

#### About the Author

Dr. Allen G. McNamara who gained his Ph.D. in Physics from University of Saskatchewan is currently Head, Planetary Sciences Section, Herzberg Institute of Astrophysics, National Research Council.

He has been involved in auroral, meteor and ionospheric research and has employed experimental techniques using radar, photographic, and photometric systems, and rocket borne probes.

The Planetary Sciences Section currently has research projects in the following areas, amongst others:

Field observations of aurora are made by radar and by optical methods at many sites across Canada, mainly in the Arctic and sub-Arctic regions. The Section also operates a Prairie Network of 12 stations for the photographic recording of meteor entries into the atmosphere, and a multi-optical and radar system at Ottawa for the observation of meteors.

#### DEFINING THE TERM UFO

Taken literally, the term Unidentified Flying Object means any phenomenon detected in the air for which the observer has no immediate logical explanation in terms of natural events or phenomena. However, if sufficiently good data are obtained and/or sufficient investigation and analyses are performed, then it may perhaps be found to be a perfectly natural earthly phenomenon or object. It is then no longer unidentified. There are some people, often called 'believers', who take the position that if it is not identified then it must be of extra-terrestrial or supernatural origin (often called the ETH, or extraterrestrial hypothesis). This connotation has been so widely propagated in the public media and by its proponents, that the popular concept of 'UFO' is immediately synonymous with 'extraterrestrial visitor'.

Actually, in the great majority of UFO reports there is no definite yes or no answer and there never can be, simply because the data recorded are either lacking entirely or insufficient to make an interpretation. The proper scientific attitude is to declare the observation to be indeterminate.

#### HISTORICAL REVIEW OF UFO'S

Reports of unusual sightings, very similar to many of today's UFO reports, go back into antiquity. Take for example, the wheels in the sky described by Ezekiel in the 6th Century B.C., or the numerous myths of the ancient Greeks. The descriptions of the appearance and behaviour of their phenomena are similar to today's, but expressed in the language and beliefs of the time. In the middle ages such sightings led to the belief in witches, demons, wizards, fairies, ghosts, elves, to mention just a few. In the 1890's, there was a flap of mysterious airships reported in the United States.

The terms 'flying saucers' and 'UFO's' arose in 1947 from the news media descriptions of a phenomenon seen by a private pilot, Kenneth Arnold, in the United States. (It is probable that he was seeing mountain top mirages.)

However, throughout the entire course of human history there has never been an authentic case of physical contact with an alien spacecraft or of the recovery of any artifact of clearly extraterrestrial origin.

In 1947, the U.S.A.F. set up Project Bluebook to collect

UFO reports. This project was finally abandoned in 1969 with the publication of the Condon report on the contents of their files.

From 1951 to 1968, the Department of National Defence in Canada operated a parallel data collection project. Then in 1969, D.N.D. declassified the files and turned the collection and maintenance of the UFO files over to the National Research Council.

#### TYPES OF UFO OBSERVATIONS

Reports of UFO's may be categorized in the following five types:

- (i) Visual sightings
- (ii) Photographs
- (iii) Radar detection
- (iv) Local effects remaining on the ground
- (v) Close encounters with vehicles and beings.

Before continuing with a discussion of the types of observations, one should examine the physical and psychological characteristics of the human 'instrument' to try to understand its sources of error and limits of observation.

#### THE HUMAN BEING AS A 'TRANSDUCER' AND 'RECORDER'

The single most important factor in understanding the UFO problem, yet probably the most overlooked one, is the human observer himself. It is not sufficient to think only in terms of the physical laws which the alleged object must obey, but one must also recognize the data distortion which goes on in the eye-brain mechanism of the observer, and the psychology of the human both individually and en masse.

(a) **The eye.** When the eye is considered as a purely optical element, it is found that the physical limit of angular resolution is about 3.5 minutes of arc (about 1/10 of the diameter of the moon). However, when an observer reports a 'saucer' which is 30 meters in diameter with a row of 10 portholes and his estimate or some other independent observation places it at some distance more than 11 km away, then we know that the portholes are a figment of the imagination.



A bright meteor trail recorded at one of the twelve field stations of the Meteor Observation and Recovery Project which is operated by NRC in the prairie provinces. The trail image is chopped 3 times per second by a rotating shutter to provide velocity and deceleration data. This meteor trail is about 25 km long at an altitude of about 90 km. Such meteors very often generate UFO reports.

When one tests the stereoscopic depth perception of a pair of eyes, it turns out that distance estimates beyond about 100 meters are impossible by this means. Any distance estimate beyond this is based upon mental judgment of the superposition of known objects in front of it or on an assumption about the linear dimension of the object. The