XXVII.—*Supplementary Observations to Dr. Berger's Account of the Isle of Man.*

By J. S. HENSLOW, Esq.

MEMBER OF THE GEOLOGICAL SOCIETY.

[Read April 7, 1820.]

IN laying before the Society the following remarks, I beg leave to state that my intention is not to attempt a minute description of the geological features of the Isle of Man, but chiefly to point out the localities of several formations unnoticed by Dr. Berger in his account of the Island, inserted in the second volume of the Transactions. With this view I shall not trespass on the time of the Society, by repeating the description of any place he may have already mentioned, unless where I have thought him too brief or erroneous; but, as I have sometimes found it necessary to differ from him, I must offer in my defence the information I have received from gentlemen of this Society, who have assured me, that his account was drawn up from loose memoranda, long after he had left the Island, when, probably many facts had escaped his memory. At the same time, having his observations before me, I was naturally induced to become more anxious in my research wherever I imagined there appeared to be any inaccuracy in his descriptions.

Mr. HENSLow's *Supplementary Observations, &c.* 483

The knowledge of the few additional facts that I now offer may tend to promote further enquiry into the structure of this Island; but much yet remains to be done before a complete account can be expected.

Dr. Berger himself admits his map to be faulty, and I was entirely destitute of the means of accurately correcting it; but some of the positions are so erroneously laid down as materially to affect what I have to communicate, and I therefore submit to the Society a rough sketch of the mountains (Plate 35), particularly of the central chain, which will, I hope, serve to convey at least a general idea of their disposition. The chief error in Dr. Berger's map is in the delineation of the southern group, the whole of which has been brought three or four miles too much to the east; by which means the road from Castletown to St. John's is thrown on the west, instead of the opposite side of South Barrule. Cronknyirrea-Lhaa also, as well as the mountainous ground stretching from it to Brada head, is made to rise about midway between the east and west coasts, instead of forming an overhanging cliff to the latter.

A central chain may be distinctly traced from north Barrule to Cronknyirrea-Lhaa, bearing north-east and south-west, a direction nearly parallel to the greatest length of the island. This chain includes most of the highest mountains, the tops of which are nearly in the same straight line, with the exception of Cronknyirrea-Lhaa, which lying rather to the north of this direction, gives the southern extremity a slight curvature towards the west.

As cursory observations require no particular method of arrangement, I shall follow that adopted by Dr. Berger, beginning with granite and gneiss.

Granite exists in much greater quantity in the Isle of Man, than appears to have been suspected by Dr. Berger, and may be traced

484 Mr. HENSLOW's *Supplementary Observations to*

further than he supposed it to extend, even where he mentions having found it. This was near the Dun, or as the Manks pronounce it, the Dtooden, a small harbour about three miles to the north of Laxey. A stream discharges itself here, and at a short distance from its mouth receives two feeders from the north, the most easterly of which is again subdivided into two courses, and it was in the southern branch of this that Dr. Berger perceived the decomposed portion of the granite he mentions. The different courses descend from a boggy land on the hill to the west, and run across the high road, but the main stream on the south is the only one of sufficient magnitude to require a bridge. Both branches of the northern feeder run over the granite as far down as their union, where it disappears. The southern branch, at one spot, runs through a vaulted excavation in its course below the road, where the rock is so soft as to admit of its being dug by the spade. If a westerly course be pursued up the hill from this spot, many places will be found where the bare rock is exposed for several yards square, and more particularly on some eminences near the top, where the soil has been washed away, and which are situate above the bog before alluded to, near the source of a stream which crosses the road about half a mile to the north, at Ballallen. It may also be traced towards the east, up the How, and though no good section is afforded in this direction, yet the disposition of numerous large blocks, unmixed with those of any other rock, sufficiently point out its extent.

This granite passes into gneiss, which is also in a state of decomposition in the excavation above mentioned, though the small portion denuded precludes the possibility of ascertaining its connexion with the granite, and confines the description to a bare exposition of the fact of its existence.

Dr. Berger mentions the composition of this granite only at the spot where it occurs in a decomposed state ; but at greater elevations it is perfectly compact, the quartz and mica bearing as large a proportion to the felspar as usual. The mica is black and the varieties of texture numerous, but it is impossible to trace with any degree of certainty the beds which constitute the different changes, as no very extensive section is formed in the rock. All that can be stated is, that the greater the elevation, the more compact and less decomposed the aspect ; and on approaching the stratified rocks to the south, the mica gradually yields to chlorite, the quartz at the same time becoming less abundant, till some varieties are little else than felspar and chlorite.

If I have been prolix in my directions for detecting the locality of the granite here, it has arisen from the desire of leading future geologists to the spot without that loss of time which might otherwise attend their search. For it is situate between two streams not half a mile distant from each other, whose courses any inquirer would naturally be led to explore. On finding the dip and direction of the stratified rocks which form the bed of each to be the same, he would most probably conclude that they were parts of a continuous bed, and thus overlook the granite which occupies the intermediate space : a circumstance, which not only happened to myself upon first visiting the spot, but even, as I was informed, to a celebrated geologist, who was there the previous year.

The above is the only spot where Dr. Berger mentions having met with granite *in situ* ; but another more extensive tract of this nature occurs to the south of Foxdale. The main body forms a hill or ridge, stretching nearly north and south for about one mile, and is called by the inhabitants "Slieu-ny-clough," or "the Stony Mountain." The best section of this is formed by the course of the river which

486 Mr. HENSLOW's *Supplementary Observations to*

runs through Foxdale, and there are also several places on its summit which are laid bare in a manner similar to those mentioned near the Dun. The stream affording this section rises on the eastern side of south Barrule, crosses the road between Castletown and St. John's near the sixth mile-stone, and after flowing through a small extent of boggy land, suddenly turns down the slope on the side of Slieu-ny-clough in a northerly direction. Another section is formed by a stream running on the same side, but down the opposite slope of the hill, and here the granite is soon lost beneath mica-slate, but towards Kirk Marown it once more appears at an elevation not so great as before.

The aspect of the granite forming Slieu-ny-clough is very different from that found near the Dun; the materials of which it is composed are in general large grained, especially towards the summit of the hill. On comparison with various granites in the collection of G. B. Greenough, Esq. it appears closely allied to that from Dalky, in Ireland, and also to some towards the southern extremity of Scotland, and it is worthy of remark, that these three localities are situate in nearly the same straight line.

On Slieu-ny-clough itself, I did not perceive any gneiss, but between this and Kirk Marown church, it occurs in a few places; at a hill about midway, behind the Garth, and close to the church. At these places it rises through the clay-slate presenting a bare rock in the midst of verdure. The felspar often greatly predominates; it then has a compact texture with a few spots of mica and quartz dispersed through it; the fracture conchoidal; the structure thick slaty. A similar gneiss is met with on Slieu-ny-carnaane. No section is formed in it, but it appears to lie in a bed penetrating the mountain in a direction about north-east by east. Broken masses occur disposed in an elevated ridge, and which, from the direction

of quartz veins traversing several contiguous blocks, may be known to be still *in situ*. It will readily be conceived that the granite found in working the Foxdale mines, mentioned by Dr. Berger, page 36, was a continuation of that forming Slieu-ny-Clough, since the southernmost shaft is within gun-shot of the spot where we first meet with it denuded on ascending the course of the river.

QUARTZOSE DISTRICT.

By this title I wish to designate three localities, throughout which the prevailing ingredient of the rocks is quartz, and as I know not under what head to class them, I prefer giving a description of their appearance to hazarding a conjecture. No good section is afforded which might enable us to compare their connexion with the other formations, some quarries however occur at intervals which give us an opportunity of examining their structure, which in several places consists of quartz only, very crystalline and finely granular, and would deserve the name of quartz rock, were it not associated with other varieties. The first district to be mentioned lies between the Dun granite and Slieu-Roy, on which latter mountain many large blocks are scattered, which lie bleached on the surface, and at a distance present the appearance so commonly exhibited in granite regions. A section on the west of the mountain shews this rock intimately associated with the clay-slate in broad contorted beds, the composition here consisting of the same ingredients as granite in a very comminuted state; but the general character of the scattered blocks is that of a genuine quartz rock.

To the south-east of South Barrule and Cronk-ny-irrea Lhaa, the quartz is blended with mica and specks of clay-slate, sometimes with the latter only, presenting an intermediate passage between

488 Mr. HENSLOW's *Supplementary Observations to*

mica-slate and clay-slate. On Slieu-ny-Carnaane the appearance is similar, and as Dr. Berger notices the occurrence of blocks of mica-slate on this mountain, he probably considered the rock of which it is composed to be of that nature.

MICA-SLATE.

Two distinct varieties of this are met with on Slieu-ny-Clough. The first occurs in laminæ about an inch in thickness, where the Foxdale river bends to the north after leaving the Castle-town road. The surfaces are richly coated with mica, giving the specimen a brilliant appearance when detached from the bed. It is traversed by veins of quartz and schorl, sometimes crystallized in alternate bands.

The other variety is met with in two or three detached places lower down the stream. The rock has a greyish aspect, and consists of fine grains of quartz and mica intimately mixed with small crystals of schorl. Layers, one or two inches thick, of granular quartz, sometimes lie between contiguous laminæ, and inclose small reddish-brown garnets. Other layers have larger crystals embedded of a liver-brown colour. Although the bed of the river is sunk through this to the depth of ten or twelve feet, and we can trace both it and the granite along different portions of its bottom, the actual contact is no where visible, but is concealed by broken masses and rubbish.

CLAY-SLATE.

Dr. Berger divides this into clay-slate and greywacke-slate, and the latter does in fact appear to exist, though the gradation between it and the former is so insensible that it is impossible to draw the line of separation, and I have preferred designating the whole tract

occupied by these under the name of clay-slate, the general character being that of the Cornish killas.

The gneiss near the Dun, passes into a chlorite slate very regularly stratified. The strata run north-east and south-west, dipping at a considerable angle to the south-east. A bed occurs here about twelve or fourteen feet wide, which lies between well defined strata, but is itself in a state of confusion. It appears to have once consisted of strata similar to those which enclose it, but which from some disturbing cause have been broken and bent in every direction at the time of their consolidation. A sketch (fig. 5, Plate 35.) of a portion of this ten feet in length, representing a vertical section formed by the stream at the Dun, will convey some idea of their disposition. It is much decomposed on the surface, having assumed a brown tinge to the depth of about one foot into the rock. A vein partly composed of clay, and partly of a steatitic substance united with a considerable portion of lime and a few specks of galena, traverses this. The bed may be traced from the road side a little beyond the bridge and along the course of the stream, about half way between the former spot and the sea, until it is lost there. Owing to the inclined position of the strata, connected with the rapid descent from the top of the hill to the sea shore, the real disposition of the bed has not a direction so nearly east and west, as the section formed at the surface might appear to indicate. It is from this bed lying conformably to the direction and dip of the laminæ of clay-slate, that I presume the strata and fissile texture are in this spot coincident. The clay-slate on the western coast, between the northern termination of the red sandstone and Kirk Michael, does not assume that regularly slaty appearance which it presents on the opposite side of the island. There occur also in several places nodules of quartz sparingly dispersed, and

490 Mr. HENSLOW's *Supplementary Observations to*

near Balla Neah, I observed the cliffs to consist of angular fragments of clay-slate embedded in a clay-slate paste, and what is curious, these fragments are scarcely to be distinguished from the base excepting on the surface of the rock which has been exposed to the action of the waves, where they become sufficiently apparent by the fragments assuming different tinges of colour, giving the specimen a mottled appearance. One or two beds of magnesian limestone and iron pyrites occur here.

GREYWACKE.

Beds of greywackè occur in the clay-slate which do not lie conformably with the direction of the laminæ of the latter. The description of one will serve to convey a general idea of the others. On the north part of Douglass-bay at the top of the hill over which the road passes upon quitting the shore, is a quarry in which one of these occur. Two sections at right angles to each other afford a convenient opportunity of examining its position.

Fig. 1. Plate 35, is a section perpendicular to the direction of the strata, and fig. 2, parallel to them. The direction of the bed is nearly north and south (that of the strata being north-east and south-west,) and its dip is to the west. In one part it is seen traversing the clay-slate with great regularity, but in the other it becomes confused, and the schist passes insensibly into it.

On Peel hill there occur beds of a similar description; also between Port-le-Murray and the small patch of limestone to its south, and in the floor of a quarry at Port Eshee, may be seen a bed of a similar quality, and two others which apparently spring from it, intersect the slate in the manner represented by fig. 3. One of these is bounded by soft clay on one side and indurated on the other, whilst the other has the hard clay on one side, but on

the opposite is in contact with the slate itself. These last mentioned beds separate into concretions bounded by remarkably plain surfaces, differing from each other in form, but which do not strictly resemble any geometrical figure. Indeed all these beds appear to possess the same property to a certain degree.

DYKES IN THE KILLAS.

Dykes, which may be termed Elvan, occur in the island. One, two feet broad, is seen near the Dun, rising through the chlorite slate, a short distance below the junction of the two streams where, it was stated, the granite becomes concealed. It is very variable in its composition, sometimes entirely quartz and chlorite.

On ascending Slieu-ny-Clough from Foxdale, along the bed of the river, there occurs a streak of granite, about one foot and a half wide, in the mica-slate which forms the west bank. No trace of it is seen on the east, but it agrees in character with a bump of granite to which it can be traced in the middle of the stream. It appears to affect the fracture of the greywackè bed above mentioned at Port Eshee. This consists of grains so exceedingly comminuted that we should scarcely be led to suspect its real nature from hand specimens.

LIMESTONE.

Dr. Berger has extended the limestone in his map too far to the north; the boundary lies in a direct line from Cass-ny-Hawin to Balla Salla. That which occurs at Port-le-Murray is also separated from the principal bed by an intervening patch of clay-slate.

In the immediate vicinity of the hill to the south of Athol bridge, the limestone encloses nodules of quartz, mentioned by Dr. Berger, p. 44. This may be traced thence, forming a broad band between Balla Hut and Balla Salla, and the appearances it presents lead me

492 Mr. HENSLow's *Supplementary Observations to*

to reject his hypothesis, "that the existence of these concretions may be best accounted for by way of crystallization." I can conceive no possible objection to their being considered embedded pebbles from the shores of the sea, any more than the marine exuviae, so prevalent throughout the limestone, to have been derived from the depths of it; but, if we examine the facts presented, I think but little doubt can be entertained of their being the worn fragments of older rocks.

In the first place, with the smaller nodules are mixed several pebbles, of large dimensions, whose structure is by no means crystalline, but granular; these again are associated with angular masses of quartz traversed by cotemporaneous veins of the same substance. The embedded materials when entering largely into the composition of any stratum appear pretty equally diffused, but when their number is comparatively small they occupy the lower portion, as if they had subsided from their greater specific gravity through matter in a liquid state.

A similar aggregation takes place in the lowest stratum of the small patch of limestone which sets on to the south of Port-le-Murray, and if I recollect rightly at Cass-ny-Hawin also.

Dr. Berger does not notice a change which sometimes takes place in the limestone, where its colour becomes reddish brown and the texture crystalline. This appearance is slightly visible in Castletown bay, but occurs very plentifully to the south of Poolvash. Whether it forms a separate bed, in the latter case, or is merely a modification of the regularly stratified limestone is not so apparent. At one spot however, (marked *c, c*, in fig. 6, plate 35,) near the black marble quarries at Poolvash, two or three eminences occur of this nature rising through the regular strata, which are wrapped round and abut against them in a very perspicuous manner, the

change being extremely sudden; the unstratified portion having a rugged appearance and being filled with fossils, the surrounding strata thin, slaty, and scarcely containing a trace of any.

For the characters of the annexed list of fossils I am indebted to Mr. Sowerby, who kindly undertook their examination.

1. <i>Anomites punctatus.</i>	9. <i>Trilobite.</i>
Martin. Tab. 37. fig. 6.	10. <i>Nautilus complanatus.</i>
2. <i>Producti.</i> Min. Con. 59.	Min. Con. 261.
3. <i>Productus Scoticus.</i>	11. <i>Ammonites Henslowi.</i>
Min. Con. 59. fig. 32.	Min. Con. 262.
4. <i>Productus</i> , finely striated.	12. <i>Pentacrinites.</i>
5. <i>Productus</i> , another variety with intermediate striæ.	13. <i>Madreporites.</i> One of these very large and entirely new.
6. <i>Cardium</i> , new? See Min. Con. 82.	14. <i>Tubipore.</i>
7. <i>Spirifer.</i> Min. Con. 265.	15. <i>Entrochi.</i>
Lin. Trans. Vol. 12. p. 516.	16. <i>Caryophyllea.</i> Several Species.
8. <i>Spirifer</i> , flatish.	

A dark shale, containing much mica, alternates two or three times with the limestone between Derbyhaven and Cass-ny-Hawin.

SANDSTONES AND BRECCIAS.

The sandstones pointed out by Dr. Berger, differ very considerably in character.

The sandstone at Peel, which alone is stratified, occurs both fine grained and under the form of a breccia; spangles of mica are dispersed through it, and it is sometimes mixed with much argillaceous matter. Strata of these appearances alternate. Towards the northern extremity of this formation, near Knocksharry, it terminates in an unstratified breccia containing limestone, agate, and ferriferous carbonate of lime. The limestone is of a dusky

494 Mr. HENSLow's *Supplementary Observations to*

hue, very compact, and often an abundant ingredient. The agates are sometimes of a large size and very beautiful texture, but in general so full of flaws as to render them useless to the lapidary. Though they may be picked out from the sandstone, their union with this appears once to have been more intimate than at present, from a circumstance which happens with respect to the thin veins of crystallized carbonate of lime which traverse the bed in every direction: these invariably pass through every substance which they meet with in their course, even the smallest agates; from whence it would seem that the narrow fissures, into which this infiltration has taken place, were caused by the shrinking of the mass, during its consolidation, at a period when the texture of the different ingredients was more homogeneous than at present. If a crack of this nature were to take place now, it would most assuredly be turned from its regular course upon meeting with those agates, pass round them, detaching one side from the matrix, rather than traverse them in the manner described.

This bed is here seen penetrating and mixing with the clay-slate. Dr. Berger has committed a great mistake in supposing the whole isthmus of Langness to be composed of red sandstone. This is confined to the beach, and a small space inland, down the western side; the remainder of the isthmus being composed of clay-slate. The appearance also is totally different from that at Peel, and is that of an exceedingly rude conglomerate of quartz, slate, &c. in masses one or two feet in diameter, mixed with smaller fragments, and held together in a loose manner by a ferruginous cement. Wherever the removal of a portion of this bed, by the influence of the tide, had afforded an opportunity of examining the slate beneath, *this* appeared to have been rent and split in every direction into fragments, and these again cemented together, so that those belonging

to any particular lamina may be traced for some extent, though thus confusedly disposed.

If I mean the same as that to which Dr. Berger alludes, when he says there is a sandstone overlying the limestone along the Castletown river, it is a breccia, which forms a hill immediately to the south of Athol bridge, consisting of angular fragments of quartz in a basis resembling that at Langness, but the ingredients are not so large or the texture so loose.

A breccia composed of angular fragments of limestone and quartz pebbles, loosely cemented by sand and calcareous matter, overlies the limestone at Caal Ferrane. This bed is not seen on the shore below high water mark, owing to the facility with which it becomes disintegrated by the tide.

The sand and gravel, which compose the high cliffs of diluvial detritus, towards the north of the island, are in many places agglutinated into sandstones and breccias by a calcareous cement which appears to pervade the whole of this tract to a great extent, so much so, that the roads, repaired with sand from this quarter, soon become hardened after a few showers. Fragments of shells and some nearly perfect specimens of recent *cerithea*, often occur sticking in the sandstone, and probably the whole of the calcareous matter here may be derived from this source.

AMYGDALOID.

From what Dr. Berger says of this formation, we might be led to suppose that the whole space between Scarlet and Poolvash was composed of a bed of amygdaloidal trap, which is not the case. The great mass of the formation is a trap-tuff of loose texture. Towards Scarlet it rises higher, becomes more compact, and acquires

496 Mr. HENSLow's *Supplementary Observations to*

the character of an amygdaloid, the basis of which varies considerably in colour, assuming every intermediate shade between light grey and the deepest green. This portion appears to traverse the tuff like a broad irregular dyke, rising at intervals in abrupt masses, the highest of which, denominated the Stack, is insulated, except at low water. It is in several places split by numerous vertical fissures.

Fragments of the amygdaloid occur entangled in the tufaceous tract, as well as large nodules of the dark limestone, and even portions of its strata to a considerable extent, more particularly towards the south, where they have caused the appearance of an alternation; but I could observe no instance where the limestone might not be traced to an end, and be observed to feather out, with the evident character of an isolated mass. On examination we find that the embedded nodules, which occur so plentifully in the tuff, have been penetrated by it, and that it appears in little enclosed patches within the whole extent of their surface. Small cavities like air blebs also occur. These nodules do not appear to have lost their original colour or texture. Where the amygdaloid comes in contact with the limestone on the north, the latter for a few feet appears confused, is not stratified, contains many large cavities coated with bitter spar, and is intimately united with numerous small angular fragments of quartz, which are often exposed on the surface from the weathering of the rock.*

* I am aware that Dr. Mac Culloch has given a different view of this tract, since this paper was presented to the Society, but having again visited the spot I am inclined to think that he has taken his ideas from supposing the portion of limestone marked (b) to extend further than it really does. Perhaps the impossibility of visiting this rock, which can only be approached at very low tide, may have led to the error.

I observed five dykes in this neighbourhood, three to the north and two to the south of the tuff. The composition of all these is nearly the same, consisting of a tolerably close grained basalt, the northernmost containing a great quantity of olivine. Fig. 4, Plate 31, represents the horizontal section of this dyke formed on the beach. They all intersect the stratified limestone, and one also cuts through the tuff. They do not appear to alter the nature of the limestone, except in one or two places, where it has become white and charged with a quantity of argillaceous matter, but at the immediate contact it is filled with specks of basalt and crystals of hornblende, which are entirely embedded in the manner already mentioned with respect to those portions which have been entangled in the tuff.

Explanation of the Sketch, fig. 6, Pl. 35.

- a*, basaltic dykes.
- b*, confused mass of crystalline limestone, mixed with fragments of quartz.
- c*, crystalline limestone rising through the regular strata, containing many fossils.
- d*, the more compact portion of the trap, which is amygdaloidal and porphyritic.

A dyke, similar in character to these, occurs at Brada, running parallel to the course of the metallic vein along the coast to the north of the Head.

The strata towards the southern side of Langness are much intersected by dykes of greenstone.

A bed of greenstone, in which the hornblende is remarkably well crystallized, occurs to the south of Port-le-Murray. It may

498 Mr. HENSLow's *Supplementary Observations to*

be seen on the beach, a few yards to the north of the small patch of limestone there, from whence it runs inland in a westerly direction forming a ridge eight or ten feet broad. It rests on the schist, and thin veins project from it downwards. There is a bed of trap resembling the more compact varieties of that at Scarlet, but not amygdaloidal, lying to the north of the Peel sandstone. It rises from the sea, and penetrates the schist in the form of dykes.

Hornblende slate is seen behind the Garth, near Kirk Marown, but whether in contact with the gneiss there, I was not able to determine, owing to an intervening spot of cultivated land.

SIMPLE MINERALS.

I have but little to add to Dr. Berger's list of simple minerals.

Fibrous Actinolite occurs in a decomposing state near the Dun, in two veins, each about six inches broad, traversing the decomposed portion of the granite and gneiss. It is accompanied by quartz, which it penetrates and frequently colours. It may be taken from the vein in fibrous bundles of three or four inches in length, but it is in general so much decomposed as to have assumed an earthy form. In this state it is mentioned by Dr. Berger, p. 54, under the name of Dun earth. On pressing the fibres between the fingers they crumble to a harsh powder capable of taking away the polish from glass, and consequently very unfit to be used in cleaning plate, a purpose to which it has been applied. I found a single specimen in which the fibres were flexible. Specific gravity=3.03.

I met with a worn lump of the arseniate of lead among the rubbish of the Laxey mine.

Veins of chlorite occur in different parts of the island traversing the clay-slate, and often colouring the quartz by which they are accompanied.

DILUVIAL DEPOSITES.

Curragh is a name given, in the Isle of Man, to any tract of peat bog. A large extent of land, called *the Curragh*, now under cultivation, and lying to the north of the mountainous tract, formerly consisted of this substance.

Much discussion has been excited in the island concerning the origin of its peat, some affirming that it is daily formed by the decay of certain aquatic plants, whilst others attribute its existence to the ruin of ancient forests. Those who favour the former hypothesis draw their conclusion partly from the phenomena observed upon cutting it. The method pursued is to take off the surface, which consists of vegetating matter, and having dug a trench to the depth of a few feet, to replace this on this bottom, when, in the course of time, this trench becomes filled up by a fresh body of peat, a circumstance attributed to the growth of the vegetable that is found on the surface. The opposite hypothesis accounts for the trench becoming replenished, by supposing the peat which forms its walls and base to yield to the pressure existing on all sides, and thus gradually filling up, in the manner that a ditch becomes obliterated when dug in soft mud.

It is not my intention to enter into an examination of the merits of either hypothesis, nor have my sparing observations on this head at all qualified me for such an office. Perhaps to the union of the two causes may be attributed the formation of the curraghs in the Isle of Man; but certain it is that some great catastrophe has here overwhelmed large tracts of forest land, and I am indebted to H. R. Oswald, Esq. of Douglass, for much of the information I received respecting the nature of these and the various trees which are found buried in them.

500 Mr. HENSLOW's *Supplementary Observations to*

These curraghs exist both in the low lands and on the tops and sides of mountains, are very variable in their depth, and in most of them are found trees of a considerable magnitude, principally oak and fir; hazels also, with their nuts, are common, sometimes ash, walnut and black alder are met with, and in one instance holly has been found in a mountain curragh, tolerably green, but rotten and incapable of bearing exposure to the atmosphere. These trees never assume the appearance even of a partial conversion to charcoal, but the more they lose their original structure, the looser and softer they become. The oak is frequently tinged of a deep black colour, and is liable to split and crack when brought to the air, unless carefully seasoned by a gradual exposure; a large trunk will require two or three years training before it can be wrought with any degree of safety for purposes of ornament, but will then admit a polish no way inferior to ebony.

Towards the north the trees lie in general upon a bed of clay; some in the deeper curraghs are still erect; a few are torn up, but the generality are broken off about two or three feet from the roots, and are disposed parallel to each other, with their heads lying towards the north-east; any casual deviation from this position may be attributed to some obstacle, as the branches having changed the direction of their fall. The smaller boughs have either totally disappeared or lie crushed together in one mass.

This general disposition of the trees was long ago noticed by Sacheverill and Bishop Wilson, and is still fully believed to exist by the inhabitants, but I had no opportunity of examining this myself.

Between twenty and thirty years ago, during a violent storm, the sea laid bare a forest, about midway between high and low water-mark in Poolvash Bay, which had been covered with sand. It remained thus exposed for two or three days, and was seen by

several people. The trees were of the pine tribe, and lay disposed in the same direction as those before mentioned, from south-west to north-east. Tradition reports a fine meadow to have been washed away hereabouts, by the encroachment of the sea at a very distant period.

In addition to these general remarks upon the curraghs, I shall mention some observations I made in the parish of Kirk Balaff, upon a substance which the farmers use there as a marl. It is confined to a spot within the compass of a few acres, and in it are found the remains of the gigantic Elk. Over this marl, to which I shall presently revert, is a bed of sand six feet thick and of a light colour ; upon this lies a kind of peat, about a foot and a half thick, composed of rotten leaves, and small branches closely matted together, mixed with sprinkles of sand and containing a vast number of the exuvixæ of beetles, bees and their nests, crushed together with seed-vessels, rotten, but having their external coating well preserved. This bed has not the wet and thoroughly decomposed aspect generally to be observed in peat ; probably from the sand beneath absorbing the rain and moisture, and thus enabling it to remain in a state of unusual preservation. In general the hard wings are the only parts of the beetles which are preserved, and these are in appearance as fresh as on a living insect. Dr. Leach was enabled to identify a few with species at present existing in England. Upon this bed lies turf and vegetating matter to the depth of one or two feet.

The marl which lies beneath the sand is very different in appearance from the substances generally known by that name. It is white or greyish, and the fracture resembles that of a highly decomposed peat, though rather more earthy, and through it are dispersed in every direction the traces of small branches and roots, which partake of the character of the mass, and only become

502 Mr. HENSLOW's *Supplementary Observations to*

apparent where a light or dark line has traced their figure; in short a better idea cannot be conveyed of the appearance presented, than by conceiving a mass of peat converted to a loose, earthy, calcareous substance. When fresh dug it is moist, and possesses a peculiar odour, somewhat resembling that of hydrogen, which it loses upon exposure, and though it retains its texture, does not become indurated, but is easily reduced to powder between the fingers.

Upon connecting the several appearances here presented, it seems probable that an extensive forest was formerly overwhelmed by an incursion of the sea, bringing with it a large portion of sand. This sand would be sufficient to crush and keep down the main body, but some dry branches and leaves would rise to the surface and together with the insects form a scum there, which on the subsidence of the waters would remain resting on a bed of sand.

It would appear also that a herd of Elks must have here perished, so numerous are the remains which have been discovered within a small compass; but at the same time many of their bones have disappeared, if we may judge from the few which accompany the head and horns of each animal.*

Native phosphate of iron, in an earthy and pulverulent state, is sometimes found in contact with the bones; a similar substance I have observed coating the external surface of the empty shells of the *Mytilus cygneus* of Linnæus, which lie scattered over the fens of Cambridgeshire, after the crows have extracted the animals.

* Whilst I was on the island, in August, 1819, two heads with the branches and a vast number of bones were dug up in the finest preservation. An ingenious blacksmith in the neighbourhood, taking the skeleton of a horse for his model, has contrived to put together these bones with great accuracy, and form a skeleton in which the only parts wanting are the half of one hoof and the end bones of the tail. It has a most magnificent appearance, stands six feet six inches to the top of the back, and thirteen feet to the tip of the horns.

From the position in which the trees are said to lie in the curraghs, it would appear probable that some overflowing of the sea, in a direction from south-west to north-east, took place at a very distant period, but the few observations I made on certain banks of diluvium in various parts of the island do not countenance this idea. Some of these occur along the road from Peel to Douglass, and thence towards Laxey. They are generally composed of gravel and sand, and contain rolled blocks of various descriptions and sizes disposed in horizontal or wavy lines. Those about Douglass contain, principally, fragments of quartz and clay-slate, but further north we meet with a few blocks of granite, at Laxey, with very many, and between Laxey and Dun, the stone fences, which have been collected from the fields in the neighbourhood, are composed of little else. This granite is of the same appearance with that at Dun, and though dispersed so abundantly to the south of that place, I did not observe any towards the north. In an undisturbed bank of diluvial detritus at Clovenstone, I found a large block of quartz traversed by crystals of actinolite similar to those met with at Dun, and another block in a similar situation about two miles to the west of Douglass.

Blocks of granite, similar to that of Slieu-ny-Clough lie dispersed for two miles over the low plains between St. Mark's chapel and South Barrule, nor have they the least appearance of resting on their birth-place, so that no cause appears so likely to have placed them there as that which scattered those of Dun. This disposition of the granite boulders appears to indicate a current having set over the country, (at least on the eastern side of the central chain) in a direction from north-east to south-west, or contrary to that pointed out by the alleged disposition of the bog trees.

Beyond the northern extremity of the mountainous group the

504 Mr. HENSLow's *Supplementary Observations to*

whole country consists of diluvial matter, raised in many places to a considerable height above the level of the sea, excepting to the north of the Balla Chirrym hills, from whence there extends, to the point of Aire over two miles, a low sandy plain covered with rolled pebbles.

Dr. Berger has remarked, p. 34, that it is by some asserted, that the sea loses ground here at the rate of two yards per annum, but from enquiries made on this point, I am inclined to think this circumstance overrated. Though all who have lived long in the neighbourhood allow that there has been a very sensible increase of land within their memory, the mean rate at the utmost would not appear to exceed half that mentioned.

The cause of this increase may possibly be ascribed to the tides which act upon the island. These enter the Irish channel at two quarters, that from the south running up the island meets the northern between Kirk Maughold and the point of Aire, where their united efforts form the flood, and their strength being exhausted by opposing forces, we may imagine that they would leave deposited whatever each brought with it, causing an extent of shallow water for a considerable distance. It will readily be seen that the body of water raised over this deposit would not, on subsiding, produce the same effect in removing as a current in accumulating it; thus permanent additions would daily take place, and the portion contiguous to high water mark become gradually covered with soil and vegetation till it is at length removed without the influence of the tide. The numerous blocks of various descriptions and magnitude found along the north coast, are probably derived from some distant spot, for although several of these have doubtless fallen from the cliffs, yet their vast number precludes the idea of all having come from thence, more especially

Dr. BERGER's *Account of the Isle of Man.* 505

on the north-east quarter where the sea does not wash their base but in few places, being prevented from reaching it by a slight accumulation of sand and pebbles. But the blocks which are scattered through the high cliffs of sand and gravel were themselves most probably derived from the very same source as their neighbours on the beach.

Fig. 6.

MAP & SECTIONS OF THE ISLE OF MAN.

Fig. 1.

Fig. 2.

Fig. 3.

Fig. 4.

Fig. 5.