

SCIENCE AND THE UNCANNY

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ONCE a holy man came to a small village. He was possessed of strange powers. It was stated that he could cook rice instantly in the heat provided by a mere candle. The villagers who actually witnessed the performance were impressed and the holy man became a highly respected person in the vicinity.

A young man from a neighbourhood college was sceptical. How can something cook without adequate supply of heat? He decided to probe the miracle further. One day he managed to get hold of a small sample of the rice which the holy man was going to cook. Having examined this sample, he was not only able to solve the mystery but he was also able to repeat the performance in his own right! What was the trick?

The rice contained liberal quantities of quick lime which, when mixed with water, produced heat. It was chemical rather than divine energy which did the heating.

A CONTRAST OF HUMAN ATTITUDES

This story illustrates the difference in the attitudes of man towards uncanny phenomena. On the one side we have the scientific attitude which leads man to probe the mysterious until he has found a rational explanation. By contrast, the other attitude, which I will call the superstitious attitude, takes the observed phenomenon on face value and if the phenomenon is found strange this attitude leads man to docket it as a 'miracle' or a 'supernatural event', in any case something beyond the range of science.

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The history of science is full of instances where apparently inexplicable phenomena received a rational scientific explanation. Take the early examples of astronomy. Why does the Sun radiate heat and light? Why do stars shine? Why do heavenly bodies systematically rise in the East and set in the West? Why do a few exceptional bodies (known as planets*) show irregularities in their motions? The superstitious attitude interpreted these events in terms of divine powers. Ancient mythologies have the Sun as a god. Astrology, ancient and modern, is based on the assumption that planets move 'at will', and therefore possess supernatural powers through which they control human destiny. The scientific approach on the other hand attempted to find answers to these questions in terms of the basic laws of science which have been tested repeatedly.

Thus the scientists found that the Sun shines because energy is generated deep in its interior through thermonuclear reactions. The rising and setting of the Sun and the stars is due to the fact that the Earth itself revolves about an axis. The apparent irregularities of planetary motion are completely understood in terms of the law of gravitation. Thus there is no longer any mystery surrounding these astronomical phenomena. In this context it is worth recalling the anecdote about the 19th century scientist Pierre-Simon de Laplace who solved the problem of the motion of planets and satellites of the solar system and published his work in five volumes entitled *Mecanique Celeste*. When Napoleon saw this impressive work, he asked the author why there was no mention of God anywhere in the volumes. Laplace replied 'Because I have not felt the need of that hypothesis'.

The above examples illustrate another difference between the two attitudes. The planetary motion was scientifically understood after a long and painstaking series of investigations starting with the early Greeks (300 B.C.), through Copernicus (1473-1540), Galileo (1564-1642), Kepler (1571-1630) and Newton (1642-1727) up to Laplace (1749-1827). The problem of the Sun's energy reservoir was solved only about four decades ago. Thus the scientific path does not immediately yield dividends; it often requires patience and hard work. By contrast it is very easy to adopt the superstitious attitude and to call any mysterious event as arising from supernatural causes.

The present age is called the age of science. This designation does not correctly reflect the status of modern human attitudes. Rather it reflects the extent to which modern human society has

* The Greeks used the word 'planet' to mean a 'wanderer'. The planets showed irregularities in their trajectories which prompted the above name.

come to depend on the inventions of science. So far as human attitudes go, society still displays schizophrenia. On the one hand we see numerous laboratories and research institutes dedicated to science. On the other hand we still see rampant superstitions of various kind.

In this article I will discuss some of the instances peculiar to the present age of science, instances where a case is made out for the supernatural or the paranormal. To what extent are the claims for such uncanny events justified? Have they stood up to scientific probing?

FLYING SAUCERS

On 24 June 1947, Kenneth Arnold, a 32 year old businessman was piloting his small plane near Mt. Rainier in Washington State, U.S.A. when he observed a peculiar phenomenon. He found nine disc shaped objects in the sky which seemed to be tracking him. If he slowed down or moved up or down the objects would do the same. The phenomenon was reported by Arnold after landing at his destination, and his account received wide publicity in the news media. It was this event which led to the coining of the phrase 'flying saucers'.

The publicity given to Arnold's flying saucers led to a number of other similar reports from all over the United States. It was argued that these flying saucers came from beyond the confines of the Earth, from some advanced supercivilization in the Galaxy. Fears were expressed that these spacecrafts posed dangers to the overall security of the country. There were demands for governmental investigations into the reported incidents. There were also accusations that the authorities were trying to 'cover up' serious situations of public concern. Finally the U.S. Air Force appointed a committee to investigate the so called visitations from outside the Earth.

Project Sign, Project Grudge and finally the Project Blue Book started in 1952 represent the investigations conducted by various committees of the U.S.A.F. into reports of apparently inexplicable sights of unfamiliar space ships. The last of these projects was closed in 1969 after investigations over a period of 17 years. What did the committee headed by the distinguished scientist F. Condon find?

The Committee could find *no* evidence for the assumption that in any of the cases reported, an alien spacecraft visited the Earth.

In this connection it is worth remembering that as a rule any sighting reporting an unfamiliar object would be investigated until it is properly identified. Till then it would be called an 'unidentified flying object' or a UFO in short. We will use this term in future. Although the Project Blue Book closed in 1969, the UFO reports continued to come unabated.

The Blue Book Committee and other isolated later investigations reveal a remarkable similarity so far as the results are concerned. In most cases, however, the explanation of UFOs is found along one of the following lines:

- (i) The reported incident was a deliberate fraud or a hoax.
- (ii) The witnesses reporting the incident were unreliable e.g. with past history of telling lies, or with medical records of hallucination or drug addiction etc. In this case, in contrast to (i) there was no deliberate intention of giving misleading information.
- (iii) Low-flying aircrafts, artificial (man made) satellites, planets like Venus near the horizon, etc. were mistaken for alien spacecrafts. (A notable example of this last type is the sighting of a UFO by President Carter of the U.S. on 6 January 1969).
- (iv) Some UFOs seen are classified military aircrafts or satellites whose existence is never officially admitted.
- (v) Some optical illusions are created by atmospheric effects such as mirages, temperature inversions, ball lightning and these are often mistaken for events of supernatural (and extraterrestrial) origin. The discs that Arnold saw can be explained as an atmospheric effect of temperature inversion.

In spite of these results the UFO lobby in the world is still active and maintains that alien visitations of the Earth have been going on. The proponents of this point of view argue that although over 90 per cent of the UFO reports fall in the above categories (i)-(v) a few unexplained events still remain and that these must be examples of genuine alien visitations.

Philip Klass from Washington D.C. has selected a few of the 'best' cases of the UFO lobby — cases which are apparently difficult to explain within the possibilities (i)-(v). In a book entitled *UFOs Explained* published a few years ago, Klass has demonstrated that there is nothing uncanny about these cases. In fact Klass has given examples which cover all the above categories.

For example, the common man tends to believe in photographs of UFOs. Klass has shown how photographs can be faked. Investigator Robert Sheaffer has developed scientific techniques for detecting fakes. Sheaffer's cases show that photographs *per se* cannot be considered solid evidence.

Apart from Klass's work there have been other investigations of UFO reports by scientists. Even the sightings of UFOs by astronauts of Gemini 7, Apollo 12, etc. have been discussed and shown to be events which can be explained rationally, and without invoking the extraterrestrials.

These developments might give the reader the impression that scientists as a community do not believe in extraterrestrial life. This is not correct. Judging by the vast size of our Galaxy and using also the circumstance that many many galaxies besides our own exist in the universe, it would be highly unlikely that life exists only on the Earth. In fact life even more advanced than ours in intellect and technology might well exist over as many as a million sites in the Galaxy.

What makes alien spacecrafts from such sites coming to the Earth rather unlikely is the vast distance which separates two such typical sites. For example, the nearest star is located about 4.2 light years* away from us, and the Galaxy as a whole is a disc-shaped object of about 100,000 light years diameter. In such a vast region the above quoted number of a million supercivilizations is not very large. In fact over such a region, the average separation between two civilizations can be as large as 100 light years. So long as physical laws place an upper limit on how fast material objects can travel through space, even at this limiting speed (which equals the speed of light) a return journey will take 200 years: a somewhat unlikely proposition.

It could be argued that a century is a long time in human terms but need not be so for other beings. It is also possible that 'new physics' exists elsewhere in the Galaxy which permits faster-than-light travel. Having committed to keeping an open mind the scientist should not rule out these possibilities. At the same time he is entitled to be extra-cautious and critical when dealing with claims that such a possibility has actually occurred.

For example, if spacecrafts were to travel with almost, or exceeding, the speed of light, we should expect them to be designed in a radically different way from the aircrafts and spacecrafts we

* One light year is the distance travelled by light in one year and is approximately 10 million million kilometres.

are familiar with on the Earth. Yet the reported shapes of UFOs hardly differ from the shapes of these terrestrial objects. This suggests that the shapes 'seen' by witnesses must be based on the limited imagination of the observers rather than on hard facts.

THE BERMUDA TRIANGLE

If flying saucers and other UFOs are supposed to bring the superior extraterrestrials from thousands of light years away, the Bermuda Triangle refers to a specific part right on our Earth where mysterious events of supernatural origin are claimed to occur. The area in question is essentially a triangle whose vertices are at Bermuda, Florida and Puerto Rico. In recent years this region received considerable notoriety, mainly through the book of Charles Berlitz. In his book Berlitz claimed that many mysterious events occur in this triangle, events which cannot be explained except by invoking the supernatural. Let us look at a couple of examples from Berlitz's book, *as given by the author*.

An Eastern Airlines flight heading towards Miami was being routinely tracked on the airport radar system. For a ten-minute interval the flight disappeared from the radar. As the emergency search procedures were being launched the flight was suddenly located and it landed safely. However, the passengers and the crew had noticed nothing unusual during the flight except for one thing. When they examined their watches they were all found to be ten minutes behind time! So whatever mysterious agency made the plane disappear appeared to have interfered with the timekeeping devices of the occupants of the plane.

An even more remarkable event occurred on 5 December 1945 which is known as the incident concerning Flight-19. Flight-19 refers to a group of Avenger aircrafts which left Fort Lauderdale, Florida one afternoon on a training expedition. All planes except the leading one were manned by trainee pilots. They were following their instructor Lieutenant Charles Taylor who was an experienced airman. The planes lost their way and never came back. A rescue aircraft sent after them also disappeared suddenly from the radar. Moreover at one stage a message was heard from commander Taylor which went like this: 'Don't come after me, it looks like they are from outer space.' This message was found in the official radio log kept at that time. Subsequent searches in the Atlantic revealed no debris of any of the missing aircraft.

Incidents like these presented together in book form generated remarkable sensation. Aided further by news media the impression was created that the Bermuda Triangle is the location of mys-

terious powers beyond the ken of man. This impression still persists although the myth has been blown sky high by scientific investigations.

One of the major investigations into the Bermuda Triangle episodes was conducted by Lawrence Kusche who published them in a book containing some 50 Triangle events. Kusche, a librarian in the University of Arizona has shown that there are *no* grounds for invoking the supernatural in explaining these episodes. The two examples cited above illustrate how the myths are exploded by scientific investigations.

First, the strange episode of the Eastern Airlines flight. When Kusche began to look for details of the incident he found vital pieces of information missing. For example, no date, flight number, etc. are given by Berlitz. Enquiries at the airport and at the Eastern Airlines drew a blank. For, there is no record that such a thing actually took place! So there are no hard facts to go by but only vague descriptions, which seem characteristic of many other episodes in Berlitz's book.

The incident of Flight-19 is quoted in Berlitz's book with more details, some of which are found to be misleading. For example, the official log recording of Taylor's message reads not what was quoted earlier; instead it goes like this: 'I know where I am now — I am at 2300 feet. Don't come after me.' Not quite what was quoted by Berlitz! Thus there is no hint that the ill fated planes were being attacked or followed by sinister beings. In fact Kusche's investigations and those by others now confirm that Taylor had genuinely lost the way and instead of going West (which would have taken the planes back home) he led the planes towards the East and further away from their destination. Finally the planes had to land on stormy sea and perish. The Mariner rescue plane which disappeared was actually seen to explode by a ship which happened to be in that area. The explosion was not very unusual since planes of that model carried fuel in a rather exposed form which had earned them the name 'flying gas tanks'.

Statistical analysis of the sea and air accidents which occurred in the Bermuda Triangle shows that the frequency of such cases in this area is not higher than in other parts of the world. For example, the frequency of air mishaps is larger over the continental U.S. than in this area.

So vague descriptions, misleading statements and half truths have been largely responsible for creating the myth about the Ber-

muda Triangle. Yet the paradox of human nature is such that the myths still generate more interest than reality.

MIRACLES

Ancient mythology and folklore are full of incidents falling under the category of 'miracles'. Miracles are usually of two types. One type relates to events occurring in apparent defiance of natural processes, but behind which there is no human agency. Thus in these miracles a drought is suddenly replaced by rain, rivers in rampant flood are suddenly brought under control, the dead become alive and so on. These supernatural phenomena reflect the pleasure or wrath of God. By contrast, miracles of the second kind are performed by man. Krishna, Jesus, Buddha have all been associated with miracles. The purpose of benign miracles in these old stories has been to promote religion.

It is obviously not possible for modern science to provide a critical assessment of these ancient writings. What science can do, however, is to provide a suitable framework in which to assess any claim for a *modern* miracle.

Claims for levitation, production of material objects out of nothing, mind reading, ability to visit far off places in spirit and not in body, etc. are claims which can be examined under controlled scientific experiments.

Most of us have witnessed performances by magicians. These acts also appear impossible under the natural laws of science. How can a live rabbit appear out of an apparently empty hat? How is a girl sawn in half and still comes out unscathed? How can a vessel produce unlimited quantities of water? These acts are not, however, acts of miracles. The magicians who perform these acts frankly admit that they employ sleight of hand, special gadgets and lighting arrangements as well as psychological tricks to produce these apparently impressive effects.

Where such frank admission is lacking and claims are made that special mental or divine powers are responsible for these miracles, an implicit challenge is posed to science and to scientists. Are the well established laws of science being broken in these miracles?

Sometimes such miracles are used to make a certain cult or its leader popular. In an educationally backward country like India it is not surprising that such miracles are accepted uncritically and the cult of the performer of miracles gains prestige. What is surprising

is that the miracle makers also get away with their acts in the so called sophisticated countries of the West. The spoon-bending acts of Uri Geller are examples of the latter kind. Even some scientists were initially impressed by Geller's performance. Eventually however, controlled scientific experiments led to the conclusion that no miracle was involved in Geller's acts. Subsequently some magicians could perform the same feats as Geller without making any special claim of the power of mind over matter.

CONTROLLED EXPERIMENTS

What are controlled experiments? To understand their significance consider the case of a man who tosses a coin and makes a prediction that it will fall head on top. If the coin does fall head-up is he justified in claiming that he possesses extraordinary predictive ability? The answer is 'no'. If the coin is unbiased, there is a fifty percent chance that it will fall head-up and in such circumstances a correct prediction has no statistical significance.

Suppose now that the same coin is tossed 10 times in succession. What is the probability that a *given* Head-Tail sequence, such as

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say, occurs? The probability is less than tenth of a percent which is considered low enough. Thus if a person correctly predicts the entire sequence, then he has achieved something that is statistically significant. Moreover, the conclusion that the person has extraordinary predictive ability is established only after many such experiments with a number of different unbiased coins and different throwers. It was experimentation of this type that led to the above mentioned negative conclusions for Uri Geller's ability.

Should claims for miracles and the unusual events be scientifically examined, preferably under controlled conditions? It can be argued that scientists have more important things to do than exploding myths. Certainly many professional scientists keep themselves aloof from these claims and phenomena which they dismiss as para-science or pseudo science. On the other hand many of the miracle performing godmen turn down or ignore offers from scientists to investigate their miracles under controlled conditions. They or their supporters argue that so long as these miracles bring mental solace to the masses why worry about their scientific status?

Perhaps the same arguments could be used in favour of drugs like opium, which tend to lull the senses and provide apparent solace.

We may well paraphrase a well known saying and say that 'society gets the godmen it deserves.' In a society which uncritically accepts claims for the supernatural or for miracles the progress of science will be slow and faltering.

The purpose of this article is not to advocate any specific type of action, but to highlight the contrast of attitudes which exists in our so called age of science. Whether we talk of the ultra-sophisticated UFOs, or of the sinister implications of the Bermuda Triangle or read divine presence in mind boggling miracles, all cases are examples of the same contrast of attitudes.

The march of science will, however, go on inexorably and as in the past some of today's superstitions will crumble before its onslaught. Nevertheless human nature is unlikely to change dramatically and we are bound to see new examples of the above contrast of attitudes.