

elegant solutions which were constantly being given. We have the number for October, 1862, before us, in which are Questions 1312 to 1320 proposed under six different names; we turn to the number for the current month, and the questions range from 5387 to 5419 from as many individual proposers, whose names are given. Here is evidence that a want has been met, and that there is considerable vitality in this direction; indeed, we may remark that this is the sole English periodical (since the demise of the *Lady's and Gentleman's Diary*) to which mathematicians can send high-class problems. University and college examinations swallow up a great deal of what is produced by residents at the universities, but these pages are open to all comers.

It soon occurred to us that here was a great mass of useful work being done and yet not producing the full benefit it might do if it were reproduced and published in a separate volume. The editor at once fell in with our views; indeed we found that the like idea had occurred to himself. There were, however, supposed pecuniary and other difficulties to encounter, but at last these were got over and the work, after one volume had been published, took its present form, which is now a conspicuous one on many a student's shelf. The fact that now their solutions would be treasured up in this more desirable shape seems soon to have led our foremost mathematicians to give in their adhesion, and as we run over the long list of contributors prefixed to the volume before us, there is hardly a name familiar to us which is not to be found there. France, Italy, and America also, are fairly represented. Ladies, too, there are, showing that

"the gay determinant
For (them) its rows exchanges,
While Hamilton's weird delta turned (▽)
O'er all the symbols ranges."

It says very much for the ability, in more directions than one, of the editor, that he has nursed the bantling which was handed over to his care more than sixteen years ago into the vigorous and lusty athlete of to-day. Nothing mathematical comes amiss to his net, but we may say that though the *Dii majores* roam about in their own special pastures, he has a marked predilection for the line taken up and well-worked out by Messrs. Woolhouse and Crofton, *i.e.*, of probability in its many applications.

It only remains to say that the "Reprint" is more than a reprint, for it contains about as much more original matter as appears in the monthly paper. Space is found for detached papers and notes, and for alternative solutions, often of equal, if not greater, interest, than the previously published matter.

There are occasional parenthetical notes—we think it should be more clearly indicated who is responsible for these, as they are often valuable ones.

The training the printers have gone through in getting out these solutions has placed them on a high level as printers of mathematics, and the volumes of this series reflect great credit upon them.

Cronicon Cientifico Popular. Por D. Emilio Huelin. Vol. I. (Madrid: 1877.)

We perused this volume with interest and pleasant surprise; we were pleased at finding it to be an excellent and well-written review of all new occurrences in the scientific world, and we were surprised to see such a work emanate from a country which hitherto has contributed but too small a share towards the progress and welfare of science. If we place Turkey at the head of the list of the most unscientific countries in Europe, Spain and Portugal certainly come second on that list; it is gratifying, therefore, to see some sign of improvement. We congratulate Senor Huelin on his valuable publication, which is one of the best of the kind that has yet come under our notice. The arrangement of the contents of the

volume is particularly good. The first few chapters are dedicated to generalities and the philosophy of sciences; some of them contain detailed lists of all scientific publications in the world. Then follow numerous chapters relating to the latest discoveries, inventions, theories, &c., on the domains of physics, chemistry, astronomy, meteorology, mineralogy, and geology; the chapters of the physical section alone numbering no less than eighteen, and those of the chemical section as many as twenty. Any occurrence at all worthy of record up to the end of last year is faithfully mentioned in the book. The second volume will contain the biological and mathematical sciences. We wish Senor Huelin and his publishers every success with their valuable addition to scientific literature.

Die Naturkräfte. Band 21. "Die Insekten" (1st part): "Der Organismus der Insekten." With 200 original Woodcuts. By Dr. Georg Mayr. (München: R. Oldenbourg, 1877.)

THE importance of an examination of the internal as well as the external anatomy of insects has unhappily not hitherto engaged the attention which it deserves at the hands of British entomologists. It is a fact which cannot be disputed that by far the greater portion of that energy which our country has exhibited in the investigation of this branch of natural science has been devoted to the mere founding of types, and in consequence but little light has been thrown upon the ever-increasing array of problems which puzzle the biologist.

In studying the affinities of insects it is quite as important, and in all probability more so, that the internal structure and the embryology of insects should be known, as the external characters and the metamorphoses; it is therefore with unmixed pleasure that we welcome the appearance of Dr. Mayr's admirable and ably-illustrated treatise.

It would be impossible here to give even an outline of the vast series of facts which the learned author has brought together, nothing relative to the organism of insects being regarded as too insignificant for careful and unwearied research; as an instance of the thoroughness of his labours we would especially call attention to his interesting observations on the action of the legs of insects when walking, a point which he seems thoroughly to have studied and which he has amply illustrated, although many students would probably have regarded it as a matter of little moment. In fine, the entire volume is most valuable, and should be esteemed as a necessary hand-book, not only by every entomologist, but by all who have the interests of natural science at heart.

A. G. B.

LETTERS TO THE EDITOR

[The Editor does not hold himself responsible for opinions expressed by his correspondents. Neither can he undertake to return, or to correspond with the writers of, rejected manuscripts. No notice is taken of anonymous communications.]

The Editor urgently requests correspondents to keep their letters as short as possible. The pressure on his space is so great that it is impossible otherwise to ensure the appearance even of communications containing interesting and novel facts.]

Glacial Geology of Orkney and Shetland

A RECENT visit to Orkney has brought forcibly before me certain points of the highest interest in modern glacial geology, upon which, I believe, the state of the surface deposits in these islands is calculated to throw considerable light.

I may premise that although I am perfectly well acquainted with all the usual glacial phenomena of the North of Scotland, as described in Geikie's and other works, I am not a sufficient practical geologist to speak with positive certainty, though I think I know enough of the subject to establish a *prima facie* case for what I have seen with my own eyes, and which I put forward in the hope that more competent observers may direct their

attention to the subject and either confirm or disprove facts which, if true, would seem to afford a crucial test of the truth or falsehood of some of the most important theories of modern geology.

The fact which I assert is, that there are no traces of glacial action, or of raised sea-beaches in Orkney.

I speak from an intimate personal acquaintance with these islands, which are my native county, and almost every yard of whose surface and shores I have explored with rod and gun, and in the course of canvassing at elections, and for many years back keeping a special eye on this very subject. Now I can assert positively that I never saw a boulder or perched block, or the trace of any till, boulder clay, kame, eskar, raised beach, or other form of glacial or marine action.

The whole of the islands consist—except a small patch of granitic axis—of Devonian strata, bare in places, but for the most part covered with a mantle of soil, which is the obvious result of the disintegration of the subjacent rock by existing sub-aërial causes, such as wind, frost, and rain.

In places, where soft strata come to the surface, this soil is deep and clayey, and the sections of it, afforded by the coast-line, might readily be mistaken at a distance, or by a superficial observer, for boulder-clay. But a close examination will show that the stones in this stony clay are always angular and always similar to the adjoining strata, and that the larger stones are generally deposited, allowing for subsidence and displacement, in the original lines of stratification conformable to those of the unworn rock below them. A good example of this may be seen within 200 yards of Kirkwall, on the east side of the bay under Cromwell's old fort.

Let any one compare this with the section of glacial boulder-clay shown on the other side of the Pentland Firth at Scrabster, and he does not require to be a geologist to understand the difference between a surface soil of glacial deposit and one of disintegrated rock.

In like manner I have observed innumerable sections of surface soil and of mounds and ridges, which at first sight might have passed for marine or glacial, and I have invariably found them to consist of angular fragments of the subjacent rock passing on the one hand into thoroughly decomposed rock or soil, and on the other into the solid strata on which they rest.

I believe I may state broadly that there is not a rolled or rounded stone or pebble, or trace of sand or gravel, in all Orkney above the level of the present sea-beach and blown sands, and away from the beds of the existing lakes and small streams.

There is not the vestige of a raised beach along the hundreds of miles of rocky coast of the various sounds and islands, or in the many sheltered inlets where, in the nearest counties of Scotland such as Sutherland, Ross, and Cromarty, raised beaches are invariably seen. All recent movements seem to have been movements of subsidence and not of elevation. The Loch of Stennis, with its surrounding plain, affords conclusive proof that at no recent geological period can the level of the sea have stood higher relatively to that of the land than it does at present. Had it done so the Loch of Stennis, which is now exactly level with the sea so that the tide flows into and out of it, must inevitably have been a sheltered inland fiord of salt water extending to the hills which bound the plain, which as the land rose or the sea retreated, must have left the plain covered with sand, shingle, and marine or brackish shells, of none of which is there the slightest trace, but, on the contrary, the ordinary rock strata with their disintegrated surface soil, occupy the whole plain and come up to the margin of the existing loch.

Now as to the inference from these facts.

The received theory of most glacialists is, that during the glacial period there was a great polar ice-cap extending over the whole of Scandinavia, Scotland, and a great part of England and Ireland. As a corollary of this many draw the inference that such an accumulation of ice, by displacing the earth's centre of gravity, would raise the level of the sea in the Northern hemisphere, and thus account for the higher levels relatively to the land at which it has undoubtedly stood.

Others contend that the glaciation was more limited and only extended in islands as it were, round each considerable mountain group in northern latitudes, and these attribute the phenomena of raised beaches, &c., to local elevations of the land rather than to general elevation of the sea.

Now here appears to me to be an opportunity of applying the *experimentum crucis* to these two conflicting theories.

If it be true that Orkney is not glaciated, and has no raised

beaches, it seems to follow that the second, and not the first, of these theories must be the true one.

The second theory would account perfectly for the boulder-clay being found in Caithness, over the plain of which we may easily suppose the glaciers from the great mountain range which bounds it on the south and west, to have extended as far as Scrabster and the south shore of the Pentland Firth, while in Orkney there were no glaciers, because there was no great local mass of mountain region to produce them.

But, on the theory of a great ice-cap, I cannot see how Orkney could fail to have been planed by ice and covered by boulders, perched-blocks, and masses of glacial clays, sands, and gravels.

In any case the absence of raised beaches and of all traces of marine action above the present sea-level, seems to be inconsistent with any theory of a general and uniform rise of the ocean in these latitudes.

As regards the Shetland Islands I cannot speak with the same confidence, not being so intimately acquainted with them; still, having travelled over a great part of the principal islands, and coasted along their shores, I can assert that I have never seen any traces of glacial action, or of raised beaches. The latter must, I think, inevitably have shown themselves in the form of sea-caves at a higher level, such as those at Cromarty, had they ever existed, as the present line of exposed rocky coast is worn by the waves into innumerable caves and clefts.

As to boulders or boulder-clay, I do not believe they exist, and the only rounded or water-worn stones I have ever seen have been rolled in the Devonian and not in any modern seas, and result from the surface disintegration of the great conglomerate.

These are abundant in exposed situations, and they show the necessity for care in inferring modern glacial or marine action from the presence of rolled stones of foreign rocks.

In conclusion, I believe that these groups of islands, Orkney and Shetland, have never been subjected to glacial action or submerged and subsequently elevated, in any recent geological period, and that these facts are inconsistent with any theory of a great polar ice-cap, or of any uniform rise of the level of the ocean in northern latitudes.

S. LAING

Brahan Castle, Dingwall, N.B., August 25

Meteorological Effects of Eclipses

IN connection with certain variations of temperature observed during the total eclipse of the moon on August 24, 1877, by M. Berigny, and discussed at a late meeting of the French Academy of Sciences, as reported in NATURE (vol. xvi. p. 412), I am reminded of some observations made on board H.M.S. *Challenger* during the total eclipse of the sun on April 6, 1875. The position of the ship at noon of the day of the eclipse was in lat. 27° 13' N., long. 137° 59' E. about 400 miles south of Japan and 200 miles due west of the Bonin Islands. If my memory be correct, the eclipse was only partial for the part of the world we were in, a portion of the sun's disc being still visible in the shape of a thin crescent at the moment of maximum obscuration. The eclipse, occurred in the afternoon, and was heralded by a breeze from the south-west, which continued during the rest of the evening; but what at the time struck us as very remarkable was the fact that it was accompanied by a rise of the surface temperature of the sea, as will be seen from the following observations made at the time:—

April 6, 1875.		Temperature of sea-surface.	
4 A.M.	20° 3' C.
10 "	20° 9' "
Noon to 3 P.M.	21° 1' "
4 "	22° 5' "
5 "	22° 2' "
6 "	21° 9' "
7 "	20° 9' "
8 "	20° 0' "

} Time of the
eclipse.

The *Challenger*, progressing at the rate of about three knots per hour, had just entered an area of alternate streaks of warm and cold water, the former due to the North Pacific equatorial current, known as the Kuro-Siwo or Japan current, the latter to the Arctic current which flows down off the east coast of Nipon, so that the observed rise of temperature, and perhaps also the south-westerly breeze which sprung up at the commencement of the eclipse may be a mere coincidence, and I give the observations for what they are worth.