same subject by Dr R. Rubenson,* containing a series of valuable observations made at Rome on the place of maximum polarisation, and on the intensity of the maximum polarisation at different hours of the day. Important observations on the polarisation of the atmosphere have also been made by M. Liais and M. Andres Poey, and the value of such observations, in determining the height and constitution of our atmosphere, has been universally recognised.

Under this impression, the author was induced to submit to the Society the rest of the four years' observations which he made at St Andrews, which, along with those already published, all exhibit the optical condition of the atmosphere during many days of every month of the year.

2. Notices of some Ancient Sculptures on the Walls of Caves in Fife. By Professor J. Y. Simpson.

The county of Fife abounds in caves or “weems”—a derivative from the Gaelic name for caves—and their existence gives a title to the earldom of Wemyss. Some of the caves in Fife are historical, as St Rule's at St Andrews, St Adrian's near Elie, and St Margaret's at Dunfermline. St Serf of Culross, the great patron saint of the west of Fife, is described by one of his biographers as having usually spent the forty days of Lent in a cave named, as such retreats often were, the *Desertum*. This cave at the *Desertum*—(or Dysart, to use the modern form of the name)—was used as a church up till near the time of the Reformation. About two miles eastward of Dysart, and near the village of Easter Wemyss, there is a range of large caves, seven or eight of which are at the present time open; but several more probably exist, having their openings covered over with debris. They stand about 15 or 20 feet above the level of high tide. Some of them are 80 to 100 feet in length, and of corresponding height and breadth. Two or three of them are perfectly dark, and require to be entered with candles. Last summer, when on a professional visit to Fife, Dr Simpson made a hurried visit to two of these caves, along with Dr Dewar,

* Acts of the Royal Society of Sciences of Upsal. Series iii. tom. v.

and saw some rude sculpturings in one of them. This discovery induced him to return for further search, accompanied by his friends, Drs Joseph Robertson, Duns, and Paterson, when two or three new caves were visited, and their walls found to be covered at different points with representations of various animals, figures, and emblems.

The cave sculpturings in Fife are of special interest to the Scotch archæologist, for this reason, that they exactly resemble, in type and character, the carvings on the so-called Sculptured Stones of Scotland. In his magnificent first volume on the Sculptured Stones of Scotland, Mr Stuart has collected one hundred and fifty examples; and latterly perhaps fifty more have been discovered. These Sculptured Stones extend along the whole east coast of Scotland, from the Forth northwards. Only two have been found south of the Forth. In general ornamentation, they resemble the sculptured stones of the west of Scotland, Ireland, Wales, and England; but the peculiarity of the Scotch stones is, that they have additional figures and symbols upon them that have been seen nowhere else in the world. These peculiar and characteristic symbols consist of the crescent or crescent-ornament, sometimes intersected with the V sceptre; of the so-called spectacle ornament—a double set of circles connected by middle lines—with or without the Z sceptre; of figures of elephants, fish, serpents, mirrors, combs, arches, or torcs, &c. The arrangement of these symbols upon the stones is in no two instances alike. On the oldest stones they are cut upon unhewn blocks, without any surrounding ornamentation. In the Sculptured Stones of a later date, they are cut in a raised form, with surrounding ornamentations, and often combined with figures of the Christian cross. Other figures are found carved on these stones, as portraits of priests and dignitaries, processions of men; the sacrifice of the bull; war and hunting scenes; animals, native and foreign, as the lion, tiger, camel, and monkey; the battling and devouring of men by wild animals; men with monster heads of beasts and birds; representations of dragons and monsters, &c. There is one instance of the representation of a boat and another of a chariot, at Meikle.

These rude sculpturings have, with one exception, been previously to the present time found only on sepulchral stones; but in the Fife caves they exist in great abundance on the cave walls.

These walls are usually comparatively smooth ; and in many places, though not in all, they retain the figures cut upon them. The cave figures consist of animals, as the elephant,—exactly of the form seen on the Sculptured Stones,—the deer, the dog, the swan, the peacock, fish, serpents, and monsters. On them we see also representations of the mirror, comb, and arch or horse-shoe. No perfect example of the crescent ornamentation exists in these cave sculpturings ; but many specimens of the spectacle ornament are to be found on their walls, both with and without the intersecting Z sceptre.

One of the cave-figures is specially interesting, from the fact that it is the exact counterpart of the only analogous carving found on aught except a monolith, viz., a scale of silver armour presented to the Antiquarian Museum of Scotland by Mrs Durham of Largo, and whose history is this :—A man still living in Fife—a huckster—acting, it is said, upon an old tradition, that a knight lay buried in silver armour in a small barrow called Norrie's Law, stealthily dug into it, found in reality the silver armour, and removed and sold it in pieces to the amount, it is alleged, of four hundred ounces. By the time this spoliation was discovered, the silver armour was all melted, except a few fragments. One of these fragments is a scale, having cut upon it a spectacle ornament traversed by the Z sceptre, and having appended to one end of it the head and shoulders of a dog, as in some modern Orders of European knighthood. Precisely a similar figure, with the appended dog's head, is carved upon the interior of one of the Wemyss caves.

On the walls of some of the caves there are crosses of various forms ; and in two or three parts appearances somewhat resembling letterings, and symbolic arrangements of figures or hieroglyphics. On the walls of St Adrian's caves are lines which some have believed to be half obliterated Runes ; and the Rev. Mr Skinner of St Andrews has a loose stone from this spot which presents, he thinks, Runic characters.

Among the cave sculpturings at Wemyss, there is a figure of a man of diminutive form ; and Mr Stuart has traced among them faded outlines of a full sized human figure, apparently tailed, as if he formed one of the provokingly missing links which some enthusiastic ethnologists are so anxiously and vainly searching after.

The caves of Fife, both those that have sculptures and those without them, have almost all occasional complete perforations or holes cut in their sides, and in their floors and roof, capable of allowing a thong or rope to be passed through, as if they were intended to suspend or to affix objects.

The age of these cave-sculptures can only be fixed by approaching the age of the analogous figures upon the Sculptured Stones. The earliest of the Sculptured Stones are perhaps very old—possibly as far back, if not farther, than the period of the Roman invasion. In opening last year a large cairn at Linlethan in Forfarshire, a figure of the elephant, exactly similar to those existing on our sculptured stones, was found on a stone lying upon the covering of the stone-enclosed cist. This cist contained a bronze weapon and an urn. The elephant sculpture was as old, therefore, as the era of urn burial and bronze weapons—except the carved fragment of stone had got by pure accident into its present position when the barrow was opened twenty years ago. The ancients sometimes buried both stone and bronze relics with their dead, after apparently they had iron instruments and weapons. But if the bronze dagger at Linlethan was a weapon used by the person buried under the cairn, the date is probably pre-Roman. For when Agricola invaded Scotland in A.D. 81, our Caledonian forefathers had apparently already passed through the bronze era, as, according to Tacitus, they fought the Roman legions with swords “long and without a point;” in other words, with iron swords.

But most of the Sculptured Stones, particularly the more elaborate varieties of them, were of comparatively later date, and were probably erected as late as the eighth or tenth century. An elaborate specimen found buried in the old churchyard of St Vigean, having upon its surface the spectacle ornament, the crescent, the mirror, the comb, &c., in raised figures, has an inscription on it, which is probably the only Pictish inscription and sentence now remaining. It speaks of the stone as erected to Drosten, the son of Voret; and a Pictish king Drosten was killed in the battle of Blathmig or Blethmont—a mile or two off—in the year 729, as we learn from the Annals of Tighearnach. The Fife cave sculptures at Wemyss are mixed up with numerous forms of crosses, particularly of equal-limbed Greek crosses, showing that they were cut after

the introduction of Christianity; and in one or two spots there are appearances of Christian monograms. Within St Adrian's cave at Caplawchy, near Elie, there are many crosses on the walls; stone seats cut out, &c.; but no animals or symbols.

The purposes for which they were cut, and the meaning of the mysterious symbols on the caves and sculptured stones, are archæological enigmata that no one has yet solved. As long as they were found on sepulchral monoliths only, they were supposed to be hieroglyphic or heraldic *funeral* inscriptions or emblems. This doctrine is so far gainsaid by this late discovery of them on the walls of caves. But possibly they may be sacred symbols of some description, or of some unknown form and meaning. For around and upon his gravestones man has always been in the habit of cutting emblems of his religion when he has cut anything; things sacred and things sepulchral being found united in his earliest carvings.

Other Scotch caves have sculptures cut upon them. The so-called Cave of Bruce, in the Island of Arran, has been found by Dr Mitchell and Mr Stuart to have deer and serpents carved on its walls; and many years ago, within St Maloe's cave in Holy Island, Dr Daniel Wilson found ancient Scandinavian inscriptions written in Runes.

In many counties in Scotland, both on the sea shore and inland, there exist large caves, the walls of which require to be now carefully examined, in order to find if our ancient forefathers had carved upon them any such emblems and sculpturings as have been traced in Fife. The Fife caves have formerly been inhabited. Dr Simpson showed from one of the Wemyss caves a collection of bones which had been split to remove their marrow, like the bones found in the old Danish midden heaps, &c. Among the bones were those of the deer, sheep, ox, &c. There were also shells of limpets, &c.; and microscopic remains of cereals were found in cavities in the rocks that had been apparently used as rubbers or querns. Perforated stones and two implements from the tyre of the deer's horn were picked up from the rubbish upon the floor; but the debris of these caves requires to be most carefully searched, before all that could be ascertained on this point becomes known to archæologists. In Scotland, there is one cave still occasionally

inhabited, at Wick, and within which Dr Mitchell has seen living a family of eight or ten. But cave men are common elsewhere. Mr Barnwell has lately recorded the curious fact, that in the neighbourhood of Charters there are at present living, in caves, 150,000 men, in the very centre of France. In Africa, Asia, &c., caves are still inhabited, as they were by the Troglodites and Horites of old.

In England, we know that in archaic times caves were inhabited by the men of those distant ages, such as Kent's Hole, the Brixham Cave, the Kirkdale caves, &c. In these caves the bones of man have been found with his stone weapons, and along with them the bones of long extinct animals, as the mammoth, the cave bear, the hyæna, &c. But in his earliest and rudest times, man has been a sculpturing and painting animal; and his old attempts in this way may yet be found upon the walls of those ossiferous English caves. Sir Charles Nicolson had stated to Dr Simpson, as a proof that man, in his savage state, was a sculpturing being, the curious fact, that at the head of Sydney harbour rude sculpturings of the kangaroo, &c., had been found cut on the rocks, when the turf was removed in building operations there. Mr Graham had likewise informed him that at the Cape, the Bushmen, one of the rudest existing races of humanity, live much in caves, and constantly paint on the walls of them the animals in their neighbourhood, and sometimes battle and hunting scenes, always in profile. Mons. Lartet has lately shown that the caves of Perigord have been inhabited by archaic man, at a time when apparently he had no metallic weapons, when the reindeer still inhabited the south of France, and when even the dog was not yet a domestic animal. Yet amongst the relics found in these Perigord caves have been discovered sculpturings upon stone, bone, and ivory, of different animals; and latterly a rude sketch of the mammoth itself. All this entitles us to hope that, if these cave researches are prosecuted, we may yet find on the cave walls sculpturings done by man in the most ancient times, and containing fragments of his earliest history.

[Dr Simpson's communication was illustrated by numerous drawings of the Fife cave sculptures, made by Mr Drummond, R.S.A., and Dr Paterson of Leith.]