PILLARS, POLYSTRATE FORMATIONS, AND POTHOLES

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Received 25 August, 1977, revised from June 1975

Three kinds of column-like formation are discussed. There are columns of unconsolidated material, often differing from their surroundings, embedded in sand or drift. There are pillars of consolidated material, often sandstone, embedded in rock. And there are free-standing solid pillars.

It is proposed that all of these kinds of pillars, and also potholes, are to be ascribed to one cause: disintegration following upon the release of pressure as the material was raised out of the water at the end of the Noachian Flood. It is hard to believe that sedimentary processes could have caused these formations; hence the cross stratification, often found with them, can not be an effect of sedimentation.

Some reasons are suggested why the study of these formations may be especially worth while to a Creationist.

Introduction

Strange polystrate pillars occur in sandstone and in drift in many places. The writer has examined many pillars in gravel and sand in the region of Waterloo County and other places in Southern Ontario. Pillars in the Potsdam sandstone, near Kingston, Ontario, were investigated by the writer and H. L. Armstrong.

These pillars, also called “pipes” or “pots”, transect the pattern of cross stratification. They are anomalous and difficult to explain in terms of sedimentary deposition.

Polystrate fossils such as trees, vertically embedded in sediments, have been cited as evidence that rock strata accumulated rapidly.[1] This explanation cannot account for unconsolidated pillars; but they, too, may have been formed rapidly.

Causes for vertical pillars in cross stratified sandstone and drift are difficult to find in nature today, but past causes may have been different from those existing now.

One such cause is a possible disintegration process, due to rapid release of former high pressure. Uplift of the continents from the depths of the flood waters would be accompanied by a decrease of pressure on rocks.

In a previous article, it was suggested that the pattern of cross stratification may be an effect of a shattering or disintegration process[2] Some features of cross stratified formations support this interpretation.

The presence of polystrate pillars in cross stratified sandstone and drift is evidence that cross stratification is not a sedimentary phenomenon, but may result from a pressure-related disintegration process. Such a process can account for many similarities between the pillars in sandstone and those in the drift. Also, from this point of view, a relationship between pillars and the *contents* of potholes would be expected.

Drift Pillars

Over a period of several years, the writer observed a group of pillars in cross stratified drift gravel exposed in the sides of a gravel pit at Blair, a few miles south of Kitchener, Ontario. See Figure 1. The gravel pit is operated by Forwell Ltd., of Kitchener. In the course of excavations over the past few years, removal of the coarse gravel has revealed many pillars. The way in which this happens is shown in Figure 2.

They were distinguished from the enclosing gravel in various ways. Many were stained dark brown or black, and appeared as finger-like extensions of the soil profile into the gravel below. This can be seen in Figure 3. Some of these contained a light coloured interior, thus exhibiting a concentric structure.

The pillars were cylindrical in shape, with tapering or rounded bottoms. All were in the uppermost part of the drift, beginning within or just below the soil. The pillars extended downwards to varying depths.

Figure 1. This shows a pillar intact, in the side of a gravel pit, the Blair pit operated by Forwell Ltd. The top of the pillar is indicated by the arrow head. The cylindrical shape of the pillar, and the difference between its composition and that of the surrounding gravel, can readily be seen.

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Figure. 2 This is a picture of the author excavating a pillar, (indicated by the arrow head) the first one which he investigated, originally about six years ago. Initially the pillar reached to the top of the gravel pit; upon excavation it was found to extend about 10 feet vertically. The dip in the stratification of the gravel around this pillar is marked; this bending downward indicates that the pillar was present before the pattern of cross stratification was formed.

At this site, pillars one to two ft in diameter, and up to 10 ft in vertical extent were common. Don Metzloff, foreman at the site, also observed the pillars in the course of excavations. He reported that the pillars were mostly clustered together in one section of the pit. The largest pillars reached 20 ft vertically and were 3 to 4 ft in diameter. These were described by Metzloff as consisting of "dirty coloured, fine sand, just like ground."

Some of the pillars consisted of sand and clay which transected coarse gravel, and others were composed of gravel, although different in appearance from that of the enclosing drift. More clay was present in some pillars, which made them more compact and resistant to weathering than the enclosing gravel.

Concentric structures were present in many pillars. In one pillar exposed in cross section, there was distinct colour banding, and an outer lining of pebbles formed the perimeter of the pillar. See Figure 4. Another pillar was lined by sand and clay, which formed a smooth cylindrical margin about the pillar.

The pattern of cross stratification in the gravel near some pillars was bent downwards.

Several features of the pillars resemble features of other structures described in the geologic literature. A recent report by Conant et al. describes "pots" in gravels in Maryland and Virginia, which were somewhat different in shape to the pillars in the Blair gravel pit, but otherwise seemed quite similar.[3]

The pots were more spherical or bulbous in shape than the pillars in the Blair gravel pit. The pots also exhibited concentric structure, and the stratification of the surrounding gravel was bent downwards around some of the pots.

The pots were about 7 ft in depth and about the same width, though some were much larger. All were at the top of the gravel. One pot was wrapped in a layer of white clay 1-2 in. thick. Describing the contents of the pots, the authors say:

> The filling of the pots is chiefly a clayey silt containing a few percent to perhaps 40 percent of admixed sand and gravel. The silt is generally medium gray and mostly structureless, but in some pots it is faintly or distinctly stratified parallel with the margins. In some pots, flat pebbles also tend to be aligned parallel with the margins. The uppermost 1 ft. of the filling is commonly more gravelly.[4]

Figure 3. This shows a typical pillar found in the Blair gravel pit, indicated by the arrow heads. The pillar is a mass of black gravel; it is not a hollow, as might appear. Only a part of the pillar remains, the top part having been eroded away. The stratification of the gravel bends down ward around the pillar, showing that the pillar was already present when the pattern of cross stratification was formed.

"Till clumps" similar in shape to the pots in Maryland and Virginia were reported by Mather et al. from Cape Cod, Massachusetts.[5]

The mechanism favoured by Conant et al. for the formation of the pots involved seasonal frost action during a Glacial Period; but such a mechanism would seem unworkable in the case of the pillars at the Blair gravel pit, which are much narrower and deeper than the Maryland pots. Yet there are similarities which suggest a common origin for all these peculiar structures.

A Pillar with Cross Stratified Contents

Some pillars in the drift seem clearly to indicate that the pattern of cross stratification cannot be of sedimentary origin. The drift in Southern Ontario is explained in terms of the Glacial Theory either as till, thought to

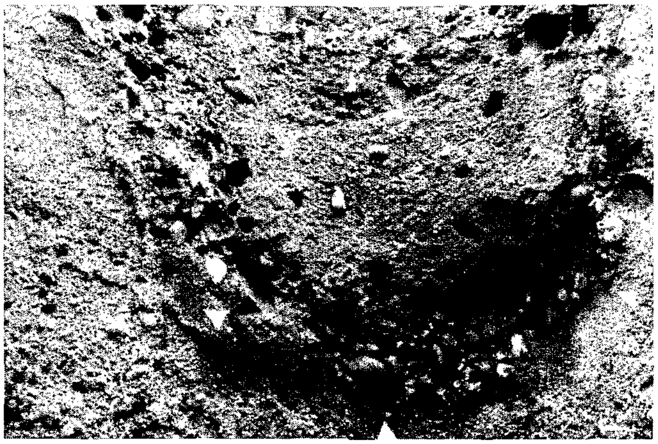

Figure 4. This shows a cross section, looking up, of one of the pillars of which the bottom part has fallen away. The concentric banding can be seen, also the outer margin lined by pebbles, or holes where the pebbles have fallen out. (Indicated by arrow heads.) The section is about 18 inches in diameter.

be a direct deposit of the ice-sheets, or *outwash*, which is considered to be glacial debris which has been transported in streams flowing from the melting ice-sheets, and deposited in rapid currents. Till is unstratified while outwash exhibits the pattern of cross stratification.

A pillar was found in sand near Campbellville, Ontario, with internally cross stratified contents. The pillar was enclosed by fine, cross stratified sand, and consisted of coarse sand and pebbles, with nearly horizontal strata. No pebbles were present in the enclosing sand. Only a part of this pillar was intact, about 5 feet below the original level of the gravel pit. The diameter of the pillar was about 1 ft.

The perimeter of this pillar was well defined, and consisted of a thin film of clay enclosing the structure. It is hard to imagine how such a structure could have formed in an environment of rapidly flowing currents, as assumed in the glacial explanation for cross stratified drift.

In particular, the cross stratification of the contents of the pillar could hardly have been caused by currents within the structure. Since the pillar was unconsolidated, and was enclosed by unconsolidated sand, it would likely have been washed away by currents of outwash streams. Another, non-sedimentary explanation is indeed called for.

Some geologists have proposed rather special circumstances to explain pillars in drift. A pillar of sand, with concentric layers, was found in coarse and medium Quaternary sand at St. Jerome, north of Montreal, Quebec, by Dionne.[6]

Height of the pillar was 152.5 cm, and diameter was 34 cm at the top and 24 cm at the base. The sand comprising the pillar was fine at the center, and the pillar transected cross stratified beds.

It was proposed that a whirlpool eroded a deep cylindrical hole in the unconsolidated sand, and refilled the hole immediately afterwards, forming a pillar.

While some such mechanisms may seem plausible for individual structures, this could hardly apply to a large group of pillars in drift; and as more observations of these peculiar structures are reported the improbability of isolated polygenetic causes for the pillars is increased.

Can Freezing Explain Pillars?

Explanations for pillars in drift that involve frost effects fail to account for many similarities between the drift pillars and those in sandstone, to be described later.

As previously noted, the deep narrow shape of many pillars does not seem to support a theory of frost action. Further evidence against this theory was found in a very striking example of a pillar, in which many of the boulders seemed to have been subjected to intense heat.

This pillar was located in a gravel pit about 5 miles east of Drayton, Ontario. It was bulbous, about 10 ft in diameter and about the same depth. The pillar was enclosed in beds of fine cross stratified sand.

The perimeter of the pillar was lined with large boulders up to 8 inches in diameter. These were cemented together by white calcite, like a mortar.

The boulders in the outer wall encircling the pillar seemed to have been baked or heated. Many were coated with a thick glaze of glass, and many were cracked.

The peculiar structure was also examined by Dr. Mat Hill of the University of Waterloo anthropology department, since it was thought the pillar may have been man-made.

The sand adjacent to the pillar, and the soil above seemed undisturbed, however; and human manufacture seemed unlikely.

A pillar consisting of boulders could hardly have been derived from the enclosing sand by any Uniformitarian mechanism such as frost action. The presence of such a pillar in sand is also anomalous if the sand is explained in terms of glaciofluvial deposition.

Formation of the Pillars

The idea of a non-Uniformitarian process of rock disintegration, causing the pattern of cross stratification, would lead to a simple explanation for the pillars.

Many Creationists believe the major part of the sedimentary rocks which contain fossils, that occur in the earth's crust, was formed during the Noachian Deluge. Uplift of the continents at the end of the flood would be accompanied by a release of pressure. This would provide the environment for a process of rock disintegration.

Disintegration would likely be limited to consolidated rocks, and it is believed that sediments formed in the Deluge consolidated as they were elevated from the depths. Lithification occurred as diffused cementing agents crystallized at the lower pressures.

As pressure on the topmost rocks decreased, due to lower depths of water and erosion of overlying sediments, water diffused within rocks could not remain diffused at the lower pressure, and tended to be expelled from the rock. Near the surface of the rock, expansion of the occluded water caused shattering of successive thin layers.

Concretions developed in rocks due to changes in the diffusion equilibria, becoming pebbles and boulders as the shattering process changed the rock about them into sand and clay. It is proposed that the pattern of cross stratification was formed by this mechanism of disintegraton.[7]

In many places the disintegration began in a small area of the rock surface, and penetrated vertically downwards, resulting in a cavity filled with the disintegration product. In effect, a pothole was formed.

Where the surrounding rock was also subsequently disintegrated, this pothole (with its contents) became a pillar within the cross stratified sand and gravel. This mechanism for the formation of the pillars in the drift implies a relationship exists between the pillars and the contents of potholes, before excavation.

Concentric structure in many pillars may be explained by lateral enlargement of the pillars during the pothole stage. Disintegration of the rock walls would account for linings of pebbles, orientation of the pebbles parallel to the margins, and lining of the margins by clay which has been reported in some pillars.

Discolouration of the contents of the pillars, which also produces a concentric effect, probably occurred during the pothole stage. Diffusion of volatiles, calcite, iron oxide, and other minerals from the rock enclosing the pillar towards the low-pressure surface would cause concentric banding. Precipitation of these minerals at the margin of the pillars occurred due to changes in diffusion equilibria during the lowering of pressure.

Down warping or bending of the pattern of cross stratification of the gravel around some pillars indicates the pillars were present when the pattern of cross stratification was formed. This bending may indicate more rapid disintegration of the rock near some pillars.

Pillars Compared with Potholes

Potholes are believed, in the Uniformitarian view, to have been formed by erosion such as the action of streams; but it is difficult to explain all the features of potholes in this way. Several problems with the Uniformitarian explanations for potholes were outlined in another article.[8]

Potholes which are exposed by streams, or other agents such as wave action along the shores of lakes or coasts, may have been present in rocks prior to the initiation of present conditions.

Before exposure, potholes are usually filled with drift, consisting of sand, clay, and gravel. In some rocks potholes may contain sandstone.

The mechanism outlined for the formation of drift pillars also explains potholes, and a resemblance between the pillars and the contents of potholes would support the proposed theory.

The pillars in drift resemble potholes in shape, many are bulbous like potholes, and the range of sizes is similar. Like potholes, the pillars are rounded at the base, and penetrate to varying depths.

In distribution patterns the pillars resemble potholes, which may occur individually or in clusters. Observations by the writer on a remarkable cluster of pillars illustrates the similarity of the pillars to groups or clusters of potholes.

A group of pillars was exposed in a field adjacent to Pinebush and Balmoral Roads, Cambridge, Ontario, in the summer of 1976. The topsoil had been removed from the field prior to a construction project. Wind erosion of the sand revealed the tops of a large cluster of pillars, numbering about 100.

The pillars were reddish brown, and were enclosed by yellow-gray sand. The largest pillar was about 3 ft in diameter, and excavation of one of the pillars showed a vertical dimension of 4 ft. Some of the pillars in the cluster were connected, which is also a common feature of potholes. The pillars resembled "hoodoos", which are sometimes eroded from soft sandstone.

Dikes of white clay connected some pillars, possibly formed by deposition of calcite in cracks in the original rock before disintegration. The sand in some pillars was speckled, possibly due to disintegration of concretions.

The characteristics of the contents of potholes are rarely given much attention in the geologic literature. Some large potholes in Norway were excavated in 1874, and described by Brögger and Reusch.[9]

The largest kettle excavated was near Bäkhelagel, and the work occupied 3 men for 50 days. Careful records were kept of the position of the boulders found in the kettle. The depth was found to be 33½ ft, or 44 ft if measured from the highest side.

The larger rocks in the kettle formed layers at various levels, and the authors wrote, "The contents of this kettle, therefore, plainly showed a sort of stratification."[10]

Deep within the pothole two large boulders were found, which appeared to have a smaller hole begun in them. The small hole was at the centre of the kettle.

In the theory of disintegration causing potholes, the smaller hole may represent part of an initial pothole, which widened and deepened by further disintegration of the enclosing rock.

Indications of a concentric structure in the contents of a pothole were found by the writer in a large filled pothole at Rockwood, Ontario. Here the larger rocks seemed to be concentrated around the walls. This may also indicate widening of the pothole by disintegration.

Further studies of pothole contents are needed to confirm the presence of a concentric arrangement of the contents, and other points of resemblance between the pillars in drift and the contents of potholes.

The Park of Pillars

From the point of view of Uniformitarianism, a relationship is not readily perceived between the drift and cross stratified sandstone. But the theory of disintegration would require such a relationship.

Pillars or pipes are present in many sandstones, which show similarities to pillars in the drift. A well known example of pillars occurs in an outcrop of Potsdam sandstone on the property of Bill Hughes, R.R. 6 Kingston, Ontario. See Figure 5, and the front cover of this *Quarterly*.

Several vertical pillars are visible, the largest measuring 14 ft in diameter. Some exposed in the sides of a cliff, evidently the site of an old quarry, extend 20 ft vertically. This is shown in Figure 6.

Concentric bands occur within many of the pillars, and also in the rock enclosing them. This feature led

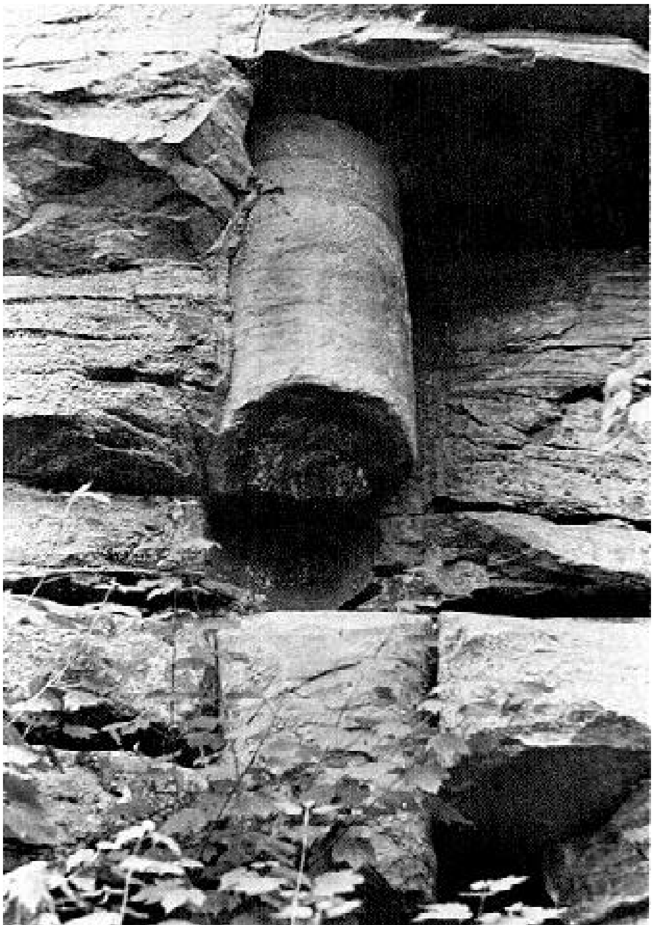

Figure 5. This shows one of the pillars at Hughes' farm. A section has broken out. Marks adjacent to the pillar wall, in the rock adjacent to the pillar, can be seen at the left.

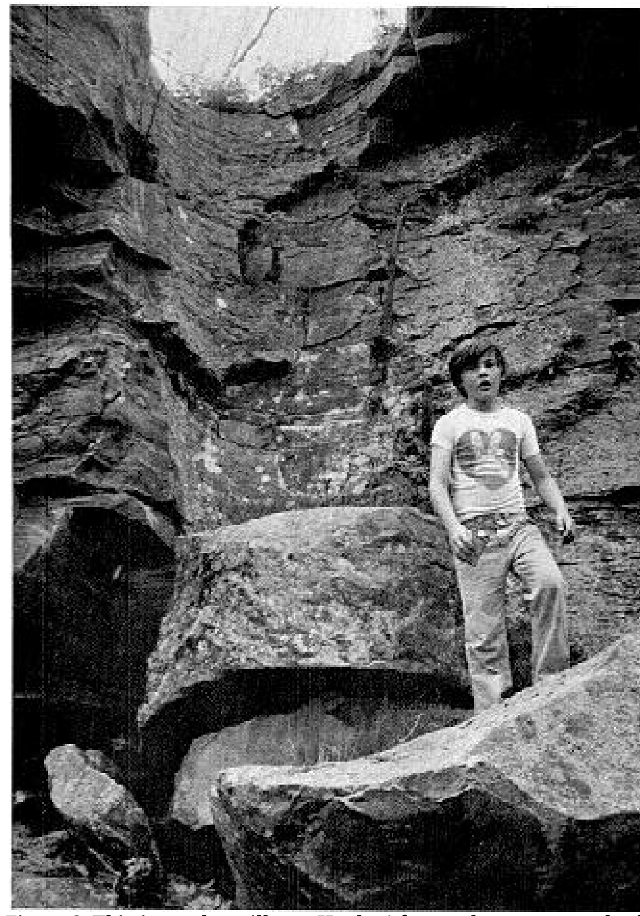

Figure 6. This is another pillar at Hughes' farm, a large one, much of which has fallen down. Gary Hughes is standing on broken pieces of the pillar. As can be seen, the place where the pillar once stood now resembles a partial pothole.

some to conclude the pillars were "fossil trees," and sections of the pillars were exhibited as such in shop windows in Kingston in 1888.[11] This feature can be seen in Figure 7.

Hughes now operates a quarry near the site of the pillars, and he told me a pothole was recently found during the excavations. It was filled with sand and small pebbles.

One of the explanations which has been offered for the pillars is that they are potholes filled with alluvial sediments.[12] It seems clear that they are not fossil trees, but, being polystrate, they may show as well as polystrate trees that the rock around them was formed quickly.

The pillars are described in an article by Hawley and Hart,[13] and a thorough description is not attempted here. These authors proposed that the pillars were formed by springs rising through the strata while it was still unconsolidated, and referred to the pillars as "quicksands enclosed by concretions."

Similar pillars have been reported from other exposures of the Posdam formation. Some occur across the Rideau Canal opposite the Hughes farm, others are present at Morton, Ontario, and at Redwood, New York.

The rock in which the pillars occur is a reddish sandstone with cross stratification. The rock may have been formed by alteration of the granite bedrock, in a process similar to disintegration. One indication of this is a gradual transition of the rock from granite to sandstone, within a few hundred yards from the site of the pillars.

The formation of the sandstone may have occurred in either of two ways. Disintegration of the granite may have formed cross stratified sand, which was recemented by silica and iron oxide, or the alteration may not have been a complete disintegration but more a recrystallization of granite, resulting in a pattern of cross stratification.

The pillars may have been formed in a manner similar to that described for the formation of pillars in drift. Vertical pillars were formed by disintegration in localized areas, and subsequently the surrounding rock was also altered. Concentric structures were formed in the pillars due to decreased pressure upon disintegration, and deposition of hematite at successive surfaces of the rock during disintegration.

Structures similar to those in the Potsdam sandstone near Kingston have been reported from cross bedded

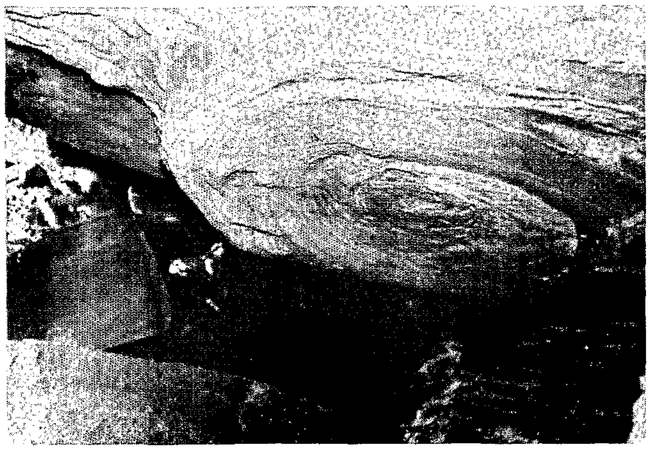

Figure 7. This shows the bottom of one of the parts of pillars at Hughes' farm, the parts below that have broken away. Parts farther up have broken away also, so that the pillar is in a detached block of sandstone, and can be seen from beneath. The pillar is about 4 feet in diameter.

siltstone and conglomerate in the Bush Creek region of Eagle County, Colorado.[14]

These were up to 4 ft in length and 8 inches across. Some of the pillars interlocked, and some completely enclosed smaller ones. Concentric bands surrounded the pillars.

Another report described pillar-like structures up to 200 feet in height.[15] These occur in the Laguna area, New Mexico, and are referred to by Schlee as "sandstone pipes." The pipes range from a few inches up to 150 feet in diameter. The pipes are grouped in clusters, and many have a concentric internal structure. Cross bedding was present within the pipes and in the enclosing sandstone.

Other similar structures have been reported in the St. Peter Sandstone of Arkansas, and in northern Arizona and Colorado.[16]

Dietrich described cylindrical pillars in the Potsdam sandstone at Redwood, New York, and noted that similar structures also occur at East Anglesey, England: near Brussels, Illinois: along the coast of Syria and Palestine: at Barnstaple Bay, Devonshire, England: and at Cañadón Hondo, Chubut, Argentina.[17]

In some regions the disintegration of the rock enclosing pillars may have been more complete than the disintegration which formed the pillar itself. In such cases a free-standing pillar may be formed by erosion of the loose sand.

Free-Standing Pillars

Free-standing pillars of sandstone were described by Simpson at Cañadón Hondo, Central Patagonia, and associated with the Potsdam pillars near Kingston.[18] These pillars were exposed by erosion of the soft sandstone beds in which they were embedded. Most of the pillars were from 1 to 2 ft in diameter, and from 3 to 10 feet in height.

Many of the features of the pillars mentioned by Simpson have their counterpart in typical potholes. Some twin pillars were observed, some contained horizontal flutings on the sides, some tended to bulge in the middle. The bases of some weathered pillars were undercut.

The pillars seem to be the antithesis of potholes, which may be explained in terms of the disintegration theory of cross stratification. The pillars originally formed by rock disintegration in small areas, and subsequently the enclosing rock also disintegrated more completely. The material in the pillars was indistinguishable from the matrix except for a slightly coarser sand and firmer cementation.

The pillars described by Simpson seem to be sandstone counterparts of pillars in drift observed by the writer.

Islands, composed of sandstone, such as those in the Wisconsin River at Wisconsin Dells, may really be large pillars. One of these island pillars is known as the "Inkstand." Many potholes occur in crevices along the Wisconsin River.

The pillars are cross stratified, and these may have been formed by more complete disintegration of the rock enclosing pillars. Sand enclosing the pillars would have been washed away by the Wisconsin River, leaving the pillars as islands.

Predictions Based on the New Theory

Four kinds of phenomena can be related by the theory of rock disintegration forming the pattern of cross stratification. These are potholes, pillars in drift, sandstone pipes, and free-standing pillars. All of these show similarities, which suggest a similar cause.

One of the ways in which theories can be tested is by means of predictions. The following two predictions can be made on the basis of the theory outlined in this article:

1. The contents of potholes should reveal concentric features, or internal cross stratification, or other features similar to those of pillars in sandstone and in drift.
2. Pillars similar to those which occur in drift may also be expected in cave fill. Potholes are common in caves, and the fill has been explained in terms of the disintegration similar to that proposed for the drift.[19]

Both these predictions can be easily tested, and future observations may either support or refute the present theory. Another prediction, based on the Uniformitarian premise, is possible, to test its validity: potholes ought to occur in rock strata at all levels, as fossils of bygone times. Are there any such examples of fossil potholes?

Why Pillars Are of Interest to a Creationist

There are at least two reasons why these pillars, or related formations, are of interest to a Creationist. First of all, while many of them are clearly not fossils, in the sense of having once been living, yet, being polystrate, *they provide as good evidence as that from the polystrate fossils for rapid formation of the strata.*

The other point is this. Uniformitarian methods have not been very successful in explaining these structures. Even those who suggest explanations do not seem to be very well convinced. The explanation proposed in this article may be verified on the basis of its predictions.

Thus the superiority of the Creationist approach could be demonstrated.

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GENETICS FAVORS CREATION

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Received 5 July 1977

While Charles Darwin and the naturalists were speculating about vague tendencies in heredity, Gregor Mendel was learning from his own research the scientific laws which govern the passing of genes from parent to offspring. This paper points out how these laws do not agree with the speculations of the evolutionists.

In the last few years much has been written against evolution, as there should be; but relatively little from the standpoint of genetics. There is a definiteness, an objectivity about this science which stands out clearly against the cloudiness and suppositions of paleontology and anthropology. Scientists say they accept the findings of genetics, giving lip service to that science, then go on accepting an armchair speculation which they want to believe about the nature and formation of living things. It was the facts of genetics that made necessary a reconciliation about fifty years ago in order to bring peace in the family of science; but this "peace" is only a patch-work affair.

The Beginning of Genetics

Genetics describes the changes which actually have occurred in living things and shows that they are small, or recurrent and not increasing, or of a disadvantage to the plant or animal. They do not tend toward greater size or better organization as the generations succeed one other.

The father of genetics, it is agreed, was Gregor Mendel, who lived at the same time as Charles Darwin. However people for a long time listened to the latter instead of to Mendel, who was primarily a teacher and later administrator. After seven year's work on the genetics of peas, he read his report to the Natural History Society of Brunn, his home town, in 1865. Modern scientists agree that his report gave definite results in an orderly manner, but the minutes of the meeting report that there were no comments.[1] The minutes also report that a member of the Society mentioned a book written by a certain Englishman named Darwin six years before, and that is what they talked about. And that is what all Europe talked about for 35 years while Mendel's paper lay on a shelf. Now that paper has become the foundation of genetics.

Different Kinds of Change Distinguished

Charles Darwin lumped all changes together, whereas we now recognize four definite kinds: acquired characters, latent genes, groups of diverse genes, and mutations. Acquired characters arise from the environment, from use or disuse, and are not inherited by the next generation if the causative environment has ceased; evolutionists and creationists agree on this point. J. B. Lamarck was the great protagonist of acquired characters; but Darwin also believed they were inherited.

Mendel pointed out that a gene may be recessive and, in the presence of a dominant gene, it becomes latent, not causing the formation of its trait. In a later generation it may occur, not accompanied by its dominant partner, and so produce its characteristic trait. It is clear that such genetics works toward recurrence rather than evolution.

In some plants and animals genes occur in groups rather than pairs and are accountable for different sizes

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