stone by land carriage, for even short distances, on a large scale is a very serious matter; in fact, it can only be done at a price which renders its use almost prohibitory in this quarter of the kingdom for common purposes. For this reason I imagine that the excellent stones of Yorkshire, though adapted for house purposes, and the styles of house decoration recently introduced into London, have hardly yet reached their proper position among materials. If they could be carried at a moderate price, if they could be brought here in such a form as to be immediately available, I have no doubt they would be welcomed, and I am satisfied, both from their lithological character and their general properties, that they would be exceedingly valuable, and recognised as superior for many purposes to any of the limestones now in use, for they possess the advantage of resisting fire. The reason why limestones do not resist fire is very clear. They become converted into lime, and fall to powder when touched with water. The reason why some sandstones, like the Reigate, do not injure by exposure to heat is, that the proportion of lime in them is so small that the texture of the stone is not injured when exposed to burning, and they only become more porous than they were before. I think what I have just observed answers two or three questions with respect to the important subject of fire-resisting material.

Passing from the varieties of Yorkshire stones, which form a large and important series belonging to the carboniferous system of rocks, and including the members of that series north of Derbyshire and Nottinghamshire, I will say a few words concerning the grit stones which are found in the two latter counties. These stones are of the first importance, and are not sufficiently understood out of the immediate district in which they are got. The remarks of Mr. Tarn on that subject are deserving of every attention from those interested with respect to buildings in the metropolis.

The group of stones used in the neighbourhood of Lancashire, referred to by Mr. Seddon, is, of course, very important. He also referred to the Bath stones, which he regards as of great utility, and of course, judging from the enormous extent to which those stones continue to be used, from the many excellent properties they possess, of which perhaps the great facility of working is amongst the most important, they are really very valuable materials. There is, I believe, no doubt that the better qualities of Bath stone are amongst the best of that class of oolites that can be used. They must not be compared with Portland, for they do not approach it in the more valuable qualities, but they are sufficient for other purposes. The Ancaster and Ketton stones are other varieties, and some of them may have properties which render them locally more applicable than the Bath; but none of them approach the Portland, and they cannot even be regarded as belonging to the same class of stones: the Portland, though it is a true oolite, passing into mere rag stones, and being sometimes entirely made up of fragments of fossil shells, and corals. It is, without exception, a composite material, consisting, however, almost entirely of carbonate of lime, with a very small proportion of silica. The silica does not alter the nature of the stone, but perhaps has something to do with its remarkable hardening quality. Some buildings exhibit remarkable examples of durability against the effects of London atmosphere. I remember my attention being called to the stone exterior of Greenwich Hospital by the late Sir Charles Barry. He well knew the value of Portland stone, and he pointed out that material as even excelling in its properties some of the common varieties of marbles occasionally used in a dry climate like that of Italy. Since then I have myself compared the appearance of such buildings as Greenwich Hospital, where the stone has been fairly exposed for a considerable period, with such buildings as Milan Cathedral, composed of marble, and also with some of the great buildings of Greece and Italy, constructed of the compact limestones found in those countries, and almost approaching marble in their properties. As far as my own ideas of colour and effect go, the Portland stone loses nothing by the comparison. I repeat now what I have said in my paper, that for all practical purposes we have in the better qualities of Portland one of the finest materials amongst the limestones that can be found in any part of the world.

The material called *clunch* has been referred to. It is nothing more than the lower part of the chalk, containing a good deal of argillaceous and siliceous impurities. The per centage of these is sufficient to alter the character of the material. As a stone clunch is not very porous, but it holds in its natural state as a rock an enormous per centage of water. When dried and used either for the inner walls of buildings or for parts always sheltered from weather, it is a very useful material. It was adopted rather largely in the churches of the 13th, 14th, and 15th centuries, and indeed in most mediæval churches in the middle east of England. A great part of the interior of Ely Cathedral is constructed of this stone, and no doubt it would have stood exceedingly well if it had not been for Cromwell's soldiers; it suffered more, at any rate, from violence than from exposure and time. This stone is useful, but cannot bear exposure to the external atmosphere in a climate like that of England, and no builder of the Middle Ages would have used it under such circumstances. Where it is found to have stood well it has been protected by some harder and more durable stone placed outside it as a facing. Thus protected, clunch is as good for interior work as even Caen stone.

Passing from the extremely soft materials amongst the limestones to the extremely hard ones, I have several notes of remarks which have been made with regard to marbles. Professor Donaldson alluded to this subject, and suggested that I should give some account of the peculiar organization of marble. There is a great difference in the composition of marbles, in every sense, and it is as desirable that the architect should have a knowledge of the different varieties of limestones called marble, as that he should be familiar with limestone itself. Some of the materials called marbles are nothing more than limestones hardened, and sufficiently compacted to be able to take a sort of imperfect polish. These are rather largely used for ornamental purposes and chimney pieces. We pass from them through stones exhibiting an almost indefinite variety of feature and colour—some with one kind of vein or streak, and some with another. Some are coloured with iron, some with magnesia, and some with copper, in various ways. Some contained so large a quantity of carbon as to be brilliantly black. We pass from these to a particular variety of limestone crystallized more perfectly, but not into transparent crystals, and called *par excellence* marble. I have seen specimens of true marble distinctly stratified, and these, though not applicable for statuary purposes, might have much value for the architect. For his purposes, indeed, they may be better than statuary marble of a finer kind, for they are harder, and more compact. In them, however, the lines of stratification are visible, and there are sometimes particles of iron or other impurity collected together near the planes of stratification. These stones have been so altered by metamorphic action in the interior of the earth as almost to have lost their texture, but it still remains half concealed. Generally speaking, in large districts of limestone, where the rock has been long acted upon by chemical force producing change and metamorphosis, we find large crevices filled up with *saccharoidal* limestones, or true marble, having that peculiar texture which distinguishes statuary marble. This character, though not very common, is exhibited in varieties of marble which have been long known and extensively worked in Greece and Italy. Similar material has been introduced from Algiers, and even from Ireland, and specimens have been found in the neighbourhood of the Pyrennees. But wherever I have traced true statuary marble it has always been in similar veins. This, then, is the essential difference between marble and limestone. Limestone becomes marble when in a peculiar form of semi-crystallization. When perfectly crystallized it takes the form of spar, but in this state does not appear to be very abundant. Such spar is, however, common enough in the veins and fissures in limestones, and even marbles. Limestone thus puts on various forms in the earth according to the changes to which it has been exposed, the processes that have acted upon it, and the foreign substances or impurities that were present in the original deposit of calcareous mud from which the whole was derived. The conditions tending to produce statuary marble are not distinctly known, but they do not seem to have been very common. On the contrary, the conditions under which the common coloured and fossil limestones were formed must have been common enough at all times. Of the different marbles, the Parian and Carrara are the two types, and they, are sufficiently distinct. The marble of India resembles the Parian. We have reason to suppose that, like the fine statuary marbles of Italy, it is obtained entirely from veins. The question, then, of Mr. Donaldson may be considered as answered, so far as I am able to answer it. but the subject is one which deserves very careful consideration.

Professor Donaldson also alluded to the question of alabaster. I mentioned in the paper that there are two varieties of stone that go by the name of alabaster, the one being the delicate white and beautifully coloured *sulphate of lime*, chiefly obtained in the neighbourhood of Volterra, on the road between Leghorn and Rome. The finer kinds of this material are only found in large blocks, but the more common kinds, called gypsum, are obtained abundantly in bands in many parts of England, France, and Italy. The finer as well as the commoner kinds of alabaster are all of the same mineral composition. But, besides these, there is a substance known as "Oriental alabaster," much adopted formerly, and re-introduced lately, for ornamental purposes in Rome. It was this material which Mahomet Pasha sent to Rome for the ornamentation of the magnificent basilica of San Paolo, and the shafts constructed of it are amongst the finest specimens of the material that have been sent out of Egypt. Specimens of Oriental alabaster were exhibited here in 1851, and others at the Exhibition just closed in Paris. They are varieties of stalactites, or stalagmites. They are exceedingly transparent, and that is connected with the process of their formation. They are formed by the slow evaporation of water, containing carbonate of lime, dropping into or upon the floors of caverns into which this water has drained.

I was surprised to hear Professor Donaldson speak of porphyry as a rotten substance, and mention that clay fills up the cracks in this remarkable rock. I do not agree with the expression, "clay filling up the cracks" in porphyry. No doubt all rocks made up of crystals embedded in a base less pure than the crystals themselves are composed of materials, partly harder, and partly not so hard, as the average of the mass. Porphyry is composed of materials very hard, but some of them are certainly less hard than others; therefore, using the same materials to polish the whole surface of the stone, you get a higher polish on the