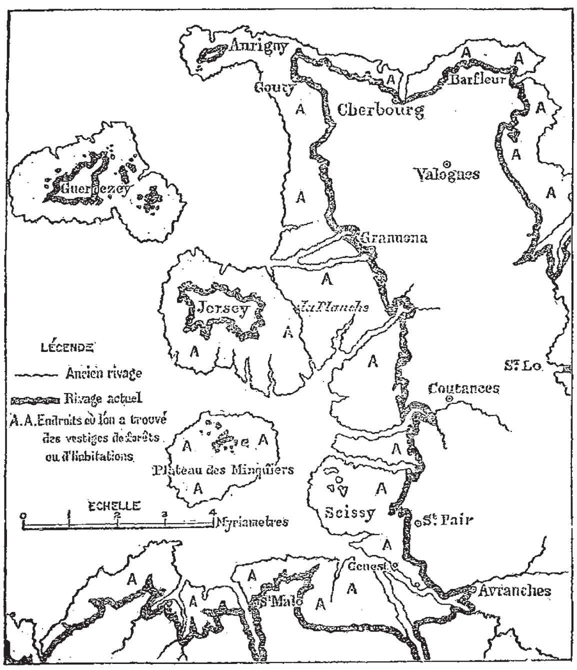
prove that at the bay of Mont Saint-Michel the coast has been submerged within a period subsequent to the Roman domination. Rouault, Curé de Saint-Pair, says :—"About the year 400 there was in the Basse Normandie towards the west a large forest named Scicy, extending from the rocks of Chausey to the Mont de Tomba"—now Mont Saint-Michel. In the twelfth century the troubadour Guillaume de Saint-Pari referred to this submerged forest in a quaint bit of old French, which may be freely translated thus :—

"Not far from Avranches, on Brittany's shore,
Quokelonde forest spread out of yore ;
But that famous stretch of fertile land
Is hidden now by the sea and the sand,
No more will its venison grace the dish—
The ancient forest yields nought but fish."

This forest of Scicy, or Scissiacum, was said to have been full of wild beasts—"præbens altissima latibula ferarum"—and peopled by half-savage natives, to whom succeeded, in Christian times, a number of Anchorites who sought retirement there, far from the tumult of the world. The parishes of St. Louis, Mauny and La Feuillette have disappeared beneath the waves since the 13th century. A story is told of a priest of the diocese of Dol, that, having in 1685, learned by tradition that there was formerly, in the place then (and now) occupied by the sea, a parish named St. Louis, informed the Court of Rome that this living was vacant "*per obitum.*" Upon this they consulted the registers and found actually that there had been presentations to this living by former Popes. A priest of Basse-Bretagne was therefore appointed and he departed at once to take possession. But on arriving in sight of Mont Saint-Michel, what was his surprise when he was shown on the sands and in the sea, the place where was formerly situated his pretended parish.



There is every reason to believe that the whole of the Channel Islands were, at one time, part of the mainland of France and there is positive proof of the island of Jersey having been so. There are certain existing manuscripts belonging to the monastery of Mont Saint-Michel, which tell us that, in the sixth century, the district of Jersey was separated from the mainland of Coutances by only a narrow rivulet, bridged by a single plank which the inhabitants were bound to keep in repair for the Archdeacon of the mother church to pass over on his periodical visitations. In the register of the taxes of the island, there is an entry referring to rents received from various persons for the privilege of allowing pigs to feed on the acorns in the forest of St. Ouen—now the bay of that name—but, M. Quenault's informant adds rather unnecessarily, "elles ne sont plus payées aujourd'hui !" There are also many other manuscripts quoted and instances given of the great alteration that has taken place in the outline of the Channel Islands and the coasts of France, of which there is given an exceedingly interesting map by M. Deschamps-Vadeville—a *fac-simile* of a chart copied in the year 1406 from one of a much older date. This map, which we reproduce in miniature, shows the coast line from Cape Finisterre down to St. Malo to have been, at that time, from six to twelve miles farther west than at present. The island of Jersey is part of a peninsula, ten or twelve miles wide, stretching out from the French coast to a point some three or four miles west of that island as it at present exists. Guernsey also is shown to have then been considerably larger than the Isle of Man now is. Throughout the whole area of this departed coast, are depicted the positions of some score of places where evidences of the existence of submerged forests have been discovered.

The sinking of the land which has occurred within the periods of history, has occurred only between the parallels of 10° S. and 55° N. lat. North of this, it is gradually becoming more and more elevated. Of this phenomenon M. Quenault gives an equally interesting and detailed account, with numerous facts and voluminous evidence which cannot be recounted within the limits of the present article. M. Quenault concludes—with regard to the depression of the land—"One gathers from all these evidences, that the movement, since the eighth century, has been about two metres a century. If it continues at the same rate for ten centuries more, the peninsula of Cotentin will be an island and all the ports of La Manche will be destroyed. Some centuries later and Paris will be a seaport, waiting only to be submerged in a score of centuries. Thus in a period, less than half as long as that during which the pyramids of Egypt have braved the ravages of time, Paris itself—if it is not burned down during one of the revolutions of its inhabitants, as amiable and *spirituel* as they are inconsistent—Paris will probably be engulphed in the Atlantic, a master before whom the intractable Parisian must haul down his flag. Let him take warning!"

CHARLES W. WHITAKER

MICROSCOPICAL INVESTIGATION OF METEORITES

A PAPER on the above subject, forming part of an investigation commenced two-and-a-half years ago by its author, Prof. Maskelyne, of the British Museum, was read at a recent meeting of the Royal Society. We are indebted to the author for enabling us to lay before our readers the following full abstract of the paper :—

With a view to obtain some more satisfactory means of dealing with the aggregates of mixed and minute minerals, which constitute meteoric rock, the author sought the aid of the microscope, having in the first place sections of small fragments cut from the meteorites so as to be transparent. By studying and comparing such sections, one learns that a meteorite has passed through changes and that it has had a history of which some of the facts are written in legible characters on the meteorite itself and, one finds, that it is not difficult roughly to classify meteorites according to the varieties of their structure. One also recognises constantly recurring minerals; but the method affords no means of determining what these are. Even the employment of polarised light, so invaluable where a crystal of which the crystallographic orientation is at all known, is examined by it, fails, except in rare cases, to be a certain guide to even the system to which such minute crystals belong. It was found that the only satisfactory way of dealing with the problem, was by employing the microscope chiefly as a means of selecting and assorting out of the bruised débris of a part of the meteorite, the various minerals that compose it and then investigating each separately by means of the goniometer and by analysis—finally recurring to the microscopic sections to identify and recognise the minerals so investigated. The present memoir is concerned with the former part of this inquiry. Obviously the amount of each mineral that can be so obtained is necessarily small, as only very small amounts of a meteorite can be spared for the purpose. On this account one has to operate with the greatest caution in performing the analysis of such minerals and the desirableness of determining the silica with more precision than usually is the case in operations on such minute quantities of a silicate, suggested the process which, after several experiments in perfecting it, assumed the following form. After the separation, by alternate treatment with hydrogen chloride and potash, of all silicate that gelatinises with acid, the pounded and weighed mineral was placed in a small retort of platinum with a little ball of the same metal and digested with an excess of pure hydrogen fluoride, containing some 32 per cent. of absolute acid, for two hours, at 100° C. By little platinum delivery tubes with which the retort was provided, a current of hydrogen was allowed to traverse the apparatus and afterwards to bubble through some concentrated aqueous solution of ammonia. After the lapse of the two hours the retort was placed in a bath of paraffin and its temperature slowly raised till 132° C. was reached, at which point the silicium difluoride is evolved and is carried by the current of gas into the ammonia. In a few minutes the operation is complete and it must be repeated with fresh charges of acid and ammonia, till all silicium has been driven into the receiver. This done, a little hydrogen sulphate is introduced into the retort and the retort once again heated in paraffin. If 0·2 gramme of silicate be taken, twice charging of the retort with hydrogen fluoride will suffice; if half a gramme, the process may have to be repeated three or four times. The greater portion of silicium is removed by the first operation and the ammonia becomes semi-solid with deposited gelatinous silica. This is slowly evaporated together with the later ammoniacal charges and the washings of delivery tube and receiver in a platinum dish, and, as the excess of ammonia passes off, a point is reached where the last flock of suspended silica is taken up by the hot solution; the dish is now removed from the water-bath and to its contents, when cold, are added a slight excess of potassium chloride and the requisite volume of absolute alcohol. After 24 hours have elapsed, the precipitated potassium hydro-fluosilicate is filtered off and weighed in the usual manner. The metallic oxides present in the mineral, remain in the retort as sulphates.

The Busti Meteorite.—This meteorite fell on the 2nd of December, 1852, about six miles south of Busti, a station half-way between Goruckpoor and Fyzabad, in India. The fall was attended by an explosion louder than a thunder-clap and lasting from three to five minutes. The explosion that shattered the meteorite, must have occurred soon after its passing the longitude of Goruckpoor. There was no cloud in the sky at the time. The stone, which weighed about 3lb., was presented to the collection at the British Museum by the Secretary of State for India. The Busti aërolite bears a great resemblance to the stone that fell on the 25th of March, 1843, at Bishopsville, South Carolina, U.S.

The meteorite consists for the most part of the mineral enstatite; at one end, however, were embedded a number of small chesnut-brown spherules, in which again one detected minute octahedral crystals, having the lustre and colour of gold. These two minerals seem scarcely to have been affected by the heat that fused the silicates which surround and encrust them. The brown spherules are sulphide of calcium (named by the author Oldhamite) and they also occur sparsely in the Bishopsville aërolite. This mineral forms small, nearly round spherules, whose outer surface is generally coated with calcium sulphate. It cleaves with equal facility in three directions, which give normal angles averaging 89° 57′ and are no doubt really 90°. Its system, therefore, is cubic; indeed, in polarised light it is seen to be devoid of double refraction. Its specific gravity is 2·58 and its hardness 3·5 to 4. With boiling water it yields calcium polysulphides and in acids it easily dissolves with evolution of hydrogen sulphide. Chemical analysis indicated the following as the composition of the spherules:—

		I.	II.
Oldhamite	Calcium monosulphide	89·369	90·244
	Magnesium monosulphide	3·246	3·264
Gypsum		3·951	4·189
Calcium carbonate		3·434	——
Troilite		——	2·303
		100·000	100·000

The presence of such a sulphide in a meteorite, shows that the conditions under which the ingredients of the rock took their present form, are unlike those met with in our globe. Water and oxygen must have alike been absent. The existence of iron in a state of minute division, as often found in meteorites, leads to a similar conclusion. But, if we bear in mind the conditions necessary for the formation of pure calcium sulphide, the evidence imported into this inquiry by the Busti aërolite seems further to point to the presence of a reducing agent during the formation of its constituent minerals; whilst the crystalline structure of the Oldhamite and of the Osbornite next described must certainly have been the result of fusion at an enormous temperature. The detection of hydrogen in meteoric iron by Professor Graham tends to confirm the probability of the presence of such a reducing agent. Osbornite is the name given by the author to the golden-yellow microscopic octahedra imbedded in the Oldhamite, in honour of Mr. Osborne and in commemoration of the important service that gentleman rendered to science in preserving and transmitting to London, in its entirety, the stone which his zeal saved at the time of its fall. These minute octahedra gave the angles of the regular octahedron; but the amount, about 0·002 gramme, was too small for anything but qualitative experiments. These showed the little metallic-looking crystals to contain calcium, sulphur and a metal which gives the reactions of titanium in some singularly stable state of combination. The next mineral described was an augite, of which the measurements and analyses were given in detail. Its formula was ($\frac{2}{3}$ Mg, $\frac{2}{3}$ Ca) Si O_3. The greater part of the meteorite, however, consisted of enstatite, which presents itself in three apparently different characters: in each, however, the mineral is nearly pure magnesium monosilicate. Of this mineral, the measurements and analyses were recorded. The iron contained in small amount in this remarkable meteorite, gave as the result of its analysis 79·069 per cent. iron, 3·205 nickel, and 1·00 per cent. schreibersite.

The Manegaum Meteorite of 1843 was next described and was shown to consist almost entirely of an enstatite, with the formula ($\frac{2}{3}$ Mg, $\frac{1}{3}$ Fe) Si O_3, associated with small quantities of Chromite and of meteoric iron. In publishing the results obtained in the attempt, so far as this memoir goes, to treat exhaustively of the mineralogy of two important meteorites, the author wished to record his obligations to Dr. Flight, assistant in his department at the British Museum, for his valuable aid in the chemical portion of the inquiry.

In March, last year, Prof. Maskelyne recorded in a preliminary note, read before the Society, his discovery in the Meteorite of Breitenbach, of silica in *the rhombic system* with the specific gravity of *fused* quartz. It was associated with enstatite with the formula ($\frac{4}{5}$ Mg, $\frac{1}{5}$ Fe) Si O_3. It is singular that the measurements of the crystals of this enstatite, made at the British Museum and published by Prof. Viktor von Lang (Sitzungsb. Akad. Wien, vol. lix., 1869, p. 848), accord closely with those recently published by Von Rath as the crystallographic constants of a kind of enstatite to which he has given the name Amblystegite.

LETTERS TO THE EDITOR

[*The Editor does not hold himself responsible for opinions expressed by his Correspondents. No notice is taken of anonymous communications.*]

Japanese Sea Shells

SINCE writing the notice of Dr. Lischke's work which appeared in No. 13 of NATURE, I have received from Dr. Lea of Philadelphia a typical specimen of his genus *Hippagus* and the volume of his "Contributions to Geology." For such a valuable communication I would publicly acknowledge my obligation to that veteran conchologist. I was misled by Philippi and Searles Wood, in considering *Hippagus* and *Verticordia* the