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729TH ORDINARY GENERAL MEETING,

HELD IN COMMITTEE ROOM B, THE CENTRAL HALL, WESTMINSTER, S.W.1, ON MONDAY, JANUARY 20TH, 1930.

AT 4.30 P.M.

ALFRED W. OKE, ESQ., LL.M., F.G.S., IN THE CHAIR.

The Minutes of the previous meeting were read, confirmed, and signed, and the HON. SECRETARY announced the election of the Rev. William Crowe as an Associate.

The CHAIRMAN then called on Lieut.-Col. L. M. Davies, R.A., F.G.S., to read his paper on "Scientific Discoveries and their bearing on the Biblical Account of the Noachian Deluge" (being the Langhorne Orchard Prize Essay, 1929).

SCIENTIFIC DISCOVERIES AND THEIR BEARING ON THE BIBLICAL ACCOUNT OF THE NOACHIAN DELUGE.

By LIEUT.-COL. L. M. DAVIES, R.A., F.G.S.

1.—INTRODUCTION: THE FORETOLD PREJUDICE.

"There shall come in the last days scoffers, . . . saying . . . 'All things continue as from the beginning of the creation' . . . For this they willingly are ignorant of, that . . . of old . . . the world that then was, being overflowed with water, perished."—(2 Pet. iii, 3–6.)

"To this theory" (the theory of Uniformity in all things), "I have always seen very great objections."—(Sir Joseph Prestwich.)

THE question as to whether we possess scientific confirmations of the Biblical Deluge is primarily one for geologists to decide; and it must be admitted that the great majority of geologists to-day would answer the question emphatically in the negative. We must remember, however, that this very negation, *also its philosophic basis*, was definitely foretold in Scripture some eighteen centuries ago, which tends to rob that

negation of some of its weight; and it is also a fact that some geologists have been convinced that the clearest evidences do exist of a comparatively recent and vast diluvial catastrophe, which may be the one referred to in Scripture.

Among these geologists we may mention in particular Sir J. W. Dawson, a former President of the British Association; the 8th Duke of Argyll, a former President of the Geological Society of Edinburgh; Sir Joseph Prestwich, an undoubted authority on Pleistocene deposits; Dr. G. F. Wright, an expert who, as Sir Arthur Keith reminds us, gave a lifetime to the study of glacial phenomena; and Sir H. H. Howorth, a geologist who wrote more vigorously on the subject of the Flood than, perhaps, any other, publishing his views in the leading geological journals of the day, writing bulky monographs on the subject, and openly charging his opponents with failing to face some of the most significant of his facts, or to account for them satisfactorily on any other theory than that of a Deluge.

Here, then, we come face to face with a circumstance which cannot be ignored in dealing with this subject—namely, the existence of a marked *prejudice* against the acceptance of belief in a cataclysm like the Deluge. Now we should remember that, up to a hundred years ago, such a prejudice did not exist—as a general one, at least. Belief in the Deluge of Noah was axiomatic, not only in the Church itself (both Catholic and Protestant) but in the scientific world as well. And yet the Bible stood committed to the prophecy that, in what it calls the "last days," a very different philosophy would be found to be in the ascendant; a philosophy which would lead men to regard belief in the Flood with disfavour, and treat it as disproved, declaring that "All things continue as from the beginning of the creation" (2 Pet. iii, 3–6). In other words, a doctrine of Uniformity in all things (a doctrine which the apostle obviously regarded as untrue to fact) was to replace belief in such cataclysms as the Deluge.

It is striking, therefore, to note how this prophecy has been fulfilled *within the last century*; for the last eighty years or so have witnessed the complete supersession of the "catastrophism" of Cuvier and his successors by the Uniformitarian doctrine of Hutton, Lyell and the modern school. It also seems unquestionable that this modern doctrine of Uniformity, or Continuity as it is sometimes called, was EXACTLY summed up by St. Peter when he foretold the rise of a belief that "All things continue as from the beginning of the creation"; for it is, to

borrow Sir Archibald Geikie's words, " a fundamental feature in Hutton's philosophy that the present affords the key to the past, and that we are not at liberty to imagine new causes of change when those seem insufficient which occur in our experience." Thus we see how, even when the evidence seems to demand the recognition of abnormal events in the past, the Uniformitarian is " not at liberty " to admit the force of the facts, but is compelled by his philosophy to abide by the pure assumption that " the present affords the key to the past " ; in other words, that " All things continue as from the beginning of the creation." And so, after eighteen centuries, we at last find the ancient prophecy fulfilled before our eyes ; *for here is, as foretold, where opposition to belief in the Flood lies to-day.* There is no mistaking the fact. It stares us in the face. Anyone, to-day, who argues in favour of belief in the Flood, at once encounters opposition upon these long-foretold lines.

Having noted the existence of this prejudice, however, we will now proceed to examine some of the facts appealed to by the above-named five geologists.

2.—Proofs of Contemporaneity : The Mammoth and the Flood.

" Sir H. Howorth's arguments from the presence of herds of mammoths, etc., in places where they must have been overwhelmed by a sudden catastrophe, have always seemed to me very strong, and have never been answered by ' orthodox ' geology."—Prof. A. H. Sayce (letter to Prof. G. McCready Price).

One of the hardest things to prove, in geology, is the fact of contemporaneity ; *i.e.*, that geographically separated deposits were laid down at the same time. It is obvious that this difficulty must be found in its most acute form when we attempt to refer well-separated sediments to a single, widespread and very brief event like the Deluge described in Scripture, the climax of which lasted only a few months. Granted a prejudice, therefore, against admitting the fact of the Deluge, nothing is easier than to throw suspicion upon data which seem to support belief in it, by suggesting that such data are not the results of one general catastrophe, but of numerous minor and local events, well-separated in time, and implying no break in the general continuity of slow cosmic changes. In many cases, too, the objection is probably well grounded. It is by no means easy for the

collector of facts, when he appreciates the difficulties of the problem, to be sure that he can distinguish the traces of the Flood from those of other events.

It seems to have been a true instinct, therefore, which led Sir Henry Howorth to commence his arguments in support of belief in a general Deluge by appealing to the facts regarding the Siberian Mammoth. Here we have a class of circumstances which will repay close attention.

* * * *

All over northern Asia, from the Obi River on the west to Behring Straits on the east (a distance of over 2,500 miles), the remains of an extinct species of elephant (*Elephas primigenius*, Blumenbach 1803, popularly known as the mammoth, and distinguished by its highly specialised teeth and remarkable covering of hair) are found buried deep in the permanently frozen soil. Often they are found intact, complete with skin and hair, showing that they were buried *and frozen* before their bodies had time to decompose. Sometimes complete skeletons or whole carcases of these great beasts are found standing erect, indicating that they were overwhelmed abruptly by the sediments which now cover them. They are also often found collected in vast herds representing every age, from adult to infant, and associated with innumerable remains of other animals, such as the "woolly rhinoceros" (*R. tichorinus*), the great extinct ox (*Bos primigenius*), the bison, musk sheep, horse, and many other forms both living and extinct.

What is still more remarkable is, that the mammoth and other remains become more numerous as we go further north; the greatest numbers of all being found in the islands of the Arctic Sea, to the north of Asia. The mammoths buried in those islands are distinguished, on the whole, from those of the mainland, by being of lighter build, with much lighter tusks.

Buried in the same deposits with the mammoths and their companions are often found great masses of trees, branches, leaves, etc. Much of this wood has apparently been transported from the south; but a great deal of it obviously grew on the spot, although nothing but hardy mosses or stunted bushes can live in those localities now. It seems that the indigenous fossil timber can be distinguished from the transported specimens by possessing narrower annual rings of growth.

How are we to explain such facts as these? The fact that

the mammoths and their companions are so perfectly preserved indicates that they could not have been transported far; in other words, as Flower and Lydekker admit, they must have lived in the general locality in which they are found. This is further supported by the consideration that, had they been transported from the south, we would find their remains becoming more numerous toward the south; whereas the reverse is the case. Local indications also bear this out, for, as we have seen, the most northern specimens are varietally distinct from those found on the continent.

It is only too obvious, however, that such immense mixed herds of animals could never subsist in the same regions to-day, even if they could survive the intense present cold. There would not be enough food to support them. Nor could an animal like the mammoth live on the only *kind* of food that is now found over great stretches of the tundra, where its remains are buried, but where hardly any vegetation but mosses and a few humble flowers can exist to-day. Elephants, however hardy, cannot graze close to the ground like sheep or oxen. The teeth of the mammoth, indeed, witness to the fact that its diet must have been very different from anything now growing where many of its remains are found. Its molar teeth, exhibiting an exceptional number of transverse plates, remind one of the molar teeth of the existing Indian elephant, which exhibit more transverse plates than are found in the teeth of the African elephant, and adapt it, as Falconer has shown, to a more woody and less succulent diet than that upon which the African species normally subsists. The mammoth must have required a more woody diet than now exists where its remains are found, and where even the humble plant life which does exist is often covered deep in snow during the greater part of the year. It seems clear that the fossil wood buried with the mammoth and his companions, much of it rooted and erect *in situ*, obviously indigenous, and distinguishable from drifted masses, must represent the true food of the mammoth, and show us what grew on the spot when he was alive.

This, then, indicates a considerable change in climate since the days when the mammoth and his contemporaries roamed over northern Siberia. The necessity of believing in this change has, indeed, been admitted by many Uniformitarians themselves; although some, like Osborn, try to argue that no change is really proved, since the teeth and stomachs of certain

mammoths which have been found contain remains of plants of similar species to those existing in the same regions to-day. Such people ignore the fact that the relatively few and stunted bushes, which now exist, could never have supported the great herds of animals whose remains we find entombed; and that, buried with those herds, are the remains of the forests in which they lived. The survival of impoverished representatives of species in a region is quite compatible with a change of climate evidenced by the more abundant and far more luxuriant forms of their predecessors. Such people also ignore other facts, namely, that remains have also been found, in the teeth and stomachs of the Siberian mammoths, of plants such as only grow in temperate regions to-day; and that, buried with the mammoths, are found shells of land molluscs which could not possibly survive in those regions to-day, and whose present habitat is far to the south. It seems clear, therefore, that the change in climate *must be allowed.*

Granting, then, that a considerable change in climate did occur, are we to believe that the change took place rapidly or slowly? Rapid changes are anathema to the Uniformitarian, who will (and perhaps rightly) adopt any explanation which offers a possible alternative. One thing, however, is certain: The *soil must have been soft when the animals were buried.* As well could the animals have been pushed into solid granite, as buried in the soil as it exists to-day. And yet the freezing of the ground could not possibly have been delayed for long after they were buried, since, in that case, the carcases would have decomposed. The freezing, therefore, must have followed almost *immediately after the burial.* Nor could the containing sediments ever again have thawed, for the carcases would have decomposed at the first relaxing of the frost; in other words, the *change in temperature must have been permanent, as well as sudden.* It seems difficult to escape from this conclusion, which was expressed in the clearest terms by Cuvier more than a hundred years ago, and has repeatedly been admitted by geologists of the first rank since then. As Howorth complained, he never could get his Uniformitarian opponents to face the facts here, or to accept the necessary conclusions from the same, even when unable to question the justice of those conclusions.

If we, however, admit the force of the above arguments, and admit the evidence of a sudden and permanent change in *climate,*

we are reminded of the fact that such a thing can hardly be purely local; and when we realize that, as Sir Henry shows, frozen "mummies" of mammoths, rhinoceroses, etc., have been found all over northern Asia, from Kamtchatka in the east to the Ural Mountains in the west, we realize that this change in climate must have been *continental in extent as well as instantaneous in time.*

Here, then, we seem to have proofs of *contemporaneity* of a kind unique in geology; proofs capable of establishing the contemporaneity over a great area of an event which must have occurred within limits of time quite as narrow, even, as those implied by the story of the Noachian Deluge. But how abnormal are the circumstances which enable us to recognize the presence of such proofs! Were it not for the permanent *freezing* of these buried carcases, there would be nothing to prevent our adopting the very natural and reasonable assumption that the animals had been buried at very different times, spread over a very long period; and hence that no sudden or widespread catastrophe need be inferred from the facts—which the Uniformitarians would soon explain away in terms of myriads of supposed minor local tragedies. Let us, therefore, recognize the good fortune which, at least for once, has armed us with proofs of a catastrophe greater than anything dreamt of in our current scientific philosophy.

Granting the contemporaneity of the event, then, we have next to ask: *Under what sort* of disaster did the mammoths and their companions perish? Was it the sudden cold itself that killed them? If not, then what was it that did so? That the sudden cold alone produced the present state of affairs, we cannot suppose. Even if the cold killed, it could not also bury the animals; indeed, by congealing the ground, it would tend to prevent their burial. We must remember that the present soil of Siberia is frozen down to great depths—600 feet at Yakutsk—below the surface. During the short and feeble summers the first few feet below the surface are thawed, but not the deeper-lying layers, which remain permanently frozen; and it is to this fact that the preservation of the buried animals is due. Had the creatures not been buried, and buried fairly deeply, before being frozen, they would have shared in the first surface thaw, and so would long ago have decomposed. If, then, they were buried before they were frozen, it could hardly have been the frost that killed them.

Indeed, we are told by those who have examined the better preserved "mummy" heads for evidence as to the way in which the animals met their death, that the indications seem to point to choking or drowning, rather than frost. Thus the capillaries are gorged with blood, a sign of asphyxiation; or the nostrils are widely distended, as if the creature were gasping for breath.

It has, therefore, been suggested that the animals met their death by being bogged, or that they sank into the mud of river-beds. But why should so many animals of all species and ages have been bogged simultaneously, over the whole north of Asia, at the exact moment when the great frost was about to set in? And what of the masses of timber, so often associated with the animal remains? How could the forests have bogged themselves too? Nor are the carcases found only in river-beds, or in ground that could ever have been boggy. On the contrary, they are mostly found on the *higher* ground, as if the animals had been trying to escape from torrents of water bringing the sediments—gravel, sand and clay—which now envelop them. Note, too, that the carcases are most abundant of all on the islands of the Arctic Sea, which must have represented the local hill-tops and plateaux in the days when the mammoth was alive. It is impossible to suppose that those islands could have supported the vast herds of animals whose crowded remains cover their whole surfaces to-day; and the fact that the mammoth once roamed over the intervening lands, which are now covered by the sea, is shown by the circumstances that, as Nordenskiold tells us, mammoth remains, together with tree trunks, are washed up from the same by every storm, while fragments of mammoth tusks, etc., and remains of the forests in which they lived, were repeatedly brought up by his trawl. It seems clear that the crowded carcases on the islands must be those of animals that fled there for safety; and it is certain that the islands could not have represented river-beds in the Mammoth Age, nor the likely areas for bogs.

Everything, in fact, seems to point to the coming of widespread torrents of water, heavily charged with sediments from the south. Brandt comments on the fact that three mammoth mummies, or else intact skeletons, described by him, and one described by O. Fisher, all of which were found standing erect, were facing north. The Arctic Islands, which would have represented the last high ground upon which the animals could take refuge from the oncoming flood, are described as practically consisting, in their

upper layers, of animal remains, while tree trunks are piled in wildest disorder against their southern slopes.

Thus the great and sudden *change of climate*, to which the Siberian mummies testify, affords us a proof of *contemporaneity* in regard to numberless facts; and, by linking them up as *simultaneous over a great area*, affords us grounds for holding that they can only be explained by postulating a flood of continental dimensions.

Nor is the time of this occurrence geologically remote. All are agreed that the mammoth and woolly rhinoceros were among the later companions of early man; and a flood which extinguished these, and many other contemporaries of early man, must have fallen within the human period. Indeed, we have positive proof that it did so. Although human remains are scarce in Siberia, yet undoubted human implements have been found, there as elsewhere, associated with the buried mammoth remains.

3.—The Rubble-drift, Head, and Ossiferous Fissures.

"Many explanations have been suggested for parts, but none have embraced the whole of the geological phenomena. Led to suspect the possibility of an unusual form of water agency, I put the case of a Submergence and subsequent Emergence hypothetically, and found that the consequences which resulted agreed in a remarkable manner with the observed facts."—(Prestwich, *Phenomena Bearing upon the Tradition of the Flood*, Preface, p. vi.)

"(The) submergence hypothesis not only meets the requirements of each particular case, but . . . it also shows them all to be concordant, and such as would pertain to one common and general cause."—(Prestwich, *Phil. Trans.*, vol. 184, p. 983.)

It came as a shock to some geologists, themselves very senior, when the venerable Prestwich, then over eighty years of age, and affectionately styled the "father" of the Geological Society, produced a succession of papers announcing his self-conversion to the opinion that a great but transitory flood of waters had enveloped England and Western Europe (including Northern Africa) at the close of Palæolithic times.

The kind of evidence to which Prestwich appealed is very different from that found in Northern Asia, which we have just been considering. Here, in Western Europe, we have not to do with the violent onset of a flood, but with its violent termination; the evidence consisting of masses of local and unrolled

debris, which have apparently been swept with considerable violence into local pockets or catchment areas, without regard to the present drainage system.

There is a singular absence, in these deposits, of anything like complete skeletons. Bones, indeed, abound in them; but, although often crowded together, and sometimes so associated as to imply that occasional complete limbs were buried, these bones seem for the most part to have been detached and swept into heterogeneous collections, regardless of species or individuals, before being buried. Yet they always appear to be fresh, and unrolled; and although they are nearly always broken, and often practically pulverized, yet they show *no signs of gnawing or of weathering*. The bones of carnivora are mixed indiscriminately with those of their natural prey; and the remains are most crowded either on higher ground, or where floods descending from higher ground might deposit part of their loads in hollows or other collecting places passed in transit.

Here, then, is no such clear proof of exact contemporaneity as we found when considering the deposits in Northern Asia. Instantaneous, widespread, and lasting frost did not set in, in these regions, to preserve the soft parts of the victims of the occasion, and compel our recognition of the fact that the various sediments containing them must have been laid down at one and the same time. Consequently, as Prestwich remarked, many different explanations had been invented to account separately for the many different local collections and forms of these deposits. One has only to read the discussions on his papers, too, in order to see how determined some of Prestwich's critics were to continue to regard these deposits as dissociated in time and cause, although they seem to have offered no reason for doing so. The determination often appears to exist independently of particular reasons.

The temporary, yet violent, nature of the action which formed these deposits is shown by the size of the *unrolled* and *local* rocks often found in them. For many of these boulders are of great weight, and have obviously been projected with considerable force well beyond the positions at which they would have come to rest if collecting under the mere influence of gravity, as part of a local scree or talus formation. The angle of deposition, too, of the sediments in general, where formed under cliffs, etc., is far lower than the normal angle of rest which they would have assumed as a simple talus; so here again we have evidence that

these sediments were laid down in a violent manner under the influence of a powerfully projecting force, such as could only have been afforded by a great mass of waters in rapid motion.

How vast this volume of water was, and how great its lateral extent, we find indicated (where deposition occurred along a former coast-line) by the disregard shown by the sediments for local depressions of the old cliffs, which would have localized lesser floods sweeping over the land. Another equally significant fact is that the masses of water seem to have been sufficiently great and enveloping to sweep down *on all sides* of isolated hills, independently of the local river systems. This is exactly what one would expect if the land were emerging from a state of *complete envelopment* by water; but it is singularly hard to explain on any other theory.

According to Prestwich, the evidence indicates that the land probably sank under the waters after a slow and gradual fashion; for there appears to be little trace left of the onset of the flood. Animals would seem, however, to have been driven before the advancing waters, and compelled to collect in heterogeneous crowds on such higher grounds as seemed to afford the best local chances of safety. Here, as the waters continued to rise, they were overwhelmed and drowned. Finally, after an interval of time which seems to have been sufficient to allow of the carcases largely decomposing, the evidence indicates that the land emerged again from the waters by a succession of spasmodic upward movements, each of which produced its own wave of translation of waters off the land, bringing more similar material over the last, shifting the great local boulders further, continuing the pounding action which broke the animal bones, and sweeping the land clear, over its smoother surfaces, of debris for which lodgment could not locally be found.

It seems clear that such an inundation as this one would, by the mildness of its onset and the violence of its termination, leave only *scattered and local* traces. The comparatively *short duration* of the submergence would prevent the formation of marine deposits over the land, such as would inevitably have marked a prolonged submergence. And the violent action of the waters, on the emerging again of the land, would tend to sweep the surface clear of all traces of the disaster, except where local pockets, old beaches, or newly-opened fissures, offered lodgment for the same.

So much for the general character of these deposits, and the theory which accounts for them; we should now, perhaps,

briefly explain the terms "Rubble-drift," "Head," and "Ossiferous Fissures," as used in this connection. The first term, "Rubble-drift," refers to the sediments in general; the peculiar and often massive collections of angular, unrolled, and local materials tumultuously deposited in local pockets and catchment areas, and generally full of shattered Pleistocene bones, which compelled Prestwich to postulate a vast inundation of the land as the only means of accounting for them. "Head" is a term applied to this Rubble-drift where it masks an old raised beach. For the land often stood lower, in Pleistocene times, than it does now, and Raised Beaches at various heights above the present sea-level are now found all over Western Europe and the Mediterranean, and are clearly of Pleistocene age, since the shells on them are all of recent species. When the Rubble-drift was being swept off the surface of the land by the retiring waters, it was poured over the tops of the old cliffs on to these former sea beaches, often covering the latter up entirely, and forming a gradual slope from the cliff tops down to the sea, far beyond the locations of the old shore-lines. The very existence of the old beaches was thus often concealed, until rivers, etc., cutting through the sediments, exposed sections of them and their overlying "Head."

The "Ossiferous Fissures" are peculiarly interesting, since they seem to represent catchment areas which did not pre-exist the catastrophe, but were formed at the time of the catastrophe itself. The great strains to which the land was subjected, while rising again from the waters, seem to have caused the opening of local rents and fissures in the surface rocks. Some of these are of considerable size, and many are very deep. Their contemporaneity with the deposition of the Rubble-drift is shown by the fact that they are full of it (with its characteristic unrolled sediments and broken bones), and not of other types of deposits. Indeed, it is probably due to the fact that they were filled with this drift as soon as they formed, that they did not close up again.

The bones in these Fissures cannot be of animals which fell in alive, for no skeleton is complete. They cannot have been brought by beasts of prey, for none are gnawed. They were not brought by streams, for none are rolled; nor are they accompanied by rolled, or any but purely local materials. The bones could not have lain exposed for long, for none are weathered. They were not covered up normally, for they were broken by the violence of their deposition together with the associated

rocks. That water had to do with their deposition is indicated (here as with other forms of the Rubble-drift) by the very general cementing together of the deposits by calcite. The formation of these Fissures in so many places, at the precise time of the formation of the Rubble-drift (proved by their filling to the top with that peculiar kind of drift *and no other deposit*), seems to confirm the belief that the Rubble-drift itself did not owe its origin to normal causes, but to something catastrophic in the nature of *earth-movements*.

Prestwich also points out that these Ossiferous Fissures are often found upon *isolated hills* of considerable height. Such are the very localities where animals would naturally gather for safety in times of flood, and where (owing to the limited catchment areas found on the hills themselves) only a general inundation, covering the whole surrounding country to a great depth, could bring powerful water action to bear. A classical example of such an isolated hill is the "Montagne de Santenay," a flat-topped hill 1,640 feet high, and rising 1,030 feet above the surrounding plains, near Châlons-sur-Saône in Burgundy. A Fissure near the top of the hill is crowded with animal remains of a typical Rubble-drift type. No skeleton is entire; very few of the bones are in their proper relative positions; yet none of the bones have been gnawed. The bones are fractured, but unweathered; mixed together, but unrolled. As Gaudry remarked: "Why did so many wolves, bears, horses, and oxen scale a mountain isolated on all sides, and whence came the vast body of water necessary to wash them into the crevice, and to deposit the carbonate of lime with which they are surrounded?" All theories of glacial floods, as Prestwich and Howorth point out, break down here, and a general deluge can alone meet the case.

The Channel Islands were regarded by Prestwich as affording a "crucial test" of the accuracy of his views. Thus both Jersey and Guernsey are surrounded by fragments of raised beaches, which are covered by a "Head," ten to thirty feet in thickness, composed of fragments of local rock in a matrix of brick-earth or Loess. The distances to which many of the larger blocks in this "Head" were carried witness to the violence with which it was deposited. Prestwich points out that the rapid emergence of the Islands from a totally-enveloping flood would alone explain the existence of this "Head" *on all sides* of the Islands, and supply the necessary force for its deposition; for no theory of local streams would ever do so.

Space will not admit of our quoting more instances of this class of evidence, for which reference should be made to Prestwich's works; but we may note that, according to Prestwich, the Rubble-drift deposits of England indicate a submergence to a depth of at least 1,000 feet; for to that height above the present sea-level are such deposits found. On the Continent, where Prestwich regarded the high-level Loess as representing a form of the Rubble-drift, he postulated a submergence to a depth of at least 3,000 feet. He found, however, that Rubble-drift deposits become very scanty in the extreme east of the Mediterranean region; so that he could not carry his proofs of a flood, from this particular type of sediment, further to the east.

We must remember, however, that the formation of the Rubble-drift depended primarily upon: (1) A spasmodic and violent termination of the flood; and (2) a depth of waters *over the land* not much exceeding 1,000 feet. For it was only when the waters had subsided to a certain remaining depth over the local land surface, that currents due to further spasmodic reductions of that depth would have much effect upon that surface. So we cannot gauge the total depth of the inundation by the height of the Rubble-drift remains. The latter only indicate certain *minimum* depths of water at times when *spasmodic* reductions of the inundation were having effect upon the underlying land surface.

So it seems clear that land to the east or south of the Mediterranean may have been equally flooded; but if the emergence of the land there had been gradual, as well as its immersion, there would be none of the classes of deposits found, to mark the flood, which we have hitherto noted as characterizing Northern Asia and Western Europe.

4.—The Asiatic Loess, &c.: Evidence of Slow Emergence of Certain Areas.

"The investigation convinced us both that the original loess of China must be regarded as a marine deposit . . . and its marine origin requires us to believe in the submergence within recent geologic time of the greater part of Central Asia."—(Kingsmill and Skertchley, *Nature*, November 10, 1892, p. 30.)

"(Its) present distribution over northeastern China was mainly secured by the agency of gradually receding water, the presence of which would be obtained by a temporary general depression of the land about 3,000 feet."—(Wright, *Bull. Geol. Soc. Amer.*, vol. 13, 1902, p. 134.)

Evidence that certain great areas of land remained submerged for considerably longer than Western Europe—that

they rose from the waters after a much more gradual fashion—has been collected by several geological observers; but the strongest evidence of a fairly *prolonged* immersion of certain great areas was collected by Dr. G. F. Wright. This well-known American glacialist, who had long accepted Richtofen's theory as to the æolian distribution of the Asiatic Loess, and Geikie's ideas as to the extensive glaciation of parts of Central Asia during the Pleistocene, visited Asia himself, in the year 1900, hoping to collect definite evidence of this glaciation. He never found it. What Wright did find, however, was what he regarded as abundant evidence of a widespread inundation. He went to collect evidence of glaciation; he returned, talking about a flood. It was shortly after this that he published his series of papers on "Geological Confirmations of the Noachian Deluge" (*Bibliotheca Sacra*, vol. lix, 1902). His later writings show that he held to these opinions until he died, in 1921.

The principal facts he noted were briefly as follows: Extensive deposits of Loess are found all round the south-eastern and northern borders of the Mongolian plateau (the northern borders of which extend nearly 2,000 miles from east to west). These deposits are for the most part very different in character from the hummocky collections of Loess made by æolian action in certain places. The former, apparently older and far more extensive, deposits are spread out for many hundreds of miles in flat, terrace-like, extensions from the base of the mountains, filling the depressions between the mountain chains; and they are constantly *intercalated with beds of gravel* and fragments of rock. They have all the appearance of having been laid down by torrents depositing their sediments into a body of standing water, which must at that time have covered the lower lands right up to the very base of the Mongolian plateau, both where the latter faces China to the south-east and Siberia to the north. In other words, the whole of China and Northern Asia must have been submerged, at that time, to a depth of 2,000 to 3,000 feet.

Messrs. T. W. Kingsmill and S. B. J. Skertchley confirm the fact that the Chinese Loess, below the Mongolian plateau, was laid down in marine waters. Kingsmill reports finding a band of limestone rocks near Tsinan-fu, which was bored by pholades and crustaceans up to a height of about 1,100 feet. They point out that the Chinese Loess has been traced "almost continuously beyond the limits of the eighteen provinces to the

foot of the Pamirs. West of the Pamirs, loess occurs in the valley of the upper Oxus, probably in the Kizil Kum, and up to the Caspian, and its marine origin requires us to believe in the submergence within late geologic time of the greater part of Central Asia."

Similarly, the present writer has seen vast sheets of sediment, often of great thickness, spread over large tracts in North-western India, which apparently correspond fairly closely in type to the deposits described as Loess in Europe, Central Asia, and America. They have the same property of homogeneity, of standing in vertical cliffs when cut into by streams, and of being full of calcareous concretions of various shapes (known as *kankar* in India, *löss-kindeln* or *löss-puppchen* in Germany, and *poupées du löss* in France). In many places these deposits seem to be impregnated with salts; surface pools are brackish, and the whole ground is often white with saline efflorescence after rain. In his opinion these broad sheets of sediment (through which the existing streams cut deep channels, as saws cut into planks) can only have been laid down by water and in water; the latter being probably saline. They are utterly unlike wind-borne deposits, which now exist over large parts of the same area, but are quite distinct and also apparently *later* in character. Thus, in one of these now *desert* areas, with its drifted hummocky sands, the writer and an archæologist friend whom he was visiting in the winter of 1906, found, some 20 miles from the railway junction at Sibi, a number of great mounds or small hills, formed entirely of *fragments of Buddhist pottery*. No habitations exist there now, the nearest little Baluch mud-village being some miles away; and these mounds prove, as the archæologist at once remarked, that in pre-Mohammedan days all this area must have been well-wooded (to provide fuel for large pottery factories), and very different from its present barren condition. The evident desiccation of these parts shows that desert conditions there are relatively *new;* and the Loess deposits are certainly not æolian in origin, although now locally receiving æolian readjustment.

Further evidence of extensive submergence (though probably representing a later stage in the retreat of the waters from some parts of the land) is afforded by Dr. Wright's discovery of a shore-line deposit of gravel at a height of 750 feet above the sea, at Trebizond, on the Black Sea. Corresponding shore lines, as he points out, have been reported at Soudak, on the south shore of the Crimea, nearly opposite Trebizond; also near Samsun, a

hundred miles further west, on the south side of the Black Sea; while at Baku, on the east side of the Caspian Sea, stands yet another post-Tertiary shore-line at a height of 600 feet above sea-level. Water standing at this level would, as Wright goes on to remark, submerge, with the exception of the Ural Mountains, "Northern Germany, all Russia, the Aral-Caspian basin, and all Central and Western Siberia" (*Origin and Antiquity of Man*, pp. 472, 3).

That this submergence took place *since* man appeared in these parts, and apparently at the end of the Pleistocene (*i.e.*, at the same geological period as the immersion spoken of by Howorth and Prestwich) is shown, as Wright points out, by Professor Armachevsky's discovery at Kief on the Dnieper, which is one of the largest tributaries of the Black Sea, of numerous remains of flint implements, also heaps of flint cores, associated with a large number of mammoth bones, with charred wood, broken and partially burnt bones, etc., at a depth of 53 feet below the undisturbed surface of the Loess which covers the region. Similar discoveries of flint implements, charcoal, and mammoth bones, associated together and buried under the Loess, were also made by Professor Armachevsky in five other places in European Russia; and Wright compares these facts with the similar discovery in Siberia, by Professor Kaschenko in 1896, of deeply-buried mammoth remains associated with flint knives and scrapers, etc. (*op. cit.*, pp. 313, 314).

Now the European Loess was definitely regarded by Prestwich (*pace* Richtofen) as one of the forms of his "Rubble-drift;" and he pointed out that analyses had shown that "in certain districts in Belgium the Loess is largely impregnated with salt . . . In general" (he adds) "the Loess is so permeable that the rain-water would remove any salt that there might have been left in it, but in some instances the Loess is sufficiently argillaceous to . . . favour the retention of the salt." The presence of this salt seems to be worth noting, for, according to Professor Sollas (an eminent supporter of the æolian theory), the Loess was blown on to its present position by winds driving outwards from ice-sheets during periods of glacial accumulation, and such winds would hardly bring salt with them. Surely the presence of the salt supports those who attribute the distribution of the Loess to the action of *marine waters* rather than continental winds. The submergence hypothesis, as Prestwich remarked, alone accounts for all the facts.

5.—Inland Lakes and Seas: Proofs of General Desiccation.

"(It) is in place to point to the indubitable evidence of the recent existence of an inland sea as large as the Mediterranean over the area of the desert of Gobi, and connecting, probably, through the Sungarian depression between the Thian Shan and the Altai mountains, with a vast submerged area in Western Turkestan and Siberia. The existence of this internal sea of Central Asia is attested by the abundant sedimentary deposits about its margin . . . and also by the Chinese historical references to it as the 'Great Han Hai,' or Interior Sea . . . (A) general depression of Central Asia must have occurred to account for the phenomenon we have presented, distributing the loess in the peculiar manner indicated, and filling the central depression of Mongolia with an inland sea."—(G. F. Wright, *Bull. Geol. Soc. Amer.*, vol. 13, 1902, pp. 135–8.)

"Since the end of the Ice Age the drying up of the plateau has been rapid."—(R. C. Andrews, *On the Trail of Ancient Man*, 1926, p. 296.)

When we study a contoured, or relief, map of the world, we see that there are many inland areas which form great basins, shut off from the sea, and often situated far above the level of the sea. A general flood would have filled them with salt water, which could not have escaped when the rest of the waters drained off the land, but would have had to wait to be evaporated away. By affording extra areas for evaporation, too, these trapped waters would, at first, have induced a considerably greater rainfall, which would have progressively decreased as these inland waters dried up. Have we, then, evidence of such a *progressive desiccation* of inland basins in recent times?

It seems that we have. It has, indeed, surprised the present writer to find how uniform the testimony seems to be that *all* the great inland basins of the world are in a state of progressive desiccation.

We have seen how Wright argued that the whole of Northern Europe and Asia must have been submerged to great depths under marine waters at a very recent geological date. This submergence must, he pointed out, have been to a depth of at least 2,000 to 3,000 feet in Central Asia. That it was originally even more, and had caused the flooding of the Mongolian plateau itself, he infers from the fact that for a great extent all over that plateau the Loess has accumulated in level areas which resemble lake basins. "In many cases," he tells us, "these are without outlet, and contain remnants of larger bodies of water, which are now drying up, leaving well marked terraces at elevations of considerable height around the rim" (*Bull. Geol. Soc. Amer.*,

vol. 13, 1902, p. 132). Chinese historical records actually refer to the former existence of a very large body of water in these parts which they call the " Great Han Hai," or inland sea.

Yet this very area now forms the Gobi Desert. Of the progressive desiccation of the Gobi, Dr. Andrews gives an interesting illustration. A skeleton was found by his party, of a post-Pleistocene man, who had been buried *wrapped in birch bark*. Andrews says: " It must have been pre-Mongol, for now there are no birch trees within hundreds of miles of this region, and there have been none for centuries."

Further evidence that the whole of Siberia was recently submerged to great depths under marine waters is afforded by the presence in Lake Baikal (the surface of which stands more than 1,500 feet above the present sea-level) of the remains of a considerable *marine* fauna, including an Arctic type of seal, closely resembling seals now frequenting Spitzbergen. It seems significant that very similar seals are found in the Caspian Sea; and their remains have been found in the Aral Sea as well. Wright infers the geological recency of this general inundation from the fact that not only have the extensive Loess and gravel deposits, which were laid down while this inundation lasted, suffered comparatively little from the powerful geological agencies which have ever since been brought to bear upon them, but that Lake Baikal itself is still very far from being filled by the immense quantities of sediment brought into it by the Selenga River. (The freshening of Lake Baikal is explained by the fact that the Angara River, which flows out of it, continually drew off its salt waters, while the Selenga River continually brought in fresh water.)

How slowly a great part of the trapped waters disappeared is shown by the presence of extensive physical evidences of the gradual reduction of the Caspian and other inland seas to their present limits. Most of these seas are now comparatively fresh, but they are surrounded by scattered salt-pans, etc., testifying to their former greater extent and salt contents. According to von Baer, the relative freshness of the Caspian Sea (which is only about one-third as salt as sea water) is due to the concentration of salt in shallow lagoons round the margin of its basin; the biggest of these lagoons at present being the Karaboghaz, which is excessively saline. As the water in these lagoons evaporates, and the salt becomes more concentrated in them, fresh salt water is drawn from the main basin.

The latter is thus always passing on to these lagoons more of its own saliferous contents, and replacing the same by fresh water flowing into it from rivers entering at spots remote from the lagoons. Hence the main basin tends to become gradually fresher, and the bordering lagoons more salt. Finally, if the inflowing fresh water is not sufficient to replace all that is lost by evaporation, then the main basin (with its fresher contents) becomes smaller, leaving dry salt-pans isolated on the surface of the surrounding country. W. B. Carpenter tells us that deserted salt-pans are to be found "in different parts of the great area of the steppes of Southern Russia. . . . Everywhere the sand of these steppes contains an admixture of salt; and there are various local accumulations of salt, often associated with marl, having shells and fish-bones embedded in them, and thus clearly marking the sites of lakes which survived for a time the reduction of level and recession of the northern border of the Caspian, but which are now entirely dried up." Bogdanoff points out that "the polar fauna may be traced through the succession of salt lakes lying to the north of the Aral Sea, and that its proportion increases as we approach the Polar Ocean." *Marine* shells scattered over this area are said to be "much larger than the shells of the same species now inhabiting the weakly-saline Caspian"; the gradual freshening of the Caspian being unfavourable to its surviving marine fauna. Similarly, shells of *Pecten* and *Mytilus*, characteristic of the Aral Sea, have been found in the Kara Kum Desert, 33 miles south of that Sea, and up to 200 feet above its present level, showing both how that Sea has shrunk, and how recent the Kara Kum Desert is *as a desert*.

If we turn to Southern Asia, we find that Mr. D. N. Wadia, in his *Geology of India*, talks of the "well-marked desiccation" of the Kashmir lakes, and the evidence the old high-level beaches afford of the former "greater rainfall and humidity" (p. 344). Further to the north, we find the vast enclosed basins of the Tibetan tableland, the highest country in the world (averaging 16,500 feet above the present sea-level). Numerous lakes, generally salt or alkaline, and salt bogs, are scattered over its western and north-western regions. These are apparently the remains of larger bodies of water which formerly existed. "The desiccation of the Tibetan lakes," says Wadia, "is a phenomenon clearly observed by all travellers in that region. . . . This . . . is one of the signs of the increasing dryness and

desiccation of the region north of the Himalayas following a great change in its climate" (p. 22). "All travellers," say Waddell and Holdich, "bear witness to a gradual process of desiccation in the Tibetan uplands. Everywhere there are signs of the diminution of the lakes and the recession of the water line—a phenomenon that has also been observed in the Pamirs."

Thus it seems to be much the same story everywhere. If we approach Africa to the west, we pass the Holy Land. The desiccation of this region is marked by the fact that, as Dawson tells us, old Dead Sea deposits have been noted at a height of 1,400 feet above the present level of that Sea.

According to Herodotus, early tradition stated that at one time "all Egypt, except the Thebaic canton, was a marsh, none of the land below Lake Moeris then showing itself above water."

Further to the west, we find that the Sahara, during the early human period, was anything but a desert. It possesses the skeleton of a well-marked river system, with numerous water-cut valleys, now dry; and masses of water-worn pebbles cover great parts of its surface. Boule mentions the "extraordinary abundance of Stone Age antiquities" found in the Sahara, "in almost every part of this vast desert" (*Fossil Men*, 1923, p. 379). Herodotus and Pliny record the fact that, even in historic times, the rhinoceros and the crocodile used to exist here, where the environment is now utterly alien to such creatures. The salt efflorescence and deposits of salt found on the Sahara, together with the remains of marine mollusca scattered over certain parts of its surface, also seem to be worth noting in this connection.

Further to the south we find that Lake Chad, in the Sudan, which is situated 850 feet above the sea-level, is shrinking in size. It was also once more salt than it is now. Like the Caspian and Aral Seas, it is becoming less salt as it shrinks; the salt being concentrated out in lagoons and pans to its sides. We are told that the shrinking of the Lake is due to the "progressive desiccation" of the region, which is "most marked," and that "Saharan climate and conditions are replacing those of the Sudan."

Still further to the south, we find that the great Kalahari Desert, standing on an average 3,000 feet above sea-level is scored, like the Sahara, by the beds of dried-up rivers. Saline mud-flats cover extensive areas of its surface; and the whole country, we are told, is "suffering from progressive desiccation." Ngami Lake, which stands at the central part of the water system of this region, has completely dried up since David

Livingstone visited it in 1849, at which date it was still of considerable extent.

Thus desiccation appears to be evidenced *all over the world* (for similar facts could be adduced for the New World as for the Old). As another writer has remarked: "(In) all deserts the dryness is probably progressively increasing" (*Ency. Brit.*, 11th ed., vol. 23, p. 1005). Why is this? We cannot attribute it to a drying up after the mere melting of the ice at the close of the Ice Age, for such an explanation would not account for the *marine* faunas of the Caspian and Aral Seas, Lake Baikal, etc.; nor was there any Pleistocene glaciation in the regions, *e.g.*, of the vast Gobi, Sahara, or Kalahari deserts. Desiccation is not confined to recently glaciated regions, but is everywhere marked in regions where waters would have been trapped after a general inundation. Thus the facts seem to accord best with belief in a recent general deluge. So does the frequent connection of salt deposits with these desiccating areas.

N.B.—Wright points out, in this connection, that the mountain region of Armenia, where the Ark is said to have grounded after the Flood, is one which would naturally have been among the first to become dry land after the Flood. Also that, while so much of Northern and Southern Asia, etc., was still emerging from the waters, or still covered with great sheets of trapped waters, the *adjoining regions* of North Persia and Southern Turkestan, extending into Central Asia, would have been about the most fertile in the world. Later on, as desiccation proceeded, these parts would become more arid, while lower lying areas became cleared of swamps, etc., and more habitable. It seems significant, therefore, that what appear to be some of the oldest traces of post-Deluge (or Neolithic, etc.), civilizations, older even than those of Mesopotamia and Egypt, are to be found in these regions, where the oases are now so reduced.

It is, perhaps, during a general counter-wave of migration westwards, after the lower lands began to compare favourably with the upper, that the story is resumed in Genesis xi, with the account of the descendants of Noah entering the Plain of Shinar during their journey *from the east*. (Cf. Wright, *Origin and Antiquity of Man*, pp. 56–64; 366–370; 469; 474–476.)

6.—Summary and Conclusion.

"The main evidence of the Noachian Deluge must always be historical; but it is the prerogative of science to consider the degree of its intrinsic credibility, and so to remove unwarranted prejudicial bias."—(Wright, *Bibliotheca Sacra*, vol. lix, 1902, p. 537.)

Limits of space have forbidden our dealing with this subject in any but the most cursory manner. What we have tried to bring out, however, is the fact that, while the great majority of present-day geologists would emphatically deny that geological evidence exists of a great deluge such as that described in Genesis, yet some fully qualified geologists have insisted that such evidence does exist. The proofs to which these various experts have appealed have been of very different (though by no means conflicting) kinds in different localities. And this was only to be expected; for, although the Flood itself was, *ex hypothesi*, wide-spread over the globe, yet the earth movements which brought it on, or which attended its close, would naturally have been very different in different localities. In Northern Asia we see the apparent effects of its locally very sudden onset; in Western Europe of its locally more abrupt termination; in other regions of a slower emergence of the land. And, all over the world, we find that inland basins are everywhere desiccating, as if recovering from a recent *general* drenching by what may well have been *marine* waters (to judge from the associated prevalence of superficial salt deposits). Everywhere we find that inland areas of the earth are *drying up*; that the great deserts are all of geologically very recent development, and are progressively increasing their extent.

Nothing will, of course, prevent the Uniformitarian from inventing separate local explanations (often strangely conflicting) of these phenomena, in order to avoid the necessity of admitting such an abnormal event as the Biblical Deluge; but even he will hardly find it easy to account for the ancient prophecies which so exactly foretold, not only his denials, but also *the very postulate upon which they are based.*

The writer himself, as a geologist, is satisfied that belief in the Flood is at least *tenable* on a basis of physical facts; and, as a Christian, he regards with keen suspicion our modern unbelief in the Flood—an unbelief which seems to be ultimately founded upon the very postulate which was foretold, over eighteen centuries ago, as due to become dominant in the "last days" of our age, and to produce the very effects which we find it producing before our eyes to-day.

APPENDIX.

The following list shows some of the principal addresses, papers or books by the five geologists referred to, which bear on the subject of the Flood:—

ARGYLL, the 8th Duke of: Address to the Geological Society of Edinburgh on its Fiftieth Anniversary, 1883. Paper on Geology and the Deluge, in *Good Words* for January, 1884.

DAWSON, Sir J. W., K.C.M.G., etc., F.R.S.: Paper on the Lebanon Caves, *Trans. Vict. Institute*, vol. 18, 1884. Presidential Address to the Geological Society of America, December, 1893. "Modern Science in Bible Lands," 1895 (3rd ed.) (Hodder & Stoughton). "The Meeting Place of Geology and History," 1895 (2nd ed.) (R.T.S.). "The Historical Deluge," in *Present Day Tracts* (R.T.S.).

HOWORTH, Sir H. H., K.C.I.E., M.P., F.G.S.: Scores of papers, from 1869 to 1918, in *British Assoc. Rep., Geol. Mag., Nature, Quart. Journ. Geol. Soc.*, etc.; also the following books: "The Mammoth and the Flood," 1887 (Sampson Low & Co.). "The Glacial Nightmare and the Flood," 1892 (Sampson Low & Co.). "Ice or Water," 1905 (Longmans, Green & Co.).

PRESTWICH, Sir Joseph, Kt., D.C.L., F.R.S., F.G.S.: "The Raised Beaches and 'Head' or Rubble-Drift of the South of England," *Quarterly Journal of the Geological Society*, vol. xlviii, 1892, pp. 263–343, Plates VII and VIII. "On the Evidences of a Submergence of Western Europe and of the Mediterranean Coasts, at the Close of the Glacial or So-Called Post-Glacial Period, and Immediately Preceding the Neolithic or Recent Period," *Philosophical Transactions of the Royal Society of London*, vol. 184 (1893), A, pp. 903–984, Plate 33. "A Possible Cause for the Origin of the Tradition of the Flood," *Transactions of the Victoria Institute* for 1894. "On Certain Phenomena Belonging to the Close of the Last Geological Period, and their Bearing upon the Tradition of the Flood," 1895 (Macmillan & Co.).

WRIGHT, G. FREDERICK, D.D., LL.D., F.G.S.A.: "Recent Geological Changes in Northern and Central Asia," *Quarterly Journal of the Geological Society*, vol. 57, 1901, pp. 244–250. "Origin and Distribution of the Loess in Northern China and Central Asia," *Bulletin of the Geological Society of America*, vol. 13, 1902, pp. 127–138, Plates 16–21. "Scientific Aspects of Christian Evidences" (D. Appleton & Co., New York. For the Flood, see especially pp. 149–165). "Geological Confirmations of the Noachian Deluge," *The Bibliotheca Sacra*, vol. lix, 1902, pp. 282–293; 527–556; 695–716 (Bibliotheca Sacra Company, Oberlin, Ohio; and Kegan, Paul, Trench & Co.). "Scientific Confirmations of Old Testament History" (3rd ed.), 40 illus., 450 pages (Bibliotheca Sacra Company, Oberlin, Ohio). "The Origin and Antiquity of Man," 1912 (John Murray).

Discussion.

Mr. W. C. Edwards said: I remember that as a child I read all the missionary books I could get hold of, and I think that each one, whether from the South Sea Islands or Africa, or Asia, all gave some native traditions of a great flood. It has been said that All Saints' Day, when people in some countries go to cemeteries, is a commemorative day of the Flood. It seems incredible that an event so momentous and so well authenticated can ever be disputed, but to-day it is disputed. Alas, it is the same with many other things that were once regarded as beyond all question. The central attack seems always to be at the Word of God—the veracity of Holy Scripture. Behind it all is a great master mind of constructive evil, who directs the attack—the mystery of iniquity, working with uncommon success, in these last days, and blinding the minds of those who believe not. I think that the day will come when it will be seen that the Flood and the Ark explain satisfactorily most of the supposed arguments for evolution. Let us try and imagine the Ark in which so many species seemed to hibernate for about a year. Of course, all the once created species were not there, but certain representative species found in that part of the globe were there, with potentialities that were almost infinite. Take the classic case that Darwin quotes—the pigeon. He found that if all the almost endless varieties of pigeons were allowed to breed together they went back to the rock pigeon; therefore, if there were seven rock pigeons in the Ark there were thousands of varieties potentially preserved. The same may be said about others, *e.g.*, the dog. To me the Ark and its miraculously collected menagerie is a key to unlock all these mysteries.

As to the universality of the Flood, without being a geologist, I believe it. I recall more than forty years ago standing on the Coupée at Sark, between those two rocky islands, and gazing at the remains of the sandy deposit that once covered the Channel. I thought of tidal waves which I had seen, and tried to imagine a mighty wave five or six miles high, that, sweeping round the globe, smashed up some parts of the old world, and deposited the debris of some Atlanta or Atlantas, and yet swerved from the garden

described in Gen. i, 8–14, the place which the Vedas call "the navel of waters." Then I remembered that the next Flood will not be of water, but of fire.

Lieut.-Col. MOLONY said: Our essayist's proposition is to be found on p. 63 of his printed lecture; he says, "Some geologists have been convinced that the clearest evidences do exist of a comparatively recent and vast diluvial catastrophe, which *may* be the one referred to in Scripture." I think we shall all agree that this proposition has been fully proved, for which aid to faith we ought to thank our lecturer.

But in this discussion we surely ought to submit the witnesses he cites to some cross-examination. There is one verse in Genesis which at least three of them tell us they cannot corroborate if read quite literally. It is Gen. vii, 19, which reads: "All the high mountains that were under the whole heaven were covered."

Dr. G. F. Wright in his book, *Scientific Aspects of Christian Evidences*, pp. 141, 142, gives eight cases where it is practically impossible to take Biblical statements literally. With special reference to Noah's Flood he says: "The language describes what appears to the senses, and does not go beyond the phenomena which are visible."

"As Sir Wm. Dawson has well expressed it, the story of the Flood in Genesis reads like a log book in which many things are set down as they actually appeared, and without attempts to reconcile apparent discrepancies."

Dr. Wright continues (p. 142): "It is therefore doing no violence to the spirit or letter of this ancient document to give it an interpretation which limits the phenomena to a comparatively small area, in which the civilization of the world was then centred." On the other hand, he speaks of a submergence which was much more extensive than the Euphrates Valley.

Sir Joseph Prestwich, in his book on the tradition of the Flood, begins by calling the universality of the Deluge a physical impossibility. But he then gives evidence for believing in a simultaneous submergence, or marine flood, affecting England, Central Europe, Syria, all the Mediterranean islands to North Africa, but not Egypt. He believed that this left the higher ground and hills

uncovered, and that these served as places of refuge for the life that survived the catastrophe. He believes that the glacial period came within 10,000 to 12,000 years of our times, and remarks that some American geologists would make it 8,000 only. This is at the close of a section headed "Date of the Submergence," which he evidently holds to have happened *after* the end of the glacial period.

Sir Henry Howorth, in his book on the Mammoth and the Flood, says: "We can best explain these anomalies by supposing that these tribes are the descendants of fragments of a once continuous community broken asunder by some great disintegrating cause, which destroyed great portions of the human races—a revolution which left only isolated fragments behind which have spread out again." In the preface to his book called *The Glacial Nightmare and the Flood*, Sir Henry makes it clear that he does not wish to give any countenance to the notion that the postulated flood was universal, or that it destroyed all life.

When asked to believe in a universal flood, people naturally want to know where the water all came from and where it all went to. As these questions cannot be satisfactorily answered, I hold that the interests of Revelation are best served by not asking people to believe in a *strictly* universal flood. Our lecturer has advisedly refrained from stating any such opinion.

Mr. SIDNEY COLLETT said: There are three separate and overwhelming sources of evidence that the Flood of Noah's day was, in fact, universal. (1) It is an undeniable fact that in practically every part of the inhabited world there are legends of a great deluge. (2) It is an undeniable fact, as has been shown by the lecturer to-day, that there are undoubted geological evidences of a deluge which was world-wide. (3) There is also a three-fold testimony to the same fact in Holy Scripture itself—two in the Old Testament and one in the New—and Scripture, after all, must ever be our final court of appeal.

We are told very definitely what kind of Flood God was going to send upon the world of the ungodly: "The Lord said, I will destroy man whom I have created from the face of the earth; both man and beast and all creeping things, and the fowls of the air; for it

repenteth Me that I have made them" (Gen. vi, 7), "and God said unto Noah, the end of all flesh is come before Me" (Gen. vi, 13). "And behold, I, even I, do bring a flood of waters upon the earth to destroy all flesh, wherein is the breath of life, from under heaven, and everything that is in the earth shall die" (Gen. vi, 17).

Again, in equally explicit language, the Bible tells us what kind of a flood did actually come. In Gen. vii, 19 to 23, the following description is given: "All the high hills, that were under the whole heaven, were covered; and the mountains were covered, and all flesh died that moved upon the earth; all in whose nostrils was the breath of life, every living substance was destroyed which was upon the face of the ground, both man and cattle, and the creeping things, and the fowl of the heaven; and they were destroyed from the earth, and Noah only remained alive, and those that were with him in the Ark." If language means anything, this language describes a *universal Flood.*

Then again, when we come to the New Testament, we find exactly the same thing, for in 2 Pet. iii, 6, we read: "The world that then was, being overflowed with water, perished." The question has been asked, if the Flood was really universal, where did all the water come from and where did it go to? The first part of that question is very clearly answered in Gen. vii, 11, where we read, "The fountains of the great deep were broken up and the windows (or flood-gates) of heaven were opened." And as to where the water went to, although we are not actually told, may not evaporation explain the difficulty? There is a remarkable instance of evaporation to-day in the case of the Dead Sea, where from time immemorial the waters from the melting snows of Hermon have been flowing down the Jordan into that sea at the rate of 6,000,000 tons a day, and yet, although there is no outlet from that sea, its waters show practically no sign of rising; the explanation being that, owing to the great heat in that district, an immense quantity of water evaporates every day!

Mr. PERCY O. RUOFF said: This paper traverses a good deal of ground and ably cites a large number of scientific and geological facts, but it cannot truly be said that the subject is discussed. It should carefully be observed that the title is "Scientific Discoveries

and their Bearing on the Biblical Account of the Noachian Deluge." There is no discussion of the relation of the "scientific discoveries" to any of the recorded facts in the Biblical account. From first to last there is not one sentence quoted from Genesis. So far as the lecture is concerned there might never have been a *Biblical account*. How interesting and valuable the paper would have been if Col. Davies had shown in what particulars scientific discoveries were related to or corresponded with the recorded facts of the Bible? Opinions are divided as to whether the Deluge was local or universal. If it could be shown that the Flood was local the elaborate argument of the paper is irrelevant. If, on the other hand, it could be shown that it was universal, there is abundant material for the development of the subject. A third consideration is important. It is possible that the facts cited by Col. Davies may refer, not to the Deluge, but to some other colossal catastrophe.

On p. 74 of the paper it is said: "A classical example of such an isolated hill is the 'Montagne de Santenay,' a flat-topped hill 1,640 ft. high, and rising 1,030 ft. above the surrounding plains, near Châlons-sur-Saône, in Burgundy. A fissure near the top of the hill is crowded with animal remains of a typical Rubble-drift type." The Biblical scene of the Deluge is some little distance from Burgundy, and it would be interesting to know how and when these animals reached this place.

Mr. W. HOSTE remarked that such an occasion would lack something in its possibilities if no reference were made to Mr. Leonard Woolley's discoveries at Ur of the Chaldees, of which he gave an account at the Royal Institution last June. He would venture to remind the audience of the generally well-known facts. They had been excavating a royal graveyard outside the city, which rested on what had been in previous centuries the city dust-heaps. Going down 60 feet and passing through still more wonderful graves, giving proofs of an extraordinarily advanced civilization, they were suddenly pulled up by a layer of clay about 8 feet thick, distributed uniformly on all sides and completely interrupting all traces of civilization; containing no pottery, and evidently laid down all at once in a very brief period. Digging through this clay they found remains of a much older and quite distinct civilization.

Mr. Woolley had not the slightest doubt that this layer of clay was deposited by the Sumerian or Noachian Flood, which has always been supported, not only by the Bible narrative, but by such widespread and persistent Sumerian (and indeed, universal) tradition. Dr. Stephen Langdon, Professor of Assyriology at Oxford, though at first hostile, has declared his conversion to this view. All Mr. Woolley's other discoveries were received by the large audience at the Royal Institution with demonstrations of applause, this with the deadest silence, showing how far from eager the ordinary modern is to welcome any proof of the Divine accuracy of the Scriptures.

Whether the absolute universality of the Flood is intended by the language of Scripture has been questioned, but the lecturer has shown that the signs of a *world-wide* inundation are not wanting, and certainly the idea that enough water could not be found to provide for such an occurrence is not very sound. He believed that it is a generally admitted fact that, were the ocean depths raised and the earth became a uniform spheroid, there is enough water in the oceans alone to cover the whole earth to a depth of two miles. Then we must remember that the amount of moisture suspended in the atmosphere is enormous. "God divided the waters that are above the firmament from the waters that are below." We not only read that the fountains of the great deep were broken up, but that the windows of heaven were opened, and such a rain as has never been known on the earth continued for forty days and forty nights.

If the Flood consisted merely of enormous waves of translation, how could the Ark survive except by a continual miracle, of which there seems to be no hint in the Genesis record? It is difficult to see how a local flood, covering the highest hills visible to Noah, could have been prevented from running off the plains of Mesopotamia and the Syrian regions into the sea. On the other hand, it may be noted that the human race had not then been divided, and was concentrated in the first cradle of the race. We are on the only safe ground if we find out exactly what the Scriptures teach, and believe that. Certainly *it* "has more understanding than all *its* teachers" or critics.

Written Communications.

Lieut.-Col. A. G. Shortt wrote: The lecturer deals with geological questions in general. He touches on the subject of heavy rainfall, but his remarks generally appear to deal with subsidence and influx of sea water. This general treatment is necessary, but one could wish that he had dealt more directly with the conditions in the Euphrates Valley.

That this valley is subject to floods which would answer to the Flood of Noah is unquestionable. Shells from the Euphrates have been found thickly strewn fifty miles away from it, indicating the wide extent of the river's influence, and the excavations at Kish, under Prof. Langdon, and at Ur under Mr. Leonard Woolley, have revealed alluvium deposits which they both claim to be the result of the Noachian Deluge. There are serious objections to this view, however, as the great thickness of these beds (20 inches at Kish and some 12 feet at Ur) seem too much to have been laid by a flood lasting only one year, and it is doubtful if food could have been carried in a ship for very much longer.

A flood due to influx of sea water seems to be ruled out. It would be possible in the ordinary way, no doubt. In 1876 a tornado in the Bay of Bengal raised a tidal-wave forty feet in height, which cost 100,000 lives, or as Delitzsch says, 215,000, whereas the Deluge was thirty feet only. But Sir William Willcocks, the irrigation engineer, maintains that no sea water could enter the Euphrates Valley because of the high level of the Karan delta. As one who has travelled up and down the land of the Two Rivers, with Bible in one hand and level in the other, his opinion has much weight, and, moreover, it is borne out as regards the Deluge, which in the Bible account is spoken of as due to heavy rain, and by the fact that the deposits at Ur and Kish are fresh-water deposits.

As arising out of this evidence, there are several questions which would appeal to a geologist, and which are necessary before any decision can be reached; but it is quite possible that, with such assistance, far-reaching inquiries may be opened up. For instance, what amount of deposit might be expected from a year's flood after compression by overlying earth, and then whether

denudation is possible rather than deposition, since the overlying earth is only, perhaps, twenty inches in thickness? The great interest in it, however, lies in our possibly being able to date the deposition of the alluvium, as there are ruins and foundations of houses below them, and thus to clear up a great deal of chronological uncertainty.

Dr. JAMES KNIGHT, D.Sc., F.R.A.S., F.G.S., etc., wrote from Glasgow: It has long been known that the Uniformitarian theory of Hutton and Lyell is quite inadequate to explain certain physiographical phenomena, and that elaborations of various kinds have had to be invented, recalling the cycles upon epicycles invented for a similar purpose to make the Ptolemaïc system square with the observed facts of astronomy. The Uniformitarian theory was a much-needed reaction from the catastrophism of earlier geologists, but here, as in almost all branches of human knowledge, the pendulum has swung too far to the other side, and truth, as usual, lies in the middle line.

In his book on Hume, in the "English Men of Letters" series, Huxley exposes once for all the weakness of this uniformity fetish. "Nature," says he, "means neither more nor less than that which is—the sum of phenomena presented to our experience; the totality of events, past, present and to come. To put Hume's argument in its naked absurdity, that which never has happened never can happen." It cannot be too often repeated—to such an extent are men, even scientific men, the slaves of words—that there are no such things as laws of nature, for "these laws, even when they express the results of a very long and uniform experience, are necessarily based on incomplete knowledge, and are to be held only as grounds of more or less justifiable expectation."

In his latest book (December, 1929), *A History of Science, especially in Relation to Philosophy and Religion*, Dampier-Whetham again reminds us that so-called laws of nature are only statements of averages, probabilities, amounting sometimes almost to certainty, but never actually attaining it, for such a result implies omniscience, knowledge of "the totality of events, past, present and to come." Babbage has shown experimentally that a series may be uniform for a hundred million terms, and yet vary with the next term, all

the time working on a pre-determined plan in obedience to a law in the mind of the inventor.

The geological evidence for a widespread flood is fairly conclusive, although the Scripture narrative makes no such demand, using as it does the language natural to an eye-witness. When, however, this is supported by the evidence of ethnology, supplying Flood traditions all over the earth from China to Peru, and by the still more recent discoveries of archæology, as at Ur of the Chaldees and elsewhere, the cumulative evidence becomes irresistible. Ancient history, now being unearthed, has the same tale to tell, for the early Sumerian historians actually made the Flood their date-point, reckoning their dynasties as ante- or post-diluvian, and in his most recent account of the excavations at Ur, Mr. Woolley claims to have found objective evidence of the Flood in the eight-feet layer of sediment separating the relics of old and later Ur.

The Lecturer's Reply.

The question is raised as to the universality of the Flood. The Bible, in both Old and New Testaments, speaks of the Flood as destroying the whole human race, with the exception of a single family; it is therefore hard to limit the extent of the Flood, since it is difficult to say where Palæolithic man did *not* exist. I am not concerned with the personal ideas of Prestwich and others as to the limitations of the Flood, because there is nothing in the evidence itself to show that the Flood was limited in the various ways they suggest; on the contrary, the evidence produced by one writer generally seems flatly to contradict the limitations suggested by another.

Mr. Ruoff complains that I do not quote a "single sentence" from Genesis. My space was limited, and I had to assume that people know the story; but Mr. Ruoff will find Scripture quotations, or references to the Scripture story, on pp. 62, 63, 64, 68, 76, 79, 83, 84, etc., and consistency to the Scripture account will be found throughout my paper, which is (despite Mr. Ruoff's remarks) concerned solely with supplying evidence of just such an event as that of which Scripture speaks, namely, a vast, abrupt, and short-lived inundation of the habitable parts of the world, occurring *since man appeared on the earth.* Mr. Ruoff also complains that I do not deal with the "Biblical scene of the Deluge"; but the "Biblical scene" was, so far as we know, the whole world; and the only actual locality

mentioned in Genesis is ARARAT. I have duly referred to Flood evidences in the vicinity of Ararat, and in regions all round it; and I would remind Mr. Ruoff that, since Scripture says nothing about where the Ark was built, it may have started on its voyage from almost anywhere, and so it may just as well have passed over the region of Burgundy (to which Mr. Ruoff apparently objects) as over any other. Mr. Ruoff seems to be trying to limit the Flood of Noah to the Euphrates valley; a popular practice in these days, but one devoid of Scripture support. The Bible, in fact, does not even mention the Euphrates valley in its account of the Flood.

It is impossible to suppose, as Lieut.-Col. Shortt suggests, that the Flood was due entirely to rain. Rain alone could never have carried the Ark on to the highlands of Ararat, from wherever it started; and the Bible itself talks of marine convulsions *first*, when alluding to the causes of the Flood.

The fluviatile deposits at Ur, exposed by Mr. Woolley, seem to me to be far too late in date and too local in type to suit the Biblical (and senior) account of the Flood, although they may well have to do with the localized, and later, form taken by the Chaldean flood stories.* Local events must often have blended with, and altered, the local memories of a great primeval event common to the whole human race.†

The question as to "where the water came from, and where it went to," will only trouble those who hold extreme views as to the fixity of oceanic and continental levels. If the sea beds can rise, and the continents sink, there is no difficulty whatever in finding enough water even for a universal Flood.

* Palæolithic man has now been found in all the continents—Europe, Asia, Africa, America, and Australia. But the deposits at Ur seem to be much later than Palæolithic, so the admittedly very local "flood" which they indicate could not be regarded as destroying all mankind *before the race first spread abroad*. If, therefore, we are to look for an event which all but exterminated mankind, we can only concentrate upon the far greater flood, at the close of the Pleistocene, whose effects apparently *were* universal. In that case, the Ur event becomes a purely minor and later episode, accounting perhaps for the shape taken by the Chaldean legends, but not for the far simpler and grander cosmic story found in Genesis.

† Many details, common to the Bible account and to flood legends, etc., of primitive tribes in America, Australia, and eastern Asia, are missing in the Chaldean legends, showing that the Bible account *antedates* the Chaldean stories.