

*Observations on the Submersion of part of
Mount's Bay; and on the Inundation of
fine Sand on the north coast of Cornwall.*

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OUGH the labours of geologists are limited,
eral, to the investigation of the formation,
and law of the substances which com-
e shell or crust of our Planet, yet it is
ogether foreign to those studies, to ex-
uch remarkable alterations of the surface,
vidently not attributable to the slow ope-
of the ordinary course of natural causes,
ain lasting memorials of a sudden over-
occasioned by some violent shock of
ding elements.

rwall, being mostly of primitive structure,
sed considerably above the level of the
oes not exhibit many instances of post
n derangement. The two most remarka-
the submersion of a considerable extent

of low woodland, now forming a part of the Mount's Bay;—and the inundation of sand, which buried a large tract of cultivated land bordering the sea coast, from St. Ives eastward to beyond Padstow, particularly in the parishes of Lelant, Phillack, Gwithian, Perranzabuloe, Crantock, and St. Enodock.

Of the time and manner of these catastrophes there is no record, a circumstance remarkable, if, as supposed by some, they happened after christianity prevailed, and monkish establishments were formed in this part of Great Britain. All the historians of this county, from Leland, Norden, and Carew, downward, have noticed the ancient tradition of St. Michael's Mount being formerly situate in a wood, several miles from the sea. They have also handed down as a concurrent tradition, according to Carew, who, treating of the ancient extent of the county, says, "The encroaching sea hath ravined from
" it the whole country of Lionnesse, together
" with divers other parcels of no little circuit:
" and that such a Lionnesse there was, these
" proofs are yet remaining. The space between
" the Land's-end and the isles of Scilly, being
" about thirty miles, to this day retaineth that
" name, in cornish, *Lethowsow*, and carrieth an
" equal depth of forty or sixty fathoms, (a thing
" not usual in the sea's proper dominion,) save
" that about midway, there lieth a rock, which

“ at low water discovereth its head. They term
“ it the *Gulf*, suiting thereby the other name
“ of Scilla. Fishermen also casting their hooks
“ thereabouts, have drawn up pieces of doors
“ and windows.” (Carew, p. 3.) To this, Dr.
Borlase (*Letters on the Scilly Islands*) adds,
“ That there existed formerly such a country
“ as the Lionnesse, stretching from the Land’s-
“ end to the Scilly Islands, is much talked of in
“ our parts. Some fishermen also have insisted,
“ that in the channel between the islands of
“ Scilly and the Land’s-end, there are to be seen
“ tops of houses, and other remains of habita-
“ tations.” Dr. Borlase, however, seemed desi-
rous of shewing that he put no implicit faith in
the story, by adding, “ But I produce these ar-
“ guments only as proofs of the tradition, and
“ of the strong persuasion which from time
“ immemorial has prevailed among the inhabi-
“ tants of Cornwall, that such a country as Lion-
“ nesse once existed, but is now buried under
“ the sea.” Though it must be acknowledged,
that two pages after, the venerable and learned
historian appears to credit the story, which then
touched on a string that vibrated very power-
fully on a favorite theory, viz. the rock idols,
and rock sacrificial basins, of the Druids. “ A
“ person taking a survey of the channel in the
“ year 1742, took one of his stations, as he told
“ me, on the Wolf-rock, where he observed a

“ cavity, like a brewer’s copper, with rubbish at
“ the bottom, without being able to assign any
“ cause for its coming there. This cavity could
“ be no other than a rock basin; and conse-
“ quently this rock is greatly sunk, being now
“ entirely covered with the sea, at least nine
“ hours in twelve.”

Dr. Macculloch has abundantly proved that all the fancied statuary of the Druids, the hollows, and, sometimes, fantastic forms of our granite rocks, are merely the result of the disintegration of the softer parts by chemical and elementary action, which indeed is obvious to a very cursory examination. The actual operation may be traced in its various stages, shewing clearly that the only chisel ever employed was the tooth of time, the only artists, the agency of the elements. And that there may be natural fissures or cavities on the surface of the Wolf-rock, assaulted for so many ages by billows that would dash a first-rate ship to atoms in a few minutes, is far from being singular or surprising.

The arguments adduced by our old historians in proof of the tradition, refute themselves. In the first place, the sea is no shallower between the Land’s-end and Scilly, than at equal distances from land, on other parts of the coast; and the *midway gulf*, or the Wolf-rock, happens not to be in that channel at all, but consider-

ably to the south of it; and as to the stories of fishing up pieces of doors and windows, and seeing tops of buildings, &c., had all the buildings, doors, and windows, of Cornwall, been placed there, the first tempest would have swept them all away, as pebbles before a torrent. The truth is, that no such relicks were ever discovered, or could have remained for discovery, in that boisterous channel of the Atlantic ocean.

But the geologist will rather examine the gigantic cliffs which bound the ocean at the Land's End, and the opposite Islands of Scilly, for indications of the mighty shock supposed by the tradition. The intermediate sea is about 300 feet deep—the land on either side, from 200 to 300 feet high. The sudden subsidence of a tract of country 30 miles in length, and perhaps 10 in breadth, to the depth of 500 or 600 feet, with the rush of the waters of the Atlantic into such a vast chasm, must have caused a great convulsion and disorder in the new formed cliffs on either side; of which however there is no appearance. The enormous masses of rock, on both sides exhibit, no signs of unusual derangement, but appear in the same natural order observable in other cliffs of like formation, on distant parts of the coast.

While we seek in vain for any evidence in confirmation of the Lionnesse tradition, there is much to corroborate that which relates to

an irruption of the sea over a tract of low woodland, now forming the northern part of the Mount's Bay, and comprehended within a line drawn from near to Cuddan point on the east side, to Mousehole on the west, a distance of about five miles.

Saint Michael's Mount, "*the Pilgrim's holy vaunt*," was named in Cornish, as Carew informs us, "*Caraclowse in Cowse*, in english, *the hoare rock in the wood*: which now is at every flood "encompassed by the sea, and yet at some low ebbs, roots of mighty trees are descried in the sands about it." Later historians state, that this is probably the St. Michael's described in a charter of Edward the Confessor, as *near the sea*, "*Sanctum Michaelum qui est juxta mare*." And that Florence of Worcester expressly asserts that it was formerly five or six miles from the sea, and enclosed with a very thick wood; and therefore called in British *Curreg lug en Kug*, "*Le Hore Rok in the wodd*." The Hore Rok, was certainly an appropriate name, as the weather beaten surface of its massy granite rocks, still give it a greyish hoary aspect, which would be more striking in contrast with "greenwood" scenery.

Tracing the north-west shore of the bay from the Mount westward to Newlyn, the ebb tide leaves a large space uncovered: the sea-sand is from one to two or three feet deep; and under

this stratum of sand is found a black vegetable mould, full of woodland detritus, such as the branches, leaves, and nuts of coppice wood, together with the carbonised roots and trunks of forest trees, of large growth. All these are manifestly indigenous; and from the freshness and preservation of some of the remains, the inundation of sand as well as water, must have been sudden and simultaneous; and the circumstance of ripe nuts and leaves remaining together, shews that the irruption happened in the autumn, or the beginning of winter. This vegetable substratum has been traced sea-ward as far as the ebb permits, and is found continuous, and of like nature.

Another, and more decided evidence of a tremendous shock, still in part exists; but, unless recorded, will itself be only a matter of tradition at no distant period. Except the projecting tongue of land, which forms the port and site of the town of Penzance, the bottom of the bay from Marazion to Newlyn, is bounded by a sand bank, locally termed the Green, having from time immemorial acquired enough of vegetation to warrant the name. This fragile bulwark daily and visibly wastes, through the operation of two powerful causes of consumption, viz. the quantities carried off for manure, and other uses, by the inhabitants of the adjacent country; and the continual encroachment of the sea on the

mouldering front, where every wave, as well as every stroke of the wind, makes some effactive impression.

The original length of this Green (or rather two Greens) was about three miles on the east, and one mile on the west of Penzance; and is already much shortened. The ancient breadth is unknown. The oldest notice, I have met with, is a letter still extant (belonging to the present representative of the Daniell family, Mrs. Ley of Penzance,) which was written in the reign of King Charles the Second, to the then proprietor of an estate which included part of the western green; and that part is there estimated at *thirty-six acres of pasturage*. Of which *part*, a small remnant of perhaps two or three acres, is all that remains of the *whole Green* on this side, which was, within the remembrance of persons, not long since deceased, a mile in length; and it is in the recollection of people still living, that the ground on which the youth of sixty or seventy years ago, exercised their contests of cricket and other sports, is now swallowed up by the sea. This agrees with the proportionably larger extent mentioned in the letter just alluded to; and if a like ratio of decrease may be assumed for a period of six or seven hundred years, its original dimensions must have been very large, in relation to the source from which, on any probable supposition, its formation could be derived.

Enough still remains to shew that the whole was a homogeneous mass of silicious sand:—the detritus of disintegrated granite:—that it had undergone ablation, which, dissipating some of the lighter parts, left the larger and heavier crystals of quartz predominant in the mass. It also appears, that its deposition on its present bed, was sudden and simultaneous, because the subsoil and vegetable remains continue in fresh preservation; and the whole bank forms but one stratum, containing no terrene and but few marine exuviæ. It is also remarkable that the natural sand, which forms the bed of the sea, is altogether unlike that of the *Green*, being much more comminuted, different in colour, and evidently the pulverised clay-slate, and elvan, of which the rocks of the inner section of the bay are composed. Here the question obviously arises, whence did this, originally prodigious, mound of granitic sand proceed? Knowing what vast accumulations of alluvial deposit have been made in many places by rivers and wintry torrents, one naturally asks, may not this have been formed in the same way? But the homogeneous structure of the bank, and the absence of terrene remains, decisively oppose that conclusion; besides which, the streams that empty themselves into this part of the bay, are mere rivulets, the longest course of which hardly exceeds five miles, and that too in general over a

killas, and not a granite soil. It is therefore quite evident that the Green was not an alluvial deposit from the land. We must therefore refer its formation to one of those tremendous convulsions of the elements, through which the boundaries of the sea have been so often, in some degree, changed.

But here again we are met by another difficulty. The sea sands of this and the adjacent coasts are either slaty, or calcareous, while this is, as beforementioned, purely granitic.

On examining the cliffs round the bay, we find that the great granite range intersects the shore on the east near to Cuddan-point, and on the west at Mousehole, precisely in the line which the supposed seaward boundary of St. Michael's Wood would have occupied. Now, if we may be allowed to imagine, that the mound of granite rocks was once continuous from Mousehole to Cuddan, and that these had been disintegrated, by chemical and elementary agency through a long course of ages, (of which there are examples at the Scilly Islands), we shall find a granitic supply adequate to the formation of the Green, and which, in every other direction, is sought for in vain. An extraordinary rise and convulsion of the sea, accompanied by a violent hurricane, might have carried such a mound over the adjoining low land, and have finally and irretrievably submerged it, as was

the case with the great estate of the Earl Godwin; and possibly at the same time when that irruption happened.

Dr. Borlase was inclined to suppose the submersion of St. Michael's wood contemporaneous with a great encroachment of the sea, mentioned in the Irish Annals to have occurred in the year 830. But Mr. Whitaker prefers the year 1099, citing Florence of Worcester, who says that "on the third day of the nones of November, 1099; the sea came out upon the shore, and buried towns and men very many, and oxen and sheep innumerable." Also the Saxon Chronicle sub anno 1099, "This year, eke on St. Martin's mass day, the 11th Novembre, sprung up so much of the sea flood, and so myckle harm did, as no man minded that it ever afore did, and there was this ylk day a new moon." If this was the period when the Godwin estate and other low lands were submerged, it will accord well with the tradition relative to the overflow of the Mount's Bay. But leaving this point to the decision of learned antiquaries, the geologist discovers in the actual bed of the sea, vegetable remains, so circumstanced as to prove beyond all possible doubt, that where they now lie, there they once grew and flourished. In the *Green* he finds equal evidence, that its whole mass, vast as it must originally have been, was wafted from a

distance (of at least several miles) by a sea, and not a land, flood, overwhelming the woodland, on which its formation was suddenly effected; and even now, in its almost final decay, presenting an awful memorial of some tremendous convulsion of the elements, written by the hand of nature in characters so plain, that he who runs may read.

The north coast of our peninsula was visited, in some remote period, by a different, but no less destructive calamity. A very considerable tract of cultivated land was overwhelmed by an immense inundation of sea sand, forming hills of an elevation several hundred feet above the level of the sea, varying in height and form, probably, with the undulating surface of the country thus submerged. But however varying in magnitude and appearance, the masses are alike in substance, being all calcareous sand, or rather comminuted marine shells. It might be a subject of curious speculation to enquire into the source of such a vast influx of matter, every atom of which was once the abode of animal life; but that inquiry would lead us far beyond the bounds of useful research.

It is remarkable, that not even a popular tradition remains of the time, or manner of this extensive devastation, which reached, with some distinct intervals, nearly forty miles in length. That it must have been witnessed by a nume-

rous population, is evident from the number of churches still remaining, more or less ingulphed; and on pieces of ground cleared from time to time, the lines of the ancient furrows are found strongly marked. It is also strange that no memorial of the event should have been discovered among the papers of the great proprietors, whose interests were affected by a calamity so destructive of valuable domains, and so alarming to the fears of the community at large. The particular circumstances of the catastrophe seem to have been already forgotten, when Leland visited the place, about three hundred years ago; and yet the period of its occurrence could not then have been *very remote*, because it is unquestionable that no churches would have been built, subsequent to the inundation, on the sites where we now find them; and those still extant are evidently not of an age much anterior to that of Leland himself.

Some allusion to this event was supposed to be discovered among ancient records of the Arundel family, fixing the period to the twelfth century; but the fact just noticed, of the situation and age of the parish Churches, decisively refutes that conjecture.

By the shifting of the sands, the ruins of ancient buildings have been discovered; but they do not seem to have attracted much notice or investigation; and hitherto no relicts have been

found, that throw any light on the question, as to what period the submersion should be fixed. In this inquisitive age, we may expect more attention will be given to such an interesting enquiry after the remaining memorials of the *olden times*. It will be an encouragement to the researches of the persevering antiquary, to know, that owing to the dry and antiseptic nature of the sand, whatever may remain, is likely to be found in good preservation.

In some places, where the sand has been bored to a great depth, distinct strata, separated by a vegetable crust, are visible; which seem to indicate a succession of inundations, at distant periods: but it is possible, and not improbable, that this may be owing to a local shifting of the sands, because in other places the like series of strata is not found.

The phenomenon that will most powerfully arrest the attention and excite the investigation of the geologist, namely the formation of rocks, is here found in great perfection; at New-quay in particular, large masses of sand-stone have become sufficiently indurated to be used for architectural purposes. The chief cause of adhesion and induration appears to be an oxide of iron held in solution by the water, which percolates the sand, where the lapidification is now in process, and where it may be traced in its various stages. Whether any, or what other chemical

agencies may be also employed in concurrent operation, will be known, perhaps, to future mineralogists, who shall be able to penetrate deeper into the secrets of the great laboratory of nature. At present the scientific investigator may see her visibly at work; but should he hazard theoretic speculations, they may prove as little conclusive, as the notions which amused the philosophers of the last century have since appeared. Little more than fifty years have passed away since a learned author (of whom Cornwall is, and will be, justly proud), treating this very subject, affirmed that, "these imperfect stones, which are spread here and there among the Gwithian and Piran sands, are the accidental formations of a thinly dispersed *sparry or coralline juice*, blown up together with the spray of the sea. Let no one wonder that the spray of the sea shall produce such an effect; for that spar is suspended in all water is likely; but in particular waters is evident, from incrustations formed in the bottoms of culinary vessels, and in water pipes:—from petrified moss, and many other phenomena; and that spar is also found in sea water, must certainly follow, from the sea being open to, and ready to receive, all that springs will convey into it. All coraloid bodies and shells are formed of spar, modified and mixed so as to comply with the occasions of marine plants and animals." And again, "There is a kind

of stony, lapidific matter which runs through and mixes with the substance of all stones, and may justly be esteemed *the universal cement*, by which earths and minerals are combined into all the several orders and species of stones. This cement is either *spar, crystal, or diamond.*"

This ingenious hypothesis will cause a smile in mineralogists of the present age; but who can tell how much philosophers of the next, will smile at geological theories now in repute. For some, perhaps, they will grieve; and lament, that researches which are every where met by indications of infinite power and infinite wisdom, should, in any case, have excited doubts of the existence of the great Creator and Preserver of all things!