

Book Reviews

Reopening the Question

The UFO Experience. A Scientific Inquiry. J. ALLEN HYNEK. Regnery, Chicago, 1972. xii, 276 pp. + plates. \$6.95.

If there's one thing harder than writing a responsible book about Unidentified Flying Objects, it's writing a meaningful review of such a book without being drawn into the controversy. I have the uneasy feeling that Hynek has been more successful in his task than I shall be in mine. Hynek's book is more than just an attempt to justify scientific interest in UFO phenomena. It is, in fact, Hynek's version of what the Condon report (1) should have been, interlaced with stinging criticism of the study on which it reported. That study was sponsored by the Air Force and formally reviewed and approved by the National Academy of Sciences. Thus Hynek not only defends UFO's but necessarily attacks the scientific establishment that has written them off. Can our modern scientific institutions be as limited as their predecessors were when scientific authority refused to acknowledge the reality of meteorites, hypnosis, continental drift, germs, Troy, Atlantis, and Pleistocene Man? Or do UFO's truly belong in the realm of unreality to which science assigns ghosts, religious miracles, astrology, dragons, ESP, abominable snowmen, and Loch Ness monsters?

Hynek, who is chairman of the Department of Astronomy of Northwestern University and director of its Lindheimer Astronomical Research Center, is a credible investigator. For 20 years he was the astronomical consultant to the U.S. Air Force "Project Blue Book" charged with the formal investigation of UFO reports. That activity was terminated at the end of 1969, presumably in response to Condon's statement (1),

Careful consideration of the record as it is available to us leads us to conclude that further extensive study of UFOs probably cannot be justified in the expectation that science will be advanced thereby.

Furthermore, until recently Hynek generally avoided publicizing his own views on Condon's competence and objectivity with respect to UFO's. Thus he deserves a hearing before his scientific peers. Fortunately for us, the book is well organized and easy to read, being aimed at both a popular and a technical audience. A minor distraction is the didactic—almost theological—rigidity which pervades its arguments concerning what is and is not scientific. A similar failing characterizes parts of the Condon report and is, perhaps, inevitable in any discourse concerning Faith, Morals, and Heresy, scientific or otherwise.

Hynek defines a UFO not only as an object or light seen in the sky (or upon the land) whose appearance and behavior mystify its observers but as one that

remains unidentified after close scrutiny of all available evidence by persons who are technically capable of making a common sense identification if one is possible.

Thus Hynek's UFO's are, by definition, incomprehensible to a theorist as well as frustrating to an observationalist. Little wonder that the subject has been largely ignored by the scientific community. Yet similar drawbacks have applied in earlier times to the study of ball lightning, the aurora borealis, the coelacanth, Freudian psychology, and impact cratering, for example. The virtue of Hynek's definition is that such UFO's are indeed interesting scientifically. The primary question thus becomes whether any of the tens of thousands of UFO reports can pass Hynek's criteria and possibly constitute "genuinely new empirical observations."

Condon, on the other hand, chose to define a UFO as

the stimulus for a report made by one or more individuals of something seen in the sky (or an object thought to be capable of flight, but seen when landed on Earth) *which puzzled the observer sufficiently that he reported it.* Condon's UFO is Hynek's UFO report and thus includes a vast population of uninteresting mis-

identifications of stars, planets, airplanes, balloons, and so on, and occasional hoaxes as well. In such a welter any "genuinely new empirical observations" would be significantly diluted and more difficult to recognize. Condon's UFO's are dominated by what can be explained away, whereas those of Hynek are limited to what cannot.

Interestingly, Hynek and Condon agree that those who report UFO's are generally sober, serious citizens who are genuinely puzzled by what they have observed. And they agree that the great majority of UFO's are not reported at all for fear of ridicule or other reasons. Both studies also conclude that the pattern of UFO reports is similar worldwide.

The most controversial aspect of the Condon approach, and the focus of Hynek's sharpest criticism, was the decision to evaluate UFO reports primarily as to whether or not they constituted evidence of extraterrestrial visitation to Earth. Condon, in effect, took the position that either flying saucers (and little green men) can be proven, or UFO's are not worth studying! Such an approach would seem inevitably destined to lead to a meaningless negative result, perhaps obscuring truly interesting unrecognized physical phenomena. It is conceivable that both Condon's definition of UFO's and his use of extraterrestrial visitation as a serious criterion of significance reflected more an (unconscious) desire to make the UFO problem vanish altogether from scientific jurisdiction than a thoughtful attempt to isolate possible "genuinely new empirical observations."

But even if the Condon study is as superficial and irrelevant as Hynek asserts, the real question remains: Is there sufficient evidence of truly unexplained phenomena among all the UFO reports to warrant serious continuing study? Hynek's approach is to present 80 selected UFO cases, all involving more than a single observer and some involving simultaneous and independent observations. Most of the case reports include intensive interviews by Hynek himself. Hynek's cases are mainly drawn from the Project Blue Book files and only slightly overlap the 90 or so cases discussed in the Condon report. The Condon study placed little emphasis on earlier cases and generally concentrated on "fresh" ones that occurred during the course of

the study (1967-68). Those few cases which do overlap were not "explained" in the Condon report. Indeed, according to Hynek, about one-quarter of the cases selected by Condon remain unexplained, a seemingly significant fact not emphasized by Condon.

Hynek divides his 80 cases into six observational classes: Daylight Discs, Nocturnal Lights, Radar-Visual, and Close-Encounters of the First, Second, and Third Kinds. The first two categories are virtually self-explanatory. Hynek emphasizes the similarity in detail of the many sightings, such as the absence of a sonic boom despite great observed speed. Radar-visual reports, often generated by trained airport personnel who simultaneously made radar and visual sightings, would seem to be difficult to dismiss solely as anomalous radar propagation phenomena. All in all, it does not strain one's physical imagination intolerably to think of the first three classes as *possibly* understandable.

On the other hand, the Close-Encounters, in which a flying saucer-like object is stated to have been observed at close range, are obviously quite difficult to accept at face value. Hynek implicitly acknowledges this increasing credibility gap by his threefold subdivision. Close-Encounters of the First Kind involve the reported observation of such an object at a range of perhaps 20 to 500 feet. In Close-Encounters of the Second Kind the observer reportedly perceived a physical manifestation of the presence of the object; interference with auto ignition and lights is listed as a common effect, but thermal and physiological effects are also reported. Finally, in Close-Encounters of the Third Kind humanoid figures are reportedly observed as well. Hynek draws the line at this point, stating that those additional reports in which actual communication with such humanoids is claimed generally come from individuals who manifest psychological aberrations (unlike the great preponderance of those who report the less bizarre UFO categories). In fact, Hynek obviously feels uncomfortable about including Close-Encounters of the Third Kind because of the "little green men" implications.

Yet it is just here that the weaknesses in Hynek's own approach become evident. *Any kind* of Close-Encounter is bizarre—so why rule out just the most bizarre? Is Hynek afraid of the apparent implication of his own

analysis—namely, that all the UFO phenomena really may be related to the Close-Encounters, and perhaps to flying saucers and little green men? Indeed, it would appear that this staggering implication drove the late James McDonald of the University of Arizona to actual belief in extraterrestrial visitation, a sort of modern replay of Percival Lowell's intelligent-life-on-Mars theme. Hynek does not deal adequately with the crucial question of how homogeneous a population the phenomena under discussion really are, and therein may lie his greatest vulnerability. Perhaps over the decades of his preoccupation with UFO's he has fallen victim to the natural tendency of a scientist to impute unity to his subject, even if nature is actually not so simple. However, Hynek remains a dedicated empiricist, despite his uneasiness about the Close-Encounters, and maintains that the existence of new empirical observations is indeed strongly suggested by the collection of thoroughly investigated but still unexplained UFO reports. His plea therefore is for sufficient scientific respectability for the UFO subject to permit modest federal research funds to be awarded to it and new data to be gathered without fear of ridicule.

On balance, Hynek's defense of UFO's as a valid, if speculative, scientific topic is more credible than Condon's attempt to mock them out of existence. The fact that Hynek was granted no NASA or NSF support *at all* for study of UFO's can be regarded as a rather dismal symptom of the authoritarian structure of establishment science. It is also disappointing that *Science*, which has earned the respect of U.S. scientists and occasionally the enmity of U.S. bureaucrats by providing an independent forum for controversial views, failed to publish a responsible rebuttal to the Condon report, treating it instead as a news item. As a result, the substantial criticisms raised by Hynek now were not adequately aired then. Thus, from this juror's point of view at least, Hynek has won a reprieve for UFO's with his many pages of provocative unexplained reports and his articulate challenge to his colleagues to tolerate the study of something they cannot understand.

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Reference

1. *Scientific Study of Unidentified Flying Objects*. Conducted by the University of Colorado under Contract to the United States Air Force. Edward U. Condon, Scientific Director. Daniel S. Gillmor, Ed. Published in association with Colorado Associated University Press by Dutton and as a New York Times Book by Bantam, 1969.

Metal Deposits

Ore Petrology. R. L. STANTON. McGraw-Hill, New York, 1972. xviii, 714 pp., illus. \$19.50. McGraw-Hill International Series in the Earth and Planetary Sciences.

A few metallic elements, notably iron, aluminum, and manganese, are abundant in the earth's crust and are easily concentrated by natural processes into large accumulations of commercial value. In contrast, the development of ore bodies containing elements that normally are found only in trace amounts in rocks requires coincidence in time and space of an unusual succession of geologic events. An understanding of the natural histories and the changing physical-chemical controls that have produced ore bodies throughout the geologic past has a very practical application in the continuing and accelerating search for new, untapped sources of metallic wealth. Most of the land surface and the ocean floor is underlain by rocks or unconsolidated accumulations of rock and mineral debris that are essentially barren of economically recoverable valuable metals, and efficient exploration accordingly requires recognition and location of target areas where geologic conditions are likely to be favorable for concentration of metals.

The author of this book views ores as polymineralic rocks, hence the title. Their crystallization is regarded as being determined by the same physical-chemical controls that have been so extensively studied and interpreted by metallurgists and ceramists. The author reveals a strong bias against interpretation of textures of ore deposits as a consequence of replacement (metasomatism) where it is possible to find alternative explanations. This bias is evident in his statement that "it seems likely that at least many of the structures ascribed to replacement up to about 1955 are due to simple grain growth, precipitation, annealing; and so on."

One of the most successful approaches to the location of target areas