal is sent to Russia and even to the United States. It has been used in the construction of the mauso­leum of Prince Albert at Frogmore, and for Abraham Lin­coln’s monument at Springfield, Illinois. The best known

of the Italian serpentines is the “ verde Prato,” which has been quarried for centuries at Monteferrato, near Prato in Tuscany. According to Capacci this serpentine is probably of Eocene age. It has been largely used as a decorative stone in ecclesiastical architecture in Prato, Pistoia, and Florence. A good deal of serpentine is found near Genoa and Levanto. The “ verde di Pegli ” is ob­tained from Pegli, not far from Genoa, while the “ verde di Genova ” is a brecciated serpentinous limestone from Pietra Lavezzara. Serpentine also occurs at various other points of the Apennines, in Elba, and in Corsica. The term “ ophiolite ” has been vaguely used to include not only serpentines but many of the rocks associated with the Italian serpentines. In like manner the term “gabbro,” derived from a locality near Leghorn, was at one time used as a general name for serpentine and its associates, though now usually restricted to a rock composed essentially of plagioclase and diallage. It is notable that this true gab­bro is often found in company with serpentine.

Serpentine is found in numerous localities in the Alps and in France. An elegant variety is quarried at Épinal in the Vosges, and a beautiful ophicalcite is worked at St Véran and Maurins, in the department of Hautes-Alpes. The serpentine of the Ronda Mountains in Spain has been described by Mr J. Macpherson. In North America serpentine is so extensively distributed that only a few localities can be mentioned. It is found at Syracuse in New York; on Manhattan and Staten Islands; at Hobo­ken in New Jersey ; at Newport, Rhode Island ; at New­buryport, Massachusetts; at Westchester, Chester county, and at Texas, Lancaster county, in Pennsylvania. It also occurs between Clear Lake and New Idrea in California. A fine ophicalcite has been obtained from near Milford and New Haven in Connecticut, and a beautiful variety has been worked at Port Henry, Essex county, New York (Dana). The Canadian eozoon occurs in a serpentinous limestone.

See Geology, vol. x. pp. 228, 232 ; Marble, vol. xv. p. 528 ; and Mineralogy, vol. xvi. p. 414. The literature of the Italian and Saxon serpentines is rather voluminous. Of recent English writings on serpentine reference may be made to Bonney, in *Quart. Journ. Geol. Soc.,* London, xxxiii. p. 884, xxxiv. p. 769, xxxvii. p. 40, xxxix. p. 21, and in *Geol Mag.,* [2] vi. p. 362, [3] i. p. 406 ; and to Collins, *Quart. Jοurn. Geol. Sοc.,* xl. p. 458, and *Geol. Mag.,* [3] ii. p. 298. Sterry Hunt has written an elaborate paper in *Proc. Roy. Soc. Canada,* 1883, sect. iv. pp. 165-215. See also Teall, *British Petrography,* 1886, and Becker, in *Amer. Journ. of Science,* May 1886. (F. W. R\*.)

SERPENTS. See Snakes.

SERPUKHOFF, a district town of Russia, in the govern­ment of Moscow, 61 miles south of the city of Moscow, with which it is connected by rail. Built on high cliffs on both banks of the river Nara, 3 miles above its junction with the Oka, Serpukhoff has of late become an important manufacturing and commercial town. The aggregate pro­duction of its manufactories (cotton and woollen stuffs, paper, leather), which employ about 4000 hands, in 1880 was valued at about £300,000. The surrounding district has several large cotton and woollen factories, with a yearly output worth about £1,000,000. Petty trades are also much developed in the neighbourhood,—textile fabrics, furniture, and earthenware and porcelain being produced by the peasantry. The manufactured goods of Serpukhoff are sent—mostly by rail—to the fairs of Nijni- Novgorod and the Ukraine, while large amounts of grain, hemp, and timber, brought from the east on the Oka, are discharged at Serpukhoff’ and sent on to Moscow and St Petersburg. The goods traffic by rail and river showed in 1880 an aggregate of 5,400,000 cwts. (exclusive of timber floated down the Oka). Notwithstanding its recent prosperity and the sums bequeathed to the municipality by wealthy merchants, Serpukhoff improves but slowly. The cathedral (1380) was rebuilt in the 18th century; of