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837TH ORDINARY GENERAL MEETING,

HELD IN COMMITTEE ROOM B, THE CENTRAL HALL,
WESTMINSTER, S.W.1, ON MONDAY, MAY 6TH, 1940,
AT 4.30 P.M.

DOUGLAS DEWAR, ESQ., B.A., F.Z.S., IN THE CHAIR.

The Minutes of the Meeting of April 22nd were read, confirmed and signed.

The CHAIRMAN then called on R. E. D. Clark, Esq., M.A., Ph.D., to read his paper entitled "New Evidence Relating to the Reliability of Testimony. A Study of the Records of Uncommon Luminous Phenomena."

The Meeting was then thrown open to discussion, in which the following took part: Mr. S. T. E. Dark, Rev. C. W. Cooper, Dr. L. E. Wood, Rev. A. W. Payne, Dr. Barcroft Anderson and Mr. E. L. Ward Petley.

Written communications were received from Brigadier N. M. McLeod, Colonel L. M. Davies, Mr. George Brewer, and the Rev. Principal Curr.

NEW EVIDENCE RELATING TO THE RELIABILITY OF TESTIMONY—A STUDY OF THE RECORDS OF UNCOMMON LUMINOUS PHENOMENA

By R. E. D. CLARK, ESQ., M.A., PH.D.

IN modern times it has been repeatedly asserted that human testimony has proved much less reliable than was formerly supposed. A long series of researches, from that of Hodgson and Davey (*Soc. Psy. Res. Proc.*, 1886, 4, 381) to such modern work as that of Bestermann (*S.P.R. Proc.*, 40, 363) have tended to show that under ordinary conditions, even trained observers will make contradictory reports and that the testimony of ordinary men and women is therefore of little evidential value. On the basis of these experiments it is claimed by many writers (e.g., Professor Broad, *The Present Position of Science and Religion. Philosophy*, 1939, 14, 131) that human testimony in favour of miraculous happenings has lost its evidential value and can no longer be used in support of the Christian creed.

Whether this conclusion be right or wrong, there is one general feature of these modern experiments on the value of testimony which causes them to differ materially from the kind of testimony which Christian apologists have relied upon in the past. In the early disciples of Christ we have the case of men who were so certain of what they had seen that they were prepared to suffer ridicule and if need be death rather than deny what they knew to be true. This being so they had every reason for making as certain of the facts as was humanly possible at the time. In the modern experiments, on the other hand, this feature is entirely missing. We are presented with no evidence that the observers were so sure of their observations that they were prepared to suffer ridicule or persecution rather than deny them. Accordingly, they could have no motive for using their critical and observational powers to the fullest extent when the events which they purported to have witnessed were taking place.

It follows that the recent experiments upon the value of testimony, to which reference has been made, have little valid bearing upon the Christian faith, though they are of undoubted legal importance. In order to assess the evidential value of the kind of testimony upon which the Christian faith is founded, it would seem advisable to adopt an entirely different kind of procedure.

A possible method would be to estimate how far human testimony has proved reliable in parallel instances in the past. Again and again in history we meet instances of men who have witnessed strange events and who have been ridiculed for their testimony either by their own or by a subsequent generation. In many cases it is now possible to say whether the original testimonies are likely to have been true. For example, it had been claimed by many observers that stones sometimes fell from heaven. In the seventeenth century, however, scientists ridiculed the human testimony upon which this belief was founded. They urged that it was ridiculous to suppose that there could be stones in the sky, and that in any case the alleged stones never fell in the presence of those trained in natural philosophy. Today no one doubts that the falling of meteorites is a perfectly genuine phenomenon.

Cases of this kind could be multiplied, but clearly only a proportion of them would support the reliability of human testimony. Moreover, it would be exceedingly difficult to select instances impartially so that, even if hundreds of instances

could be given, no very decisive conclusion could be drawn from them.

The object of this paper is to suggest a way out of the difficulty which will enable cases of this kind to be used as real evidence. Some while back the writer was engaged for a considerable time in searching for early stories of luminous phenomena, with no thought whatever on their possible bearing on the value of testimony. Indeed, the possibility of using the material for this purpose did not dawn upon him until about 75 per cent. of the work had been completed. It is necessary to point this out lest it should be thought that the literature had been hastily scanned in order to prove a particular point of view, and thus much material of an opposing character had been omitted.

It eventually became clear that luminescent phenomena afford a favourable parallel to miracle. The literature abounds with records of the stark terror which the simplest luminous appearance has occasioned in the minds of simple people. Luminous pieces of meat have repeatedly been mistaken for ghosts, St. Elmo's fire was considered to be a divine prodigy, will-o'-the-wisps were once thought to be connected with wandering souls, while swarms of fire-flies possibly gave rise to the amazing discussions of the schoolmen concerning the balls of fire in which evil spirits were supposed to be enveloped. Thus, like religion, luminous appearances have clearly been connected with prejudice and emotion from time immemorial, and it is commonly supposed that under these circumstances human testimony is especially likely to be untrustworthy. Thus it appears that testimony in connection with unusual luminous appearances should afford a close parallel with the kind of testimony on which the Christian faith rests.

The following represent a list of cases which the writer has come across in which persons are alleged to have witnessed some definite and unusual phenomenon connected with luminous appearances, which have nevertheless been doubted by their contemporaries or turned aside as ridiculous and "unscientific" by a subsequent generation. They are classified into three groups as follows: (a) cases in which subsequent investigation makes it highly probable that the original testimonies were substantially correct; (b) cases in which modern knowledge has thrown no new light upon the problem; and (c) cases in which it now appears that the original statements were so far from the truth that scepticism was justified. In assessing

whether a given case should be classified under *a*, *b* or *c* the current opinion will so far as possible be taken, and a classification under (*c*) is not to be taken as implying that the writer necessarily regards the phenomenon as finally disproved. In a few cases (marked " ? ") the writer is not aware of having read any definite statement that the phenomenon was ridiculed, but believes nevertheless that such ridicule is or has been widespread.

The list is complete with two exceptions. As the whole object of this paper is to test the truth of *religious* testimony by independent testimony of a non-religious type, it has been deemed best to omit all cases of unexplained lights in connection with religious beliefs or practices. In addition, claims made by "sensitives" or psychically "gifted" people, have been omitted, since such people do not even claim to see events as any normal person would see them. In any case, examples of both these kinds would have to be classified under (*b*), science having thrown no light upon them as yet. Those who wish to do so may make the following two additions under (*b*) to the list which follows. (1) The appearance of lights at seances. (2) Lights moving through the air which are said to have been a feature of certain religious revivals (A. T. Fryer, *Psychological Aspects of the Welsh Revival*. *S. P. R. Proc.*, 1905, 19, 80-161. B. G. Evans, *Occult Review*, 1905, 1, 113, 179, 289).

(*b* ?) Alice Bailey (*The Consciousness of the Atom*, 3rd ed., 1934, p. 62) alleges that the leading members of the medical profession in a large Middle West City were approached by letter and asked whether they had seen anything strange at the moment of death. Several replied that they had seen a bluish flame at the top of the head, and one or two said that it had been accompanied by noise.

(*a*. In part *a* ?) There are many records of light due to electrical discharges. Pliny mentions stars which appear over land and sea. "I have seen," he writes, "a light in that form on the spears of soldiers." He also describes them on the rigging of ships, and remarks that such lights "do sometimes, about the evening, rest on men's heads and are a great and good omen. But these are among the awful mysteries of nature." Virgil (*Aenid*, bk. ii, v. 681 ff.) describes such a star on the head of Iulius, and from the context it is clear that the weather was stormy. Again, there are many records of the mysterious ball lightning, but until not very long ago it was

fashionable to deny their truth on the ground that the phenomenon was inexplicable. Today, tongues of flame and globular lightning are well established.

Despite their religious bearing, the stories of phosphorescence connected with Moses are worth mentioning here. The account of the burning bush (Exodus iii, 2) has long seemed incredible to the sceptic, as has the story that on one occasion the face of Moses was luminous without his being aware of the fact (Ex. xxxiv, 29). However, R. L. Ives* (*Jour. Franklin Inst.*, 1938, 226, 745) describes similar phenomena at high altitudes on the American Rockies. "Coronas, halos, and standing arcs have several times been observed by the writer when spending the night at very high altitudes (above 12,000 feet). These phenomena, never twice the same, sometimes attain considerable brilliance . . . often when coronas are present a person will, apparently, be bathed in flames although he himself will be unaware of it. . . . At times the source of a corona will give very severe electric shocks when touched; at other times it seems electrically 'dead' and may be contacted with impunity."

(a) From ancient times (*e.g.*, Tacitus on the earthquake which destroyed the Achaian cities in 373 B.C.), earthquakes have been associated with brilliant lights. In the quake at Mutu, in North Japan, in A.D. 869, "streaming light was seen as if it was daytime": in the Kramakura earthquake of A.D. 1257, bluish flames came from the ground and a fire-ball like a lantern flew across the sky, while in the Tosa earthquake of A.D. 1283 fire-balls appeared in the shape of wheels and flew in all directions. Scores of other similar cases are to be found in old records (see K. Musya and T. Terada, *Earthquake Res. Inst. Bull.*, 1931, 9, 177, 225), and although these are scattered over many centuries, they show considerable uniformity. Nevertheless, seismologists until recently ascribed the records to the imagination of simple people who might easily fancy they saw vivid lights if their houses were falling around them.

Since 1930 this explanation has been generally abandoned. After the Idu earthquake of November 26th, 1930, Mr. Musya, of the Japanese Earthquake Research Institute, circulated all schools within the affected area asking for independent accounts of any lights which had been seen; 1,500 reports were received,

* My warmest thanks are due to Mr. J. K. Stafford for drawing my attention to this article.

which included those from no less than 15 trained scientists. The light appeared in the sky before the earthquake and just above the epicentre. It is computed that it must have had an intensity of at least 100,000,000 candle power. Lights have been seen again in subsequent earthquakes, but still no conceivable explanation has been advanced, though seismologists now regard the phenomenon as genuine.

(c, a) The aurora borealis affords another case in which human testimony has been strongly opposed by scientists. Long ago scientists showed that the streamers were rarely less than one hundred miles from an observer. Despite this, many people have confidently asserted that the streamers often come right down to earth, and that their movements are associated with sound. Such statements were made by reliable witnesses—one or two of whom had actually receiving training in surveying (Beals, *Quart. J. Roy. Met. Soc.*, 1933, 59, 71). Yet the scientific grounds for supposing that such phenomena were impossible seemed so strong, that until recently they were often ascribed to optical and auditory illusions (Simpson, *loc. cit.*, p. 185, etc.). It appears likely, however, that illuminated columns of mist arising from lakes may appear to join the streamers above (c). The noises were explained as due to changes in the electrical condition of the air, until instruments failed to detect the supposed changes, when they were ascribed to imagination. One writer thought he had disposed of the matter by asserting (on medical authority!) that 50 per cent. of people suffered from noises in the head.

The latest development (see *Nature*, 1938, 141, 232, 956) is that Carl Störmer, probably the world's greatest authority on the aurora, has himself been reluctantly convinced of the reality of the sounds as a result of auroral displays in 1938. Several of his assistants stationed at different observatories heard the sound rising and falling as the streamers passed overhead (a). As yet no explanation seems adequate.

(c) Psychically "gifted" people have often claimed to be able to see an "aura" or mist surrounding people. By first looking through a solution of a cyanine dye Dr. Kilner (*The Human Aura*, 1912, etc.) claimed that the mist could be made visible to ordinary people—though even Kilner's own researches were inconsistent with the view that he was really observing an objective aura at all. The subject was re-investigated some

years ago by Dr. D. F. Fraser-Harris (*British Jour. Med. Psy.*, 1932, 12, 174) who reached the conclusion that the phenomenon was caused by the second visual after image—an image which lasts a considerable time.

(a) At about 10 o'clock on the night of October 11th, 1492, about four hours before he had made his landfall, Columbus claimed to see what looked like the flame of a small candle which appeared to rise and fall on the surface of the water. This light has caused much controversy, as it must have been in deep water some 35 miles out to sea. J. B. Murdock, of the U.S. Navy, after a careful review of the subject, concluded that the light was due to the overwrought fancies of the navigators (see R. T. Gould, *Geog. Mag.*, 1927, 69, 403). L. R. Crawshaw (*Nature*, 1935, 136, 559) has pointed out that the light was probably caused by a surface display of the luminous marine annelids of the genus *odontosyllis*. The displays occur for a few moments but once a month—in the last quarter of the moon.

(c) Workmen at the Notodden nitrate factory in Norway confidently claimed that they could see lights over the choking coils used to limit the current to the furnaces. Their statements were disbelieved. S. P. Thompson (*Nature*, 1937, 140, 423) now finds that alternating fields actually stimulate the optic nerve thus giving the appearance of light, so that the testimony of the workmen may have been reliable, though their interpretation was mistaken.

(a) Josephus (*Wars*, 7, vi, 3) mentions a certain plant with a yellow flower ("Its colour is like that of flame") which "toward the evening sends out a ray like lightning." In modern times this identical phenomenon was first observed by the daughter of Linnæus in 1762, while she was still a girl. She declared that a group of yellow nasturtiums had flashed with a "lightning-like phosphorescence" in the evening twilight. For many years she was laughed at and even accused of lying, but she stuck to her story. Subsequent research by Professor Haggern and others showed that many flowers, especially yellow ones, possess the power of emitting flashes of light at dusk (T. L. Phipson, *Phosphorescence or the Emission of Light by Minerals, Plants and Animals*, 1862, p. 79).

(a) In ancient times Pliny (*Nat. Hist.*, x, 67) wrote: "In the Hercynian Forest, in Germany, we hear of a singular kind of bird, the feathers of which shine at night like fire." In the

seventeenth century luminous birds were repeatedly observed—Bartholin (*De luce animalium*, 1647), for instance, mentions several luminous cocks brought to market at Montpellier in 1641. Yet in later years the great natural historian Cuvier, unable to see any reason why birds should be luminous, boldly declared that Pliny's statement was a mere poetical exaggeration. In modern times, Mr. R. J. W. Purdy (*Field*, 1908, 3, 70; *Trans. Norfolk and Norwich Naturalists Soc.*, 1908, 8, 547) found to his cost that an account of luminous owls which he had published was merely laughed at by his fellow naturalists, who had not seen such things for themselves. Yet the existence of such owls is now generally conceded (see Count L. de Sibour, *Knowledge*, 1913, 36, 321; H. W. Robinson, *The Field*, 1930, 155, 230, etc.), while the night heron and the blue crane have also been seen in a luminous condition.

(a) A relatively enormous literature has collected round the glow worm. Many early experimenters said that they were able to extract a luminous juice from the insect, but scientists believed that the light was in some way connected with life, and they refused to believe in the luminous juice. "Some have told me that this is very true" writes the learned Moffett (*Natural History of Four-footed Beasts*, etc., 1658, p. 979), "whom, notwithstanding, I will not believe until such time as the experiment be made before my eyes." Sir Thomas Brown also considered the matter in his *Pseudodoxia Epidemica* and roundly declared that the feat was impossible. Yet we know today that the extraction of the luminous material from the organs of an insect is not a difficult matter, and seeing that repeated efforts were made to achieve it, there is no longer need to doubt that attempts were occasionally crowned with success a few centuries ago.

(a) A considerable literature has also cropped up concerning the synchronous flashing of fireflies, of which no less than 36 reports have been collected by J. B. Buck (*Quart. Rev. Biol.*, 1938, 13, 301). Here again, scientists such as Craig (1916) and Ruckmick (1920) denounced the phenomenon as imaginary simply because they could not explain it. Ruckmick went so far as to declare that the observations were always made in an emotional state of mind "bordering on the romantic," and so were necessarily untrustworthy. Today no biologist doubts that the phenomenon is genuine, and it has even proved possible to reproduce it under controlled conditions in the laboratory.

(b) Will-o'-the-wisps, of which there are several distinct kinds, have a long and interesting history about which something must be said here. One variety is apparently caused by the spontaneous ignition of bubbles of marsh gas—though the cause of the ignition is not yet known. The circumstantial and matter of fact accounts of eyewitnesses (see H. Fornaschon, *Archiv. des Vereins in Mecklenberg*, 1899, 53, 34; W. Muller, *Meteorologische Zeitschrift*, 1900, 17, 505) leave little to be desired. Nevertheless, the fact that no explanation was forthcoming, caused many German scientists in the nineteenth century to ridicule the existence of Will-o'-the-Wisps—although one of their own number, the physicist Knorr, had himself seen one at close quarters (*Annalen der Physik*, 1853, 89, 620). Moreover, Dressler related an undoubted case of the spontaneous ignition of putrefactive gases in a pond near Löwenberg in Silesia—showing that spontaneous ignition can occur (compare also the ignition of haystacks). Today, little further information is available, but it is now known that many volatile compounds of metallic elements may be formed as a result of the action of autotrophic bacteria, and as some of these (*e.g.*, with zinc) are known to be spontaneously inflammable, it seems only reasonable to take the stories of the spontaneous ignition of bubbles of gas at their face value. Since the draining of the land in the nineteenth century the phenomenon has, of course, become much rarer. It need hardly be added that there are no grounds for associating will-o'-the-wisps with phosphine, for no observers have been able to smell this gas in the vicinity.

(a) There are numerous eyewitness accounts of luminous human beings (see Clark, *School Sci. Rev.*, 1936, 249). Thus Lord Bacon solemnly declared that he had seen a "woman's belly sparkling with fire," while numerous doctors in later years witnessed and published accounts of the same phenomenon. Despite this wealth of human testimony, experiment seemed to show that luminous bacteria would not live on human flesh, and in 1905 the *British Medical Journal* (2, 346) actually quoted the words of Bacon in order to illustrate the supposed amazing credulity of former generations!

In recent times, however, at least two cases of this extraordinary phenomenon have been observed. One of them, by F. Barton, a detective, led to the conviction of a murderer at Singapore at the end of the last war, but no scientific investiga-

tion was made (see *Wide World Magazine*, 1934, 73, 61).* The other, that of Mrs. Anna Monaro, an ascetic Italian woman, took place in a hospital in the fishing town of Pirano, on the Istrian coast, in 1934. This latter case received full scientific publicity, and it was found that the region of the chest became brightly luminous for 3 to 4 seconds at a time—the flashes being repeated up to 25 times in a night (see *Lancet*, 1934 (2), 227, 1403; *Illustrated London News*, May 19th, 1934; *Nature*, 1934, 133, 860, etc.). The light was successfully recorded on a cinematograph film. As a result of this case, the scientific and medical journals completely altered their attitude of scepticism.

(a) The history of the so-called "spontaneous" combustion of human beings is very similar to the above. The idea that a human being could catch fire and burn away has been ridiculed time and time again in medical works and journals, despite excellent testimony that this has indeed happened. Today the subject is at last taken seriously. In Mann's *Forensic Medicine and Toxicology* (6th ed., 1922, p. 215 ff.), the conclusion is reached that enormous generation of inflammable gases may occasionally take place in the bodies of alcoholics shortly after death. Should these become artificially ignited as a result of a fire in a room, it is pointed out that all the horrible details of the classic cases of "spontaneous" combustion would be explained. Comparatively recently a drayman of intemperate habits was admitted into Guy's Hospital when, shortly after his death, gas was generated under his skin. On ignition a dozen or so pale lambent flames (such as are mentioned in old records) flickered over his body in the post-mortem room. Had he died alone by the fireside the case would have undoubtedly been reported as one of spontaneous combustion. Certainly there is today no need to question the truthfulness of the testimonies to this horrible phenomenon which occurred relatively frequently during the intemperate nineteenth century, though at that time the witnesses were often ridiculed.

With the reservations already mentioned, these are all the relevant instances of the attempt to deny human testimony which the writer has been able to find. Other cases not known to him no doubt exist, but there is no reason to suppose that

* I am not entirely satisfied as to the truth of this remarkable story but mention it for what it is worth.

enough of them would have to be classified under (c) in order to affect the large majority under (a).

Taking the cases as they stand, the figures are as follows :—

Classified under (a)	..	..	..	10
„ „ (b)	..	..	..	2
„ „ (c)	..	..	..	3

Thus, in a majority of cases, a sceptical attitude about the value of human testimony has proved unfortunate. In two-thirds of the cases in which human beings have claimed to have witnessed extraordinary and inexplicable events connected with light, they have proved right and their critics wrong.

Even the cases classified under (b) and (c) are of little assistance to the sceptic. The flame at death (b) rests only on the authority of Alice Bailey, who in any case is a lover of marvels, while Will-o'-the-wisps might almost have been placed in category (a) instead of (b). In all three cases classified under (c), viz., lights on electric chokes, auras and low auroras, it would appear that the original observations were more or less accurately recorded, but that the reason for the appearances must be sought in optical illusions. (As it is not claimed that the aura is self-luminous it might fairly have been omitted.)

In any case, these results show that it is irrational to adopt a sceptical attitude towards things which we cannot understand, for such an attitude amounts to a refusal to learn from the past experiences of mankind. The reliability of human testimony is obviously quite unconnected with whether science can or cannot explain a particular alleged phenomenon. Moreover, these results show that when normal human beings are testifying as to the truth of remarkable events which are likely to bring them ridicule, their testimony tends to be remarkably trustworthy.

This conclusion has an important bearing on Christian apologetics. Taken alone, the evidence for the resurrection of Jesus Christ is simple, straightforward and convincing: but for the fact that it is inexplicable to science it would never have been doubted. Now, however, we learn from numerous actual experiences of mankind that inexplicability to science can no longer be regarded as a good reason for doubting human testimony. In short, the scepticism of scientists in the past has undermined the position of the sceptic today.

DISCUSSION.

The CHAIRMAN said: As one who as a youth had to pass an examination in Paley's *Evidences of Christianity*—a perfect example of sound reasoning—I believe Dr. Clark to be right in his contention that human testimony, when pecuniary or personal interests are not involved, is far more trustworthy than many people believe. It is probable that every legend is based on some foundation and is not purely a product of the imagination. As a test of the reliability of the evidence of persons having no axe to grind, Dr. Clark has hit upon the happy idea of considering luminous phenomena of a kind that do not readily lend themselves to scientific explanation, which people assert they have witnessed. Most of these are convinced that they have in fact witnessed these phenomena, and it is incredible that all of these people have been the victims of hallucination or of optical illusions.

One of the examples given by Dr. Clark is the synchronous flashing of the members of a gathering of fire-flies. I have myself witnessed this occasionally. I think Col. D. D. Cunningham is right when he says (*Plagues and Pleasures of Life in Bengal*, p. 129) “this phenomenon is by no means peculiar to any particular part of the country, but in most places it occurs rarely and only in a limited degree”. He thus describes a finer display than I ever witnessed: “As the train slowly panted upwards (on the Iggatpur Ghat from Bombay), many of the trees alternately flamed out into dazzling splendour and vanished off in the gathering gloom of an impending storm, whilst the hosts of insects resting in them lit and put out their lamps as though by common consent.”

As to will-o'-the-wisps, one variety seems to be due to the movements of flying insects which are the hosts of luminous bacteria.

When several people independently testify to having seen with their own eyes a phenomenon, the probability that the phenomenon occurred is strong; but the man of science, equally with the Court of Law, should not accept second-hand or hearsay evidence.

There is a widespread belief among the natives of India and those of the Straits Settlements that the weaver bird (*Ploceus baya*) uses fire-flies to light up its nest. I have never seen a nest so lighted and I know of no ornithologist who has. The weaver-bird is so called because it weaves with long grasses a wonderful pendent nest

in shape and size like an inverted champagne bottle, the mouth of the bottle being the entrance to the nest. Every nest I have seen had attached to it two or more pellets of dried mud. In my view these prevent the nest swaying violently in gales; but the natives of India assert that these pellets are used as candlesticks to which the bird attaches fire-flies. I do not believe this, and when in 1904 an Englishman wrote to me from Western India saying that weavers' nests are common there, that he had noticed fire-flies stuck into many of them, and asking if I could explain their presence, I suggested in reply that he was mistaken and asked him to look carefully next nesting season and, if he saw a nest to which fire-flies were stuck, to take it down and send it to me with fire-flies attached at my expense. I have not heard from him since. In two of my books on Indian birds and in a communication to the *Journal of the Bombay Natural History Society* (November, 1909) I asked any one who has actually seen a nest lighted up with fire-flies or one in which the mud of the nest had fire-flies attached to write to me. No one has responded to these invitations.

However, I find that in *Nature Notes*, vol. XIII (1902), Major McNair, although admitting that he had never seen an insect attached to the mud in a weaver bird's nest, quoted the following evidence. Mr. Buckley, Assistant Commissioner in the Indian Salt Department, informed him that in Rajputana he had often found fire-flies in the clay of the nests, but he had also found non-phosphorescent insects there, and that although the natives say the insects are placed there by the bird to light the nest, he (Buckley) thinks they were put there to be used as food for the young. Captain Barry de Hamel of the Straits Settlements Police told McNair that as a result of an inquiry he had made he met people who had actually seen fire-flies in the mud of the nest, but some argued that the flies are used to light the nest, others that they are a delicacy for the young birds. Simon Coorozo, a schoolmaster at Singapore, informed McNair that a party of his boys had told him they had found a weaver's nest with three young ones, and they also saw sticking in the mud three fire-flies.

Now notice that none of these witnesses says he saw an illuminated nest; what they saw was dried mud with dead fire-flies attached. How, then, did the fire-fly story arise? I suggest that as the weaver

bird nests in the rainy season when fire-flies are abundant and the mud pellets are often soft and sticky owing to the rain, fire-flies may alight on the nests as they do on branches, etc., and some may have become entangled in the mud and may have been seen thus while still alive ; in other words, people have seen illuminated nests, and jumped to the conclusion that the birds had stuck them to the nest ; and, as this seemed very clever, the story was often repeated.

I deem Dr. Clark's paper valuable as a warning to scientific men against rejecting testimony merely because it is not in accord with their preconceptions. Let me in conclusion tell a story against myself. Many years ago in India a visitor told me that on account of the heavy rainfall the rice plants growing near the margin of a lake in his district grew to a length of several yards to keep their heads above the rising water. As I appeared sceptical, on the following day my visitor again called with some rice stems of great length, one of which measured 24 feet.

I ask you to pass a hearty vote of thanks to Dr. Clark for his most interesting and stimulating paper.

Mr. SIDNEY T. E. DARK, B.Sc., M.R.S.T., F.Z.S., F.R.Met.S., said : that perhaps the chief difficulty in verifying phenomena of this type was their extreme transience in many cases. Though he had been observing Nature for upwards of fifty years, he had never seen a case of ball lightning or of a garden flower emitting light, and he would have been very strongly inclined to doubt the objectivity of the latter phenomenon had it not been for certain experiences that had come his way.

About twenty years ago, his brother, who was living in Streatham only a few streets away, told him that a hollow horse chestnut tree in his garden had suddenly begun to glow brilliantly in the dark. He went round many times, in all kinds of weather conditions, to see the "fox-fire," of which he had read, but which he had never been lucky enough to see for himself, without success.

On another occasion, he was on an all-night ramble, and while the party was sitting on a bank beside a Surrey lane, eating sandwiches at about 2 a.m., a tiny phosphorescent light was seen travelling slowly along in the middle of the path. On investigation, this turned out to be a centipede which a spider was carrying. It was

set free, and at once ceased glowing, and though kept under observation for nearly half an hour, and prodded occasionally with sticks, it could not be induced to emit light again.

He then read a note on luminous snow received only that morning from Mr. W. H. Spreadbury, F.Z.S., a well-known naturalist and nature photographer. "About 7.30 on the night of January 31st last I was passing along the Portsmouth Road below Ockford Ridge, Godalming. There is a steep greensand bank here covered with trees and with much ivy on the ground. The snow was lodged in small patches and after the silver frost and a slight thaw had a stale, sugary appearance. One patch, roughly oval and about the size of a large hand, was brightly luminous—a yellower light than that of the glow-worm. The light was distinctly visible even when I shone my torch on the patch. There was nothing to indicate to the eye that this patch of snow was otherwise any different from the surrounding snow. On my return at 9.30 p.m. the light had gone and I could not identify the particular patch which had been luminous."

Mr. Dark drew the conclusion that one should be very careful not to reject evidence merely because it was difficult to obtain confirmation. He had recently seen a quotation from an American "scientific" journal, stating that ball lightning had no objective existence but was always due to an optical illusion on the part of the observer. His own experience in investigating lightning strokes for the British Thunderstorms Census Organization, indicated that, for some reason rather difficult to understand, untrained observers frequently described an ordinary lightning flash as a "ball of flame". The Census Organization had, however, many records which fully established the objectivity of the phenomenon. Moreover, it had been successfully photographed in America,* and although until quite recently there had been no scientific explanation of it, Neugebauer has shown (*Zeitschrift für Physik*, 106, 1937) that quantum theory indicates the existence of forces between electrons and ions, neglected in classical theory, which do satisfactorily account for all the observed phenomena connected with ball lightning.

* *E.g.* Jensen, *Physics*, 1933, 4, 372. Dr. Clark mentioned that O. Prochnow had also published photographs of ball lightning in Germany.

WRITTEN COMMUNICATIONS.

Rev. Principal H. S. CURR wrote : I have read Dr. Clark's paper with much interest and instruction.

It is obviously impossible for anybody who has not given some time and attention to the study of the phenomena described by Dr. Clark to make any comments on them except to quote the proverb that truth is stranger than fiction. The purpose of the paper, however, is not to discuss the question of luminiferous objects but the reliability of human testimony. If I understand Dr. Clark aright, he is arguing that reports by responsible witnesses of all manner of signs and wonders should not be hastily dismissed because they seem to be incredible on the grounds that they are contrary to human experience in general. I am reminded of a remark by Sir Auckland Colvin that, in dealing with the East, the man who regards the incredible as the impossible is likely to be led astray. With Dr. Clark's application of the truth, that human testimony must not be dismissed with contempt, because it runs counter to the preconceived ideas, and the usual tenour of human life, to the miracles recorded in the Bible, especially the Resurrection of Our Lord, there can be nothing but cordial agreement. It furnishes a rejoinder to Hume's famous argument against miracles. He maintained that no amount of human testimony was sufficient to warrant belief in such a happening since miracles are contrary to our experience. The paper proves clearly and convincingly that man's experience is a very wide field indeed, wherein all manner of strange things may be met.

The question which mentally arises is as to how far human testimony is trustworthy. Thus Cardinal Newman believed that certain relics of an Italian Cathedral, purporting to be the blood of Christ, assumed liquid form at specified seasons of the year. Nobody dreams of challenging the strength and subtlety of Newman's intellect, nor his fundamental sincerity. Dr. Clark quotes from Pliny with reference to light due to electrical discharges. There are other stories in Pliny which it would require a good deal of evidence to verify. They are manifestly fables. The inquiry naturally emerges as to whether there be some touchstone of truth whereby the false can be separated from the trustworthy like the sheep from the goats, when the evidence is confined to testimony,

experimental verification being impossible. It may be that every case must be judged on its own merits. Personally, I lay a great deal of stress on the character and record of the witness. If, in general, he is found to be reliable and accurate, then men should be all the more disposed to accept his statement that the incredible has happened. He that is faithful in that which is least is faithful also in much. Witness-bearing does not occur in isolation but in a context, subjective and objective. Before a man's witness is accepted, his credentials in the form of his context should be examined. Pliny's observations regarding stars which appear over land and sea were not believed until they were vindicated by scientific observation. The scepticism was as much due to his fondness for the extraordinary as to the actual nature of the information which he professes to give.

Again, there are happenings which are beyond reason, and others which are contrary to reason. In *Gulliver's Travels* adventures are described which are palpably impossible. They are contrary to reason, but in Swift's day the famous reference to the duty of kings and governors in that allegory to the effect that they should strive to make two blades of grass grow where one grew before, may have seemed to be equally preposterous. The one was irrational. The other was only beyond the comprehension of men in the great satirist's day. It may be that by the combination of these two tests of rationality, and general credibility, that the golden grain of fact may be separated from the chaff of illusion and delusion.

Mr. G. BREWER wrote: I think that what Dr. Clark has set out to prove—that the testimony of human experience cannot be set aside simply because science has up to the present been unable to explain or account for it—has been clearly shown by his paper, in which he has referred to the testimony of men of ordinary intelligence.

When, however, we consider events regarded as miraculous recorded in the Scriptures, the character of the men who were eye-witnesses, and the manner in which their testimony was given, such as the Apostles Peter, John, James and Paul, it is impossible to imagine that they could have laboured under any delusion, and were actuated by any motive of self-interest or popularity in support of a cause which brought them loss, persecution and even death.

With regard to the testimony of uncommon luminous appearances mentioned by Dr. Clark, some of which at the time were rejected, and have since been accounted for scientifically, as the previously hidden laws of nature became apparent to mankind.

Our natural sight is only capable, even with powerful artificial aids, of observing material objects and is blind to the spiritual forces with which we are surrounded, yet scripture gives instances where human eyes have been opened to discern these spiritual forces.

To mention but few, there is the case of Elisha (2 Kings vi) when he is surrounded by the army of the King of Syria, with horses and chariots, and when his servant cried "Alas, master, what shall we do?" Elisha prayed, "Lord, open his eyes," and he saw the mountains full of horses and chariots round about Elisha. The appearance also to Joshua of the Captain of the Lord's Host with drawn sword in His hand. The several appearances to Daniel of the Angel of the Lord and to John at Patmos, as well as of the Lord Jesus Himself.

To come to recent times, there is the appearance of "The Angels of Mons", recorded by Capt. C. Whightwick Haywood in August, 1914, seen personally by British soldiers as standing between them and the Germans; and the appearance of "The White Cavalry" in the summer of 1918, who appeared advancing in the open ground behind Bethune, all in white uniform on white horses with their Leader in front mounted on a huge white charger.

An officer of the Prussian Guard, who had been taken prisoner, stated that the Germans fled panic-stricken before the White Host who continued to advance, unaffected by the shells bursting among them.

Lt.-Col. L. M. DAVIES wrote: This seems to me an excellent discussion, from a fresh quarter, of the value of Christian evidences. The case is logically stated; and the paper shows the service which a Christian worker can do to his fellow believers by subscribing an argument from his own particular angle. Dr. Clark seems fully to justify the conclusions expressed in his last two paragraphs.

Rev. ARTHUR W. PAYNE, in remembering the object of the Victoria Institute—to show there was no real contradiction between Inspired

Holy Scripture and true science—valued this paper in its suggestion of not neglecting the evidence of the objective as well as the subjective view of facts.

In reference on page 160, paragraph 1, to Moses and the Sinaitic Revelation (Ex. xxxiii, 29), the Jews—though some to-day are sceptical about the “fiery law” and the custom of having in a home a picture of Moses with the Tables of the Law in his hands, and horns of light coming from his forehead—testify to the story of the Illumination mentioned in the paper, when the Law-Giver Moses came down from the Mount after his interview for 40 days with Jehovah.

In the New Testament we have the wonderful light of Epiphany, then the contrast in the eclipse at the time of the Cross of Calvary followed by the lightning character of the angelic beings at the Resurrection Tomb, and we look forward to a marvellous manifestation at the Second Advent of our Lord Jesus Christ.

Brigadier N. M. McLEOD, D.S.O., M.C., late R.A., wrote: I have read with great interest Dr. Clark’s paper. Not only has he presented questions difficult for sceptics to ignore and harder to answer, but he has made a way for the introduction of a very big question, that of the real, though unknown, forces actuating the Solar System and influencing life on our planet.

He has mentioned the electrical manifestations which so often precede and accompany great earthquakes. These, together with the phenomena of animal and bird behaviour during the lull that so often precedes an earthquake—reported by many observers at the time of the great Quetta earthquake—all go to show that there must be some influence, quite apart from faults in the rocks, which produces these catastrophes, and that the unstable strata constitute only the favourable field on which this influence works.

I have for some years worked out the conditions prevailing as regards the position of the members of the Solar System at the time of major earthquakes on the principle discovered by A. J. Cooper, a merchant service skipper, and described in his book *Solelectrics* (6s. from J. D. Potter, 145, Minorities, E.1), and I have had very convincing results; for example:—

(1) I located the “Missing Quake” of November 10th, 1938, at the Aleutian Islands two days before the location was given in *The*

Times, and I was awaiting news of a tidal wave at Honolulu when, on opening *The Times* of November 12th, I found the heading: "Big Earthquake in Pacific", "Seismic Waves in Hawaii".

(2) I located the centre of the *Great Indian Earthquake* of January 14th, 1934, as being at a point on the north border of Napaul, west of Mount Everest, three days before it was discovered to be there. It was first reported as being somewhere in Assam!

(3) *Los Angeles Earthquake*, March 10th, 1933. The question of planetary influence was discussed by correspondnece in the *Morning Post*, but a letter of mine, describing the quite exceptional arrangement of the planets in full confirmation of Cooper's theory, was considered too technical for publication. A copy is appended for reference.

(4) *Mysterious Gasometer Explosion at Neuwirken*, February 10th, 1933, in the Saar Basin, which occurred just at the time that the locality was passing through a concentration of solar and planetary "soelectric potential". I quote this as an example of possible spontaneous combustion.

(5) *The Great Quetta Earthquake*, May 31st, 1935, *North Japan Earthquake*, March 3rd, 1933, *Greenland Earthquake*, November 20th, 1933, and several others also gave clear confirmation of Cooper's theory.

Cooper, in his book, gives over 150 examples of earthquakes and major atmospheric disturbances in confirmation of his "soelectric" theory, an explanation of which would occupy too much space.

He used to work out his weather ("Northers") ahead in the South Pacific by means of the planetary positions, and on one occasion he was able to warn the Chilean Government a day or two in advance that Valparaiso was on a certain day, hour and minute to be visited by a great earthquake.

This was the great Valparaiso Earthquake of 1906, which occurred precisely at the time precasted and, thanks to government preparations, much life was saved.

There seems to be an interplanetary, solar force, which not only drives the dynamo of the solar system, but which binds the whole system together in such a way that not only do the sun, moon and planets affect one another, but every living cell is in touch with nature like a wireless receiver.

Only thus can we account for so many animal phenomena, such as collective bird movements, migrations, etc.

I have brought this question up because it would appear that these light manifestations must be very closely connected, whether they accompany earthquakes, alcoholism, or spontaneous combustion.

If Dr. Clark, with his scientific training and knowledge, would investigate this inter-planetary question and give us his considered opinion we should feel that light had been shed upon a very big, but at present almost untouched, subject.

I append a letter on earthquakes and planetary influence which was sent to the *Morning Post* :—

“ BELLEVUE,
NORTH BERWICK.

SIR,

16th March, 1933.

EARTHQUAKES AND PLANETARY INFLUENCE.

Reference R. D. C. Graham's letter in your paper of 13th instant.

First, to answer his question regarding the positions of Mars, Jupiter, Saturn and Venus.

A reference to *Whitaker's Almanac* will show that at 2 a.m., 11th March, G.M.T., i.e., 6 p.m., 10th March, Los Angeles time, all the important members of the solar system were grouped as follows :—

Venus	}	On opposite sides of the Earth	{	Mars
Sun				Moon
Mercury				Neptune
Uranus				Jupiter
Saturn				

The right ascensions of their zeniths and nadirs were as follows :

		hr. mins.		hr. min.	
A	{	Venus Zenith	22 44	Nadir	10 44
		Mars Nadir	22 42	Zenith	10 42
		Moon Nadir	22 34½	,,	10 34½
		Neptune Nadir	22 41	,,	10 41
B	{	Jupiter Nadir	23 18½	,,	11 18½
		Sun Zenith	23 23½	Nadir	11 23½
		Uranus Zenith	1 20	,,	13 20
		Saturn Zenith	20 58	,,	8 58
		Mercury Zenith	19 38	,,	7 38

Note that the members of Group A are all very close together and those of group B less than $\frac{1}{2}^{\circ}$ apart as regards R.A.

Working on Alfred J. Cooper's theory of 'Solectrics' (published by J. D. Potter, Admiralty Agent for Charts, 145, Minories, E.1), I have plotted all these positions on a globe set at the appropriate time and I find that at 2 a.m. G.M.T. on 11 3/33 (6 p.m. 10 3/33 local time) solectric arcs struck with radii 88° from centres as follows intersect in the neighbourhood of Los Angeles.

<i>Centres.</i>		
Sub Nadir of Moon	}	Form a bunch of intersections of arcs over Los Angeles and surrounding district.
„ „ Venus		
„ „ Neptune		
„ Zenith of Sun		
„ Nadir of Jupiter	}	Intersect over same district about quarter hour earlier.
Nadir of Sun		
Zenith of Jupiter	}	Form a network which passed over Los Angeles and S. California about 1 a.m. 11 3/33 G.M.T. (1 hour before the earthquake).
Zenith of Venus		
Nadir of Moon		
„ Neptune		
„ Mars		
„ Venus		
Zenith of Moon	}	
„ Mars		
„ Neptune		

Mr. Alfred J. Cooper, in his book *Solectrics*, gives 150 examples in support of his theory, and the above would appear to provide yet another example of his theory working out correctly.

Working from data at the time of the recent earthquake in Japan, I obtained several bunches of intersections just to the N.E. of North Island, Japan.

I do not claim any great accuracy for my plotting, which was done with a pair of dividers on an 8-inch diam. globe.

To save space I have not given any explanation of the 'Solectric' theory, which can be studied from Mr. Cooper's book.

Whether Mr. Cooper's system is theoretically sound or not, it appears to give practical results and, with suitable appliances and a staff of experts, it should be possible to give warnings of danger

areas, as was done in the case of the great earthquake at Valparaiso in 1906, which was predicted by means of Mr. Cooper's system.

I should be glad if you would forward my letter to Mr. Graham, or publish it if you think fit.

N. M. McLEOD,
Lt.-Col., R.A.

To the Editor of the *Morning Post*.

Dr. LOUIS WOOD said: I should like to express my thanks to Dr. Clark for his admirable and original paper. It gives much food for thought, and seems to open a new door for Biblical research, and is full of interesting suggestions.

I notice on page 160 his allusion to fire-balls. The books I have read on electrical phenomena either ignore these, or seem doubtful as to whether there are such things in reality. The allusions are vague and sometimes hint that so-called fire-balls are actually either meteorites or an optical effect of lightning.

I once saw what I believe to be a fire-ball, and though it happened so long ago it made a deep and lasting impression, which I will try to describe after the lapse of so many years, during which I have never experienced a repetition of any similar phenomenon.

In July, probably of 1869 or 1870, when I was about 12 or 13 years old, I was staying with a brother two years younger at the tiny Somersetshire village of Poynsington. We had just returned from a drive and the first large drops of rain were making spots on the pavement. The sky was dark and thunder rolling distantly. The house adjoined the churchyard of the little church, perhaps 50 yards away. Suddenly, between us and the church appeared a glowing globe.

It is difficult to convey an accurate impression of size, especially after so many lapsed years. Perhaps about the apparent size of the moon when high in the heavens between the racing clouds. The point is that this fiery ball *hovered* for an appreciable time, moving slowly and rather uncertainly a yard or two from the ground.

I don't think we could have estimated the length of time then, and assuredly not now. After hovering it seemed to strike the

ground, exploding with a terrific crash, and the thunderstorm broke.

My brother survives and corroborates many points of this account.

AUTHOR'S REPLY.

I am very grateful to all who have taken part in this discussion, and especially to the Chairman and Mr. Sidney Dark, who have provided us with so much interesting material.

There is no need for me to make more than two short comments. Mr. Sidney Dark has pointed out that ordinary lightning flashes are sometimes confused with ball lightning. Now modern work on lightning has shown that a lightning flash to earth occurs in a series of steps, each penetrating through the air further than its predecessor, while the tip of every separate stroke is brilliantly luminous. In view of this fact, it is, perhaps, not difficult to understand why ordinary lightning may sometimes be described as a "ball of flame", especially as there must be many occasions when the position of successive tips alters relatively slowly.

It is difficult to make any useful comments on Brig. N. M. McLeod's letter. It is believed that stresses are slowly but constantly being built up in the earth's crust and that when once they have become large enough a small "trigger" action will precipitate an earthquake. It seems likely that tidal forces, due to other members of the Solar System, are sometimes responsible for "pulling the trigger", but I find it hard to connect this with the subject of my paper.