

A. Salteri in memory of my late fellow-worker in the Palæozoic Crustacea, Mr. J. W. Salter, F.G.S., for so many years Palæontologist to the Geological Survey of Great Britain.

Formation.—Upper Silurian (Wenlock Shale).

Locality.—Pencarreg (or “Penkerrig”), Caernarthenshire.

EXPLANATION OF PLATE IX.

- FIGS. 1–7. *Cardiocaris Ræmeri*, H. Woodw., sp. nov.
 „ 8–12. ————— *veneris*, H. Woodw., sp. nov.
 „ 13. ————— *lata*, H. Woodw., sp. nov.
 „ 14 & 15. ————— *bipartita*, H. Woodw., sp. nov.
 „ 16. *Pholadocaris Leeii*, H. Woodw., sp. nov.
 „ 1–16 from the Upper Devonian, Büdesheim, Eifel, Rhenish Prussia.
 „ 17. *Aptychopsis Salteri*, H. Woodw. sp. nov. Upper Silurian (Wenlock Limestone), Pencarreg, Caernarthenshire, S. Wales.

All the specimens are figured of the natural size, and are from the Museum of Mr. John Edward Lee, F.S.A., F.G.S., Villa Syracuse, Torquay.

II.—FIRST IMPRESSIONS OF ASSYNT.

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IT must be admitted that first impressions are to a certain extent instinctive, and need not, therefore, be taken for more than they are worth. To do any really valuable work in such a troubled district as Assynt would require a considerable length of time. Still, after having been nearly a fortnight in the place—a fortnight in which the rainy days and the dry ones were about equally balanced—it is almost impossible to avoid forming some idea as to the respective merits of the interpretations which have been put forth. And this one is all the more apt to do in order to be able to institute comparisons with other districts of the North-West already visited in previous years.

Furnished with Professor Heddle's excellent geological map of Sutherland (Mineralogical Magazine, No. 21), and furthermore enjoying the society and experiences of the Professor himself, I arrived, on the last day of July, in the wild and remote corrie which flanks the north side of Ben More, having walked that morning from the head of Loch Shin over peaty moors which for the most part hide all the rocks.

After wading across the upper Cassley between Fionn Loch More and Fionn Loch Beg, and after toiling through a maze of glacial debris and peat hags, we struck the solid rock at perhaps 1400 feet above the level of the sea. From this point it is easy to perceive that the east slope of Ben More is covered with quartzite, but I was surprised to find that the bulk of the rocks in the corrie, which lies beneath the northern slopes of Ben More and Coniveall, consists of a peculiar gneissic rock which Dr. Heddle terms the “Logan” rock. Some portions of this “Logan” rock are very puzzling, more especially in its relations to a dark green or dull black aphanitic rock which Dr. Heddle at one time was disposed to regard as igneous. Continuing to ascend towards the Bealloch between Coniveall and

the peaks of Na Touadhain, although we saw quartzite occupying the heights on both sides, still for a long distance there was nothing but "Logan" rock to walk upon except in one spot, where a large mass of quartzite was apparently faulted on to it. At length having arrived at an elevation of about 2500 feet, this everlasting "Logan" rock gave place to a fragmental series of quartzo-felspathic grits, with some beds of coarse conglomerate, having large and well-rounded pebbles of vein quartz. This series, I was told, is regarded as constituting the basement beds of the Upper Quartzite, which forms the summits of the mountains hereabouts, including, besides those already named, Ben Uarran, Ben Uie, etc.,—a white and dazzling wilderness of quartzite blocks. From this elevation of about 2600 feet we descended rapidly to Inchnadamph, some 230 feet above sea-level.

Local Topography, etc.—Inchnadamph, at the head of Loch Assynt, is a centre from which several of the most critical sections may be visited. It lies in what I may term a longitudinal hollow, running north and south, between two mountain ranges. The *western* range consists of a chain of disconnected heights, of which Quinaig, Canisp, Suilven, and Coul More are the culminating points, each separated by a deep lake-filled basin. This chain of heights, though nowhere reaching an altitude of 3000 feet, is a terrible condenser of moisture, and the mysterious gloom of its almost ever-clouded summits serves to exaggerate the altitude of these weird precipices. The *eastern* range is far higher, and, instead of being seamed by transverse valleys cut down to within two or three hundred feet of the sea-level, presents a tolerably continuous series of ridges, only separated by lofty passes (Beallochs). This eastern range may roughly be described as extending from the sea loch of Glen Coul on the north to the inland Loch Borrolan on the south. The familiar names of Glasven, Ben Uie, Ben Uarran, Coniveall, Ben More, and Breabag represent portions of the mass, which may be regarded as the largest mountain group in Sutherland. Ben More and Coniveall, which really are peaks of the same ridge, attain elevations of 3273 feet and 3234 feet respectively.

It is this eastern range, so massive, so rugged, and so lofty, which causes the geology of Upper Assynt to be thus difficult of interpretation beyond, one might almost say, any district in the North-West. The complexity of folding to which this mountain group has been subjected is surprising, and nothing but time and patience can adequately unravel its mysteries.

General Structure of the Western Range and Longitudinal Hollow.—The geological structure of the western range is on the whole simple. From the "dark tumbled sea" of Hebridian gneiss there rise the deeply intersected masses of Torridon Sandstone, succeeded unconformably, according to most observers, by a massive Quartzite dipping to the eastward in regular sheets, which for large distances are almost coincident with the easterly slope of the mountains themselves. This may be regarded as the normal state of things, and may be seen by any one driving along the road from Loch Glen Coul, opposite Quinaig, by way of the head of Loch Assynt and Stronch-

rubie, to Craig-a-Knockan, opposite Coul More. It is true that near Ledbeg, along this line of road, there is some deviation from the normal state of affairs, but the fact of there being "Logan" rock exposed in the vicinity is quite enough to account for the deviation, as, wherever there is "Logan" rock, trouble is sure to ensue.

So far, then, the geological sequence is tolerably clear. This Quartzite has intercalated bands of igneous rock, and dips regularly towards the longitudinal hollow which separates the western from the eastern range. There can be little doubt that the hybrid group of rocks known as the "Fucoid Beds" succeed in regular order. These beds are mixtures—chiefly fine-grained grits often with a considerable proportion of carbonates, usually blue-hearted, and weathering yellow: hence the term "yellow beds" is applicable on exposed outcrops. As there is so little alteration, these are just the beds for fossils, but only "Fucoids" and "Serpulites"¹ have as yet been found. The former are very abundant. Beds of tolerably pure quartzite, and even of dolomite, occur sometimes in this group. Such quartzites, however, have nothing to do with the supposed Upper Quartzite, whose position, if it exists at all, must be above the main mass of Dolomite, which succeeds the "intermediate" series.

These dolomites generally occupy the escarpments which immediately flank the east side of the longitudinal hollow, and may be well studied, among other places, in the Stronchrubie cliff, which rises about 450 feet above the road. The lowest beds there seen are dusky dolomitic rocks, granular or compact, and very foetid. They contain noticeable traces of carbonaceous matter, and are tolerably free from insoluble rock *débris*, at least the sediments are very fine. At this place a kind of diorite is seen to be interbedded with these dusky rocks, which are succeeded by grey dolomitic limestones, becoming paler in colour towards the top. Up to this point everything seems clear and simple; yet a thorough examination of this Quartzite-dolomite group, with accurate measurements and careful lithological notes, especially with reference to the number and nature of the bedded "igneous" rocks, would be very useful. It may not be practicable to get the whole group in one section, but suitable places might be selected for examination of portions, avoiding as much as possible places where a hollow covered with vegetation intervenes, and above all, in putting the pieces together, *nothing should be taken for granted*.

Very shortly after reaching the edge of the plateau, the dolomitic limestones are seen dipping at a very high angle, and further eastward they dip in a very different, though not exactly opposite direction. A certain amount of these very irregular dips may be due to percolation of water and unequal solution, yet much also is due to the general stratigraphical confusion which here begins to prevail—a prelude to the still more terrible confusion of the eastern range whose roots we are now approaching.

¹ From an examination of two hand-specimens of a white grit, or quartzite, full of the so-called "*Serpulites*? *Maccullochii*," Salter (see Quart. Journ. Geol. Soc. 1858, p. 381, pl. 13, fig. 31), I venture to think that their appearance is highly suggestive of crinoidal fragments.—EDIT. GEOL. MAG.

The Eastern Range.—This is the real field of battle, out of which three issues at least have to be decided. 1. Is there an Upper Quartzite? 2. What is the nature and geological position of the "Logan" rock? 3. Is the Upper Gneiss really a newer formation properly overlying the Quartzite-dolomite?

1. *Is there an Upper Quartzite?*—There are quartz beds in the "intermediate series," and possibly, in some places, in the Dolomite itself; but the real question is, whether the important rock masses referred to the Upper Quartzite are not repetitions of the series below the Fucoid Beds. One thing is pretty clear, that, in this district at least, where there is no "Logan" rock, there is no Upper Quartzite.

Thus at Craig-a-Knockan the sequence seems clear enough. The Quartzite dips steadily to the eastward from Coul More, and is regularly overlaid by the "intermediate series" with its Fucoids, "yellow beds," quartz beds and impure dolomites, and the whole is surmounted in the cliff-section by the Dolomite just as at Stronchrubie. The great difference consists in the fact that the Upper Gneiss comes on at once, so that there is no room for an Upper Quartzite. Of course it is open to the believers in an Upper Quartzite to say that it was never developed, or has been denuded off previous to the deposition of the overlying beds at this particular spot.

But let us now revert to more disturbed ground, and, in fact, to Murchison's type section at the head of Loch Assynt, known as the Cnoc-an-drein section.¹ This commences in the bottom of the longitudinal hollow between the two ranges, and ascends in an east-north-east direction. It is to the lower portion only that I would direct attention. Matters are not so clear as in the Stronchrubie and Craig-a-Knockan escarpments, where, as we have seen, no Upper Quartzite presents itself. Here, at a short distance from the Post Office of Inchnadamph, the dusky dolomites associated with a peculiar kind of diorite succeed the intermediate series, and these again are succeeded by the pale grey dolomites dipping moderately E.N.E. The ground is broken, but gradually rises, the dips being inwards. A bed of igneous rock is again seen to intervene, and then a sudden rise in the ground is observed to be composed of compact quartzite, with approximately the same dip as most of the underlying beds.

The whole thing seemed all right, and I could not deny that appearances were in favour of there being an Upper Quartzite at this place, though my first question was, what has become of the peculiar grit and conglomerate which underlies the presumed Upper Quartzite of Ben More? We continued to pass over successive beds of this Quartzite all dipping into the hill. In it there are three beds of igneous rock, each of which may be recognized by certain peculiarities, though on the whole the type is not dissimilar from what occurs in the dolomite.² Just above the third igneous bed the Quartzite suddenly becomes vertical, and ultimately assumes a dip opposite to the one below, so that, as one continues to ascend, the

¹ Q.J.G.S. vol. xvi. p. 217, and vol. xxxvii. p. 242.

² Subsequent examination would lead one to suppose that porphyritic structure is more frequent in the interbedded igneous rocks of the Quartzite.

same beds are again passed over. This is admirably shown by the different bedded igneous rocks, which now reappear in reversed order. With such evidences of rolling over and instability of dip, one is naturally led to question the value of the apparent superposition of the Quartzite to the Dolomite, which is seen below, though it would be going too far to say that the evidence of this section in favour of the existence of an Upper Quartzite is altogether to be discarded in favour of the notion of a reversed fault at the junction. This is the only place seen by me where there could be any grounds for requiring the existence of an Upper Quartzite.

In the great mountains of the eastern range there really seems very little evidence of the true stratigraphical relations of the vast beds of Quartzite to the fragments of Dolomite, which are pitched about in all directions on some of the lower grounds. As far as one can judge from such a chopped-up district, it would seem that there is a very considerable convergence of dips towards Loch Maolach Corrie, and thus that the Quartzite, *on the east* of the large area of dolomitic limestone thereabouts, *underlies* the limestone just as it does on the west. It follows, therefore, that the Quartzite of Breabag, etc., is a mere repetition, possibly with some thickening, of the regularly bedded Quartzite of the western range usually known as the Lower Quartzite.

But, quitting individual sections, there remains the general impression derived from an inspection of geological maps, and based upon the presumed continuance of an easterly dip in all the beds, that those quartzites occurring to the east of the dolomite escarpment must be Upper Quartzite, unless the contrary can be shown. It is just possible, however, that the explanation which fits so well for the Quartzite of Breabag may, with modification, apply along the whole line. This supposes a roll up of the Lower or western Quartzite in a series of convolutions to the east of the Dolomite which has been assumed to pass beneath it. Much stress has been laid upon the presumed lithological differences between the Lower and the alleged Upper Quartzite. As far as I could see, these differences amount to very little, their leading features, even to the purplish colour of some of the beds, appearing very similar.

2. *What is the nature and geological position of the "Logan" rock?*—This mysterious rock has had so many aliases that its individuality, as identified by various writers, runs some risk of being lost. Prof. Heddle has given an excellent summary of the different views respecting it,¹ and in a paper read before the Royal Society of Edinburgh, on the 17th July last, he assigns the following sequence to the rocks of the North-west Highlands:—Torridon Conglomerates, Lower Quartzite, Dolomite Series, "*Logan*" rock, Upper Quartzite, Upper Gneiss.

It may well happen that in the long range from Whiten Head to the Sound of Sleat more than one class of rock has been enumerated under this head. At present we are more especially concerned with the Assynt district, though the term "*Logan*"

¹ Mineralogical Magazine, No. 22, p. 43 *et seq.*

requires an explanation necessitating reference to other localities. It is in fact the "igneous" rock of Nicol and Murchison, which plays such an important part in confusing the geological structure of the country and the sequence of the beds; so that it may be looked upon as one of the prime authors of the controversy on the North-West succession, and a most difficult nut to crack. This kind of rock is well developed in Glen Laggan or Logan near Loch Maree, where it is very accessible in the bed of the stream. A few years ago I ventured to point out¹ some of the peculiarities of this rock, and referred especially to the strings of epidosite which pervade it. From its association with other bedded masses, and from its general appearance, I came to the conclusion that it was "an old gneiss partly invaded by extravasated matter." In the following year Professor Bonney visited the same district, and, in describing this very rock, went a step farther and classed it with the regular Hebridian gneiss.

This "Logan" rock occupies a large surface in the Assynt country, and more especially in the eastern range, of which Ben More is the highest peak. A glance at Dr. Heddle's map of Sutherland will at once show its importance in this area—an importance which could hardly be gathered from an inspection of Professor Geikie's general map of Scotland. But large as this area is, it might be extended in the great corrie on the north side of Ben More previously mentioned. Dr. Heddle controverts the views that it can either be the older gneiss, or an *eruptive* igneous rock: he regards it as conformably interbedded, its horizon being chiefly between the Dolomite and the Upper Quartzite.

I confess that, with every wish to accept my kind friend and cicerone's reading, I was unable to endorse this position, and would much rather fall back upon a modification of Nicol's interpretation of the district, as exhibited more especially in his section of Glasven.² This, if we omit an inch from the east end, is not an unfaithful representation of the appearances both about Loch Glen Coul and Glasven, when certain modifications are made. The "syenite" of Nicol, in this section, represents the position of the "Logan" rock, and he is probably not so far wrong in representing the Quartzite (which should however have a capping of "yellow beds" if not of regular Dolomite) as merely *abutting* on the rounded knolls which rise up behind. The true continuation of the broken-off ends must then be sought in the so-called "Upper" Quartzite which prevails at greater heights to the eastward.

It would be far too long a story to go into details on this important point, viz. the junctions of the Quartzite-dolomite with the apparently overlying "Logan" rock. Dr. Heddle has discovered a remarkable section in the most precipitous cliff on the south side of Loch Glen Coul, about a mile or so from the head of the Loch, to which section he conducted Dr. Callaway and myself. Here the dolomitic series, considerably modified perhaps in its development,

¹ Gneiss Rocks of the North-West Highlands, Proc. Geol. Assoc. vol. vi. p. 75.

² Q.J.G.S. vol. xvii. p. 95.

is seen to pass *under* the "Logan" rock, the angle of dip being about 28° . It is true that the beds in immediate contact are not very typical representatives of "Logan" rock, but the great gneissic masses very soon come on in force. Further eastwards the line of the dolomitic series may be traced in almost vertical masses across the head of the Loch. Geologists can hardly draw any absolute conclusions from this place alone; but whilst some see in the above indications a conformable upward sequence, others will suspect the presence of an inversion. In its general effects this latter would produce almost the same results as if the Quartzite-dolomite merely abutted against the "Logan" rock in the way supposed by Nicol.

What is the "Logan" rock petrologically? If we are to take this very district of Glen Coul, we find plenty of red orthoclase, of quartz and felspar, and of hornblende, sometimes in foliations, sometimes massive. Other varieties also occur, but one of the most difficult tasks is to make out any definite system of divisional planes, which might be regarded as showing the bedding, so as to determine the dip and strike. I hold in my hand at the present moment a thoroughly typical specimen of "Logan" rock obtained from the somewhat isolated exposure to the west of Ledbeg. It is striped something like a tiger, with bands of a hackly pinkish felspar, partially relieved by dull white quartz, alternating with thick or thin bands of a dark-green matted hornblende. The cracks and backings are lined with abundance of pale green epidosite, which is so characteristic of the rock in the Logan valley. Altogether this is a fair specimen, though there are others far richer in quartz. I have usually been disposed to regard the abundance of epidosite as one of the features of the "Logan" rock which especially distinguish it from the Hebridian Gneiss, but Dr. Heddle states¹ that this peculiar *mélange* occurs in greater quantity and perhaps in a purer state in the west of Ross-shire than in any locality known to him. This is in the Hebridian Gneiss near Poolewe. Hence this presumed distinction vanishes.

Although, therefore, there are certain differences in the aspect of hand specimens, and still more perhaps in the general character and behaviour of large masses, yet the "Logan" rock appears to me to possess more resemblance to the Hebridian Gneiss than to any other formation in the district. There must be differences, however; otherwise so acute an observer as Nicol would hardly have continued to call this rock "granulite," "syenite," "diorite," according to the district he was describing. In Assynt his "Logan" rock is mostly "syenite," and he appears to have regarded it as intrusive. It is probably owing to the circumstances connected with its appearance in the position now occupied by it in the Assynt mountains, and largely also to partial injection by local extravasations and to crushing during folding, that the main points, in which the "Logan" rock differs from ordinary Hebridian Gneiss, arise. And yet I hesitate whilst writing this, bearing in mind that Dr. Heddle, who knows both rocks so well, does not perceive the relation, which

¹ Min. Mag. No. 20, p. 211.

always struck me as subsisting between the two, though I am far from saying that they are absolutely identical.

What then is the function of this "Logan" rock throughout the eastern range of Assynt from the precipitous shores of Loch Glen Coul to the termination of the range near Loch Borrolan? Is it not in reality the framework or core round which the newer formations are folded, sometimes in great winding sheets of white quartzite like those in which Breabag is swathed? Not that these were ever deposited upon their base, whatever it may have been, in its present position. That base has been elevated to the heights it now occupies in the crush which has produced these convolutions and dislocations. The general result of these movements seems to have been the establishment of an irregular synclinal in the longitudinal hollow between the west and east ranges, so that the gently sloping Quartzite of the one reappears in all sorts of positions round about the sides and summits of the other, with fragments of the Dolomite occurring in the most unexpected places and in every attitude. In such a hill as Breabag the framework does not show through the clothing, the Quartzite is unbroken, and wonderful has been the plasticity of the rock which could endure without fracture such foldings as may be seen in the Bealloch between that mountain and Coniveall. It is probable also that the thickness of the Quartzite itself varies materially within short distances.

The explanation of a core of gneiss very well suits the appearances on both the north and south sides of the ridge connecting Coniveall with Ben More. It will be remembered that on the north side "Logan" rock continues beneath this ridge to a height of about 2500 feet, before the grits and conglomerates succeed, which lie at the base of the presumed Upper Quartzite on this mountain, but nowhere else as far as I can make out. The same phenomenon may be noticed on the south side in the wild corries round Dhu Loch More. "Granitic gneiss, and mica slate with intrusive rocks," says Nicol,¹ "constitute the nucleus of the mountain." His granitic gneiss and mica-slate are, I apprehend, nothing more nor less than our "Logan" rock, which extends to an elevation of about 2550 feet (by aneroid) on the S.E. shoulder of Coniveall. At this point the usual granitic and hornblendic assortment of crystalline rocks, varied by a little porphyry in places, suddenly terminates, and is succeeded by the coarse fragmental series underlying the Quartzite. These beds dip 25° W.N.W., *i.e.* rather into the mountain, which may receive strength from a slight local syncline. Thus on both sides an elevation of at least 2500 feet must be claimed for the "Logan" rock of the Ben More-Coniveall group, leaving about 700 feet for grit beds, conglomerates, quartzites and the like.

It was the sight of this magnificent corrie at the head of Dhu Loch More, with the entire sweep of its precipitous slopes, thus obviously composed of "Logan" rock, with a mere capping of Quartzite, which at once staggered my faith in the Murchisonian interpretation of

¹ Q.J.G.S. vol. *cit.* p. 99.

Assynt. I admit that there are plenty of difficulties still, and that much has to be explained which I had no time to see. These are but first impressions; yet I should be very loath to believe that, because a few sections may seem to show some tortured and dislocated fragments of the Quartzite-dolomite appearing to pass under "Logan" rock, that this great and continuous mass is not really from top to bottom the local representative either of the fundamental gneiss, or of something that is first cousin to it. This is the conclusion which seems to render a part at least of the sequence in Assynt intelligible, though the notion of an intercalated "Logan" rock, which has not a few supporters, may work better in other districts.

3. *Is the Upper Gneiss really a newer formation, properly overlying the Quartzite-dolomite?*—This, after all, is the most important question, but I had no opportunities of studying it in the mountains of Assynt. South of the line of Loch Borrolan there is an immense change in the geological features of the country. The "Logan" rock ceases to appear and the great range of Ben More seems to have died away in the red syenite of Loch Borrolan, where it attains an elevation of 1300 feet in Cnoc-na-Sroine. Most people regard this as an igneous intrusive rock, and such it probably is, though with a strong affinity for "Logan" rock, which it most likely injects and partly perhaps passes into. Anyhow the great eastern chain of Assynt which I have endeavoured to describe fails to the south of this line.

An important extension of the Upper Gneiss to the westward at moderate elevations is the immediate result, and we are thus enabled to see the stratigraphical relations of this group to the Quartzite-dolomite under favourable conditions. Allusion has already been made to the section at Craig-a-Knockan. If to see is to believe, there ought not to be much difficulty here. The Quartzite sweeps steadily down from Coul More, and is succeeded in ascending order by the "yellow beds," and these by the Dolomite, the whole having moderate easterly dips, just as is shown in Professor Geikie's section.¹ The junction with the Upper Gneiss, which succeeds, seems perfectly regular, the direction of dip being still about the same and not exceeding 10°. In the place where we saw the junction, along the line of which we walked for some distance, there are no appearances such as would justify Nicol's interpretation. In one place the Upper Gneiss is very much crushed and full of pyrites, but there is certainly no turning-up of the Dolomite, which may be seen for some distance to underlie the so-called Upper Gneiss conformably and at a moderate angle. It is for the students of Archæan geology to upset the plain evidence of this section, which certainly seems to mean what it says. Indeed, the beds hereabouts slope at such a moderate angle, and there are so few signs of dislocation, that one is scarcely prepared for an inversion, such as may well occur in the troubled region of Ben More.

There is only one other place where I had an opportunity of

¹ Q.J.G.S. vol. xvii. p. 180.

visiting the junction of what is usually regarded as Upper Gneiss with the Quartzite. This was at the Stack of Glencoul (about 1700 feet), where the Dolomite is absent. No actual contact was observed here, but the direction and amount of dip of the two formations are, as far as I remember, about the same; and, what is more, there really seems to be a sort of lithological passage between the regular Quartzite and the fine quartzose flags which gradually conduct to the more micaceous beds. I may be wrong, as the spot is very remote, and only accessible after fatigues which rather impair one's powers of observation.

Conclusion.—There are several minor points on which I have not touched. One of these is the relation of the Ledbeg Marble to the Dolomite. These marbles are fragmentary masses lying somewhat in the direction of the strike of the Stronchrubie Dolomite, and apparently associated with Quartzite, which is hemmed in between a ridge of "Logan" rock on the west and the so-called porphyry of Loch Borrolan on the east. These marbles effervesce with acid far more readily than do the dolomites, and from this I infer that the carbonate is principally lime. On the other hand, they contain a considerable development of silicates, either serpentine or malacolite—perhaps both. The magnesia in these beds, therefore, may exist in combination with silica rather than with carbonic acid. One can hardly say whether the difference between these two groups is one of origin, or merely superinduced through contact alteration, as was suggested by Nicol. The subject is an interesting one, but requires close attention and a careful examination of numerous specimens. It certainly seems a little far-fetched to go in search of another geological formation, in which to locate these curious and by no means extensive fragments.

There is another observation which my short trip to Sutherland has induced me to make, viz. that the local strike of beds cannot always be accepted as an indication of the group to which they belong. There has been too much dogmatism on this point. It is quite possible that a *prevalent* strike exists for certain groups, but the exceptions to the direction of this are so numerous, especially in the more disturbed districts, that no one should pretend to be guided by the strike alone to any conclusions of importance with reference to the grouping of beds in limited areas.

It is not without feelings of regret that I cannot see my way to an Upper Quartzite, and if I have been wrong about the position of the "Logan" rock, I still think that this monster will, in most places, have to be dealt with on the basis of a fold over of some of the lower beds. The sequence at Craig-a-Knockan, showing the superposition of the Upper Gneiss, seems to be unshaken.

There are workers now in the country, skilled in the interpretation of the older rocks. May it be given to them effectually to pierce the mists of Assynt, and to raise the veil which yet hangs over portions of the North-West!