

were excluded; they were foreign nationals not subject to the draft.

Draft calls fell under 20 000 a month during the last six months of 1968. The calls for January, February and March of this year, however, were 28 000, 33 000 and 33 700 respectively. They will remain high at least through June as the Selective Service System meets its quota of 255 000 in fiscal year 1969.

Mrs Betty Vetter, commission ex-

ecutive secretary, summarized the results this way:

"A substantial loss of current first and second-year graduate students inevitably will reduce the size of advanced PhD-candidate classes next year and in the two years following; and lead to a serious reduction in new PhD-trained professionals available to serve the nation's needs during the early 1970's."

She feels that the impact of the loss of deferment for first and second-year

graduate students already has been felt. In the 1237 graduate departments in all sciences that responded to her study, about 4000 students accepted enrollment and then did not show up. Department chairmen estimated that a quarter of these entered military service instead. 60% of the department chairmen said their September 1968 enrollments were lower than they would have expected had there been no change in draft rules or in research support.

## Edward Condon: A Physicist Never Afraid Of A Fight

Edward U. Condon's office, perched on the top floor of the tallest building on the University of Colorado campus, gives a sweeping view of Rocky Mountains to the west and Great Plains to the east. But for much of the last two years, Condon's thoughts and scientific energies have been directed straight up. As head of a \$496 000 Air Force-sponsored study, Condon directed a team of 37 experts looking into unidentified flying objects.

The question: Is continued study of so-called flying-saucer sightings warranted for their probable value to pure science? The answer (in nearly 1000 pages): No. The Air Force had already concluded long ago that UFOs do not represent a security hazard.

Last fall, long before the report was published, *PHYSICS TODAY* interviewed the man behind the report. Condon, now 66, could well rest on his scientific laurels. Instead he has added the UFO study to a list of activities that began about the time quantum mechanics was launched. He received his PhD

from the University of California at Berkeley in 1926, where he had also done his undergraduate work. Condon spent the next year as an international fellow at the then hotbeds of theoretical activity, Göttingen and Munich. Then he spent a year each at Princeton and Minnesota before settling in at Princeton as associate professor of physics.

Condon joined the Westinghouse Electric Corp in 1937 as associate director of research, leaving that post in 1945 when President Truman appointed him director of the National Bureau of Standards. In 1951 he rejoined industry as director of research and development for the Corning Glass Works, for which he still does consulting work. From 1956 to 1963 he was professor at Washington University, St Louis. Since then Condon has been a professor at the University of Colorado and a fellow of the Joint Institute for Laboratory Astrophysics.

During the Second World War Condon served on the committees that es-

tablished the Jet Propulsion Laboratory at the California Institute of Technology and the atomic-bomb development program. He headed Westinghouse radar research and also directed the Lawrence Radiation Laboratory theoretical division. In 1946 he was scientific adviser to the Senate committee which handled the legislation that established the Atomic Energy Commission.

Condon has served as president of the American Physical Society (1946), of the American Association of Physics Teachers (1964), and of the American Association for the Advancement of Science (1953). He was editor of *Reviews of Modern Physics* from 1957 through 1968.

His work has won the admiration of specialists in atomic and molecular spectra, quantum mechanics, nuclear physics, microwaves and solid-state physics. His book, *Theory of Atomic Spectra*, written with G. H. Shortley, has been a classic since 1935.

Condon also wrote, with P. M. Morse,





*Quantum Mechanics*, the first book in English on the subject. Published in 1929, it was reprinted in paperback in 1963. He was coeditor of McGraw-Hill's *Handbook of Physics* and edited *Momentum Books*, a paperback physics series following guidelines set up by the Commission on College Physics.

When the Optical Society of America gave Condon its Ives Medal last year, it cited his courage and candor in both his scientific work and his private life.

Condon's career often has been propelled onto the shoals of controversy, just as it has with the UFO study. On the wall of his penthouse hangs a Herblock cartoon, neatly framed and autographed, that depicts Condon tied to a chair being tarred and feathered by members of the House Committee on Un-American Activities. The caption reads: "After a while we may let you testify." This memento of a fight that began 21 years ago has served Condon well to this day: He calls personal attacks "old stuff."

In 1948 the question was security clearance. In 1969 the question is scientific method. The old fight began when the committee chairman, J. Parnell Thomas, called Condon "perhaps one of the weakest links in our atomic security." Although promised a hearing, Condon never got a chance to testify on his own behalf. In fact, he was cleared during the war and also in 1948 by the Department of Commerce and the Atomic Energy Commission and again in 1954 when he joined Corning. His clearance was suspended, however, by the Secretary of the Navy just before the 1954 elections and not reinstated until another investigation in 1966.

Now Condon has completed his UFO study amidst accusations that it was not conducted in a truly scientific manner. Two members of the UFO-study staff, fired before it ended, are among a small group that took potshots at the study even before it was completed. The group includes UFO-

enthusiast organizations, some other UFO researchers and writers and *Look Magazine*, which published an article last 14 May that essentially labeled the study a fiasco. Condon, while considering a libel suit against *Look*, thinks that he would have to prove in court that the article did some damage.

"However, that article did not damage me in the least," he says. "We received fewer than 25 letters about it, half of them favorable."

The details of the study were kept closely guarded by Condon and the University of Colorado, which received the Air Force contract, to stifle the controversy until the complete report could be made public. The general approach taken by Condon was as follows: Of the average 1000 or so saucer sightings logged in each year, 80–90% could be explained by known events, such as airplane contrails, kids' hot-air balloons and the like; the rest needed more investigation. The study group took a sample of these remaining sightings, including the most puzzling, and followed them up with on-the-spot interviews. Three teams of two men each conducted these interviews and were on the road much of the time.

Condon points out that the acquisition of hard data is the hardest task in a study of this kind. "We interviewed people. From a physicist's point of view, this is unsatisfactory." With sightings spread all around the country and with most sightings lasting only as long as ten minutes, there is no chance to get more than impressions from untrained observers. "We just can't get there in time with a camera, a spectrograph or a Geiger counter," Condon says.

There are a host of other problems that a UFO researcher must face. Early it was found that telephone checks with local police and newspaper offices were necessary because of the number of hoax calls. "It's scandalous what some people will do," laments Condon. Then there are the individuals, who for personal gain or otherwise, do not want

a study that might cast doubt on an outer-space explanation of UFOs. So Condon, quite unwittingly, found some natural enemies to his study even before its conclusions, one way or the other, were published. Ironically it was largely this group that accused the Air Force of not being scientific in its underestimation of outer-space visitors and thus indirectly prompted the Condon study.

Condon is upset by a couple of things, unrelated to his study, that he has found out while pursuing UFOs. One is that a large number of books and magazines for sale at seemingly every small town drugstore are devoted solely to the outer-space origin of UFOs. This one-sided presentation, he believes, distorts the problem in the minds of youngsters. He feels that the approach taken by these publications is more science fiction than science. He is glad that his study is receiving wide publicity because then it too will sell on magazine racks and at least show what a real study is like.

He also has discovered that the Air Force receives about 3000 letters a month from school children asking for more information about UFOs. The Air Force has a background memorandum of about a dozen pages, dubbed the "Kiddy Kit," that is sent in response to these letters. Many of these kits are used as the basis of papers in high-school science courses and, says Condon, accepted by many teachers without critical comment. As a one time president of AAPT, he is deeply disturbed by this.

With the study completed, Condon looks forward to getting back into teaching, writing and research. The study required his full-time attention from February to October last year. He plans to rewrite *The Theory of Atomic Spectra*. In one section of his report he thanks those who have contributed UFO material. He adds, however, that "it would be appreciated if no more UFO material is sent to the University of Colorado." —JJ

## Condon Study Rebuts UFOs; Critics Offer Own Version

The final chapter in the story of unidentified flying objects may never be written; all future discussions, however, will have to consider the two-year study by Edward U. Condon's team at the University of Colorado whose report to the Air Force was released in January. Bantam Books published a paperbound edition under the title

### *Scientific Study of Unidentified Flying Objects.*

In his conclusions and recommendations, Condon said "nothing has come from the study of UFOs in the past 21 years that has added to scientific knowledge." Further studies could not be justified in the expectation that science would be advanced, he said.

As Condon and everyone connected with the project expected, UFO enthusiasts promptly attacked the report as a biased attempt to hide the truth. The report had been attacked in a national magazine eight months before it was published (see adjacent interview story). When the report was published in January, it appeared on the news-