letters

defend our country and our freedom. I admit it now and surely I cannot accuse him for not making *his* bias evident.

EUGENE P. WIGNER
Princeton University
New Jersey

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The danger from fire in a nuclear attack is analyzed in an article in *Survive* (P.O. Box 910, Starke, Florida) **2**, 14 (March–April 1969) and in documents referenced therein. That article notes that 43% of the people in the Nippon Building, Hiroshima survived the fire storm of over a mile radius although the building was located ⅕ mile from the center. These people had no warning and would have been much better off in a shelter. To obtain maximum fire-ignition effects from a nuclear bomb, it must be exploded at an altitude higher than that for optimum blast effect and, therefore, will produce negligible local radioactive fallout. Fire effectiveness of a bomb depends heavily on local atmospheric conditions, because clouds, fog or smog can greatly reduce the range of the heat radiation. Rather simple measures, such as cleaning up papers and wetting dry leaves, can greatly reduce the fire ignition range. In my opinion, we would be much better off under an enemy attack directed towards starting fires than one designed to maximize blast or fallout *provided* civil-defense preventive measures are taken beforehand.

Carl Friedberg draws the conclusion that our article implies that Soviet World War II losses were "acceptable." Our point is not this, but rather that it is *unacceptable* to leave the United States population exposed to the terrible losses that it would suffer if a nuclear attack should occur. The saving of human lives is our objective.

ARTHUR A. BROYLES
University of Florida
Gainesville, Florida

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We are glad to see that Sidney Drell, in opposing civil defense, makes really an excellent case *for* it.

Drell outlines well and at some length a number of well-known difficulties inherent in achieving a meaningful civil-defense program—difficulties which are among the basic planning problems of civil-defense staff workers.

Then he strongly and repeatedly alludes to the admitted effectiveness of civil defense. (For instance: "Few dispute the technical facts concerning the means to protect large populations for one to four weeks after an attack from the physical effects of blast, fire, radiation and fallout.") These admissions of effectiveness—although to some extent contradicted elsewhere in his presentation—complement his final warning not to develop civil-defense programs on unrealistic premises. That warning merits close attention. It is where we are today.

Drell's serious objection he defines as one of cost. If the protection of American lives against the known, poised, devastating threat of nuclear missiles is considered *not* to be important, then his cost-oriented anti-civil-defense stance smacks of a certain validity. We would, to be sure, if we chose to defend our people against nuclear attack, be forced to commit ourselves to costs similar to those borne by Russia, China and other nations whose leaders have opted for citizen survival (nations whose GNP's are much less than ours). These costs, however, would be considerably less than many of today's much-criticized "frivolous" government adventures.

Such a program would mean a contribution of anywhere from one-half cent to seven cents a day per capita for the next five years, depending on how well we wanted to do the job. Survival and peace might just be worth it.

WALTER MURPHEY
Editor
Journal of Civil Defense
Starke, Florida

THE AUTHOR RESPONDS: Walter Murphey misrepresents my opposition to an expanded civil-defense program when he states my "serious objections" as being based on dollar costs. I am very puzzled by this characterization of my arguments, because my article analyzed the "cost" of civil defense in all its aspects *other* than the dollar costs. The concerns to which my entire discussion was devoted were the *costs* to strategic stability of developing and deploying new missiles to implement a strategy of limited nuclear counterforce strikes and the social and human *costs* if we were to implement the massive training programs required to construct an effective civil-defense system in this context.

Murphey's letter completely ignores these issues, which formed the basis of my opposition to developing massive population relocation and evacuation schemes beyond our present civil-defense system.

SIDNEY D. DRELL
Stanford University
Stanford, California

Ozone clarification

Whereas it is understandable from reading the article on "Fluorocarbons and the stratosphere" (October, page 34) that Charles Wang (March, page 15) of the Ford Motor Labs should want to point out some of the very significant accomplishments of his group, I believe that some of

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his comments deserve further clarification. First of all, at the time of publication of the October issue at least three other groups, in addition to the Ford group, had completed measurements of atmospheric OH below 30 km. The groups involved include: a German group under the direction of D. Ehhalt and D. Perner; a Florida-Atlantic University group under the direction of C. R. Burnett (in cooperation with J. Noxon of the NBS Boulder Labs) and the Maryland group under my direction. Both the Maryland and the German groups have since given detailed reports on their measurements at the "International Free Radical Conference" at Laguna Beach, California on 3 January 1976. All three measurements have now been submitted for publication in major journals.

Secondly, the use of the phase "ambient OH measurement" by Wang might have led to some confusion on the part of the reader. Any measurement in local air does indeed involve the sampling of ambient air, but this may or may not be representative of natural tropospheric air depending on the location of the local air relative to anthropogenic pollution sources. Only measurements of natural tropospheric or stratospheric OH levels are of major concern with regard to the fluorochlorocarbon–ozone question.

The Ford measurements made at ground level in Dearborn, Michigan during summer months certainly may have been a measure of ambient OH, but they were not a measure of natural tropospheric OH levels. Thus far, only the Maryland group has successfully interfaced a tunable dye-laser system with an aircraft platform and carried out measurements of natural OH levels above the atmospheric boundary layer. Burnett has been looking at column densities of OH in the atmosphere from a mountain observatory (using high-resolution interferometry) and he too has been looking at natural levels of OH. In these experiments, however, the principal region where reliable data can be collected is in the stratosphere, where OH levels are much higher. The German group has been looking at OH (via laser-absorption spectroscopy) near ground level and their measurements would also properly be called ambient OH measurements.

DOUGLAS DAVIS
University of Maryland
College Park, Maryland

Since versus because

With reference to the edited version of my recent review of Child's *Molecular Collision Theory* (March, page 59) I call your attention to an amusing lapse in the concluding paragraph, where a "since" has become "because." The two words are not the same. Thus one says fondly to one's wife, on the occasion of an anniversary, "I have aged ten years since I married you," *not* "I have aged ten years because I married you."

PHILIP PECHUKAS
Columbia University
New York, New York

Prejudice in physics?

In the interesting article by Samuel Goudsmit on the discovery of electron spin, in the June issue, there appears on page 42 the following sentence:

> "When my former student Robert F. Bacher was considered for a position at Cornell University in 1934, R. C. Gibbs asked me in confidence, on behalf of F. K. Richtmyer, whether Bacher was Jewish—if so, he would not have got the job."

I can perhaps believe that Gibbs made the inquiry referred to, but the implication that it was made on behalf of F. K. Richtmyer is clearly incorrect. The facts are these:

- R. C. Gibbs and F. K. Richtmyer were not on speaking terms and had not been for many years. (The animosity between them was always a cause of embarrassment and regret to me, but that is another story.) The idea that F. K. Richtmyer would have asked Gibbs to make an inquiry of that nature is just not credible.
- Gibbs was chairman of the physics department, and Richtmyer never was. Quite apart from the animosity, there is no reason why Gibbs should have consulted Richtmyer rather than other members of the department about Bacher's appointment.
- Richtmyer was deeply involved in the graduate school, of which he was dean; consequently he was inactive in the affairs of the physics department at that time.

Although I disapprove generally of speculations on things of this kind, I feel compelled to make the following conjecture on the origin of Goudsmit's remark: It seems to me likely that Gibbs somehow misled Goudsmit (possibly unintentionally) into believing that his inquiry was being made on behalf of F. K. Richtmyer. The idea naturally occurs to me that calumny could have been Gibbs's motive, but I tend to think it was not; there are many ways in which such a misrepresentation could have arisen, and I don't believe that Gibbs was a vicious man. In any case I think it is highly unfortunate that Goudsmit was so easily deceived.

I am aware that there was considerable antisemitism at Cornell University at that time—that was Goudsmit's point of course. Antisemitism was evil then at Cornell, and it is evil now in the Soviet Union, in the United Nations, and elsewhere in the world, but I think one has to be careful about making specific accusations. I never heard my father make an antisemitic remark, and I know of no basis for assuming that he had antisemitic attitudes. He was known at Cornell for his opposition to discriminatory practices of any kind, especially in regard to foreign and minority students. The suggestion that he would or could have prevented Bacher's appointment if the answer to Gibbs's question had been "yes" is in my opinion unwarranted and regrettable.

R. D. RICHTMYER
University of Colorado
Boulder

THE AUTHOR RESPONDS: I am happy that Robert Richtmyer throws some new light on the incident surrounding Robert Bacher's appointment at Cornell University. It is not impossible that Gibbs misled me. It was the very first and the only time that I encountered open antisemitism among physicists, outside Germany. I was upset about it and mentioned it to Bob Bacher at once; the letter is in the archives of the American Institute of Physics. Gibbs approached me on the subject at the 1935 Washington meeting, definitely mentioning Richtmyer. In those days physicists discussed only physics. It was impossible for me to know whether Gibbs, whom I had met a few times, or Richtmyer, whom I had never met, had any antisemitic tendencies. My colleagues at Michigan inferred that such prejudices originated with academic administrators and regents and that deans were forced to act accordingly.

S. A. GOUDSMIT
University of Nevada
Reno

Need for good references

An economic procedure to determine whether or not time should be spent in reading a scientific paper is to study the abstract carefully (if it well written) and to study the list of references carefully (if it is complete enough). In this list, the experienced scientist will find other papers he already knows and thus get a feeling on which foundation the new paper stands. He will also be able to assess the quality of referencing, which tells him something of the quality of the paper. While writing a good abstract is an art some of us must still learn, and adequate referencing is a science necessary for a good scientist, the completeness of information in the reference list is usually beyond the influence of the author and depends on the policy of the journal.

I mention that the title of a paper and both the beginning page and end page are essential contents of a reference, and thus of a scientific publication. Saving printing space (and thus money) by omitting either the title or the end page or