bility. When the senior members of the community accept such an estimate of their personality even these, otherwise fit, become candidates for the compassion of their juniors.

It may not be amiss to call attention to the findings of a group of specialists working with the Age Center of New England. After a 5-year assessment of 1000 healthy volunteers aged 65 or over, they say "not so" to most derogatory labels that are too often the unthinking daily impressions of their contemporaries. Their considered estimate is that "healthy aged folks are not very different from [their juniors] except for the stress of being denied the privilege of social usefulness." It is, of course, recognized that 1000 out of 17½ million is not a convincing sampling and that New England oldsters are not typical of the entire country. However, it does call attention to the fact that there are those who are not "miserable, unpredictable byproducts of our age."

Is it then, perhaps, fitting to propose conscious care in the oversell of the plight of such victims in the interest of a curb to the faulty (almost fearsome) folklore that is becoming evident in the current emphasis on aging? May we conserve the able as well as salvage the less privileged?

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Statistics Section of AAAS

In the 7 December issue [*Science* **138**, 1801 (1962)] Jerzy Neyman expressed his opinions concerning activities of the new AAAS Section U (Statistics). What follows is not intended to be a criticism of Neyman, whose contributions to science and statistics speak for themselves, or a criticism of any organization. But if trends in other statistical organizations are reflected in the growth of the new Section U, it will become only another outlet for papers on mathematical statistics. Is there any justification for this rather strong statement?

Neyman points out that the Institute of Mathematical Statistics now takes care of the communication problem in statistical theory and that this activity overlaps, a little, the activities of the giant American Statistical Association. How I wish this were true! Statistical theory dominates all statistical publications with which I am familiar, especially the *Journal of the American Statistical Association.*

The American Statistical Association may be a giant among other statistical organizations, but it is pgymy sized when compared with organizations such as the AAAS. It employs not a single professional statistician. Neyman points to the diversity of subjects presented at a recent ASA meeting. It is true that if one reads programs and other written material, such as the constitution of the ASA, he obtains an impression of diversity of interests. If one attends the sessions and reads the journal, however, he will hear and see little but theory.

Several years ago, I was privileged to organize a session at an ASA annual meeting on "Problems in medical statistics." I violated precedent and asked a congressman, who was also a physician, to tell us about national medical problems to which statisticians could contribute. The congressman's paper was rejected by the two ASA publications. A past president of the ASA who chaired the session was so impressed by the need for recognition of medical statistical problems on the part of the ASA that he wrote a letter urging that a section on medical statistics be established. However, the only new section seriously under consideration at present is one on mathematical statistics.

This is only one of many experiences I have had that support my claim that the ASA is not the diverse organization Neyman would have us believe it is.

The Eastern North American Region of the Biometric Society is much the same as the American Statistical Association. Five years ago [see *Biometrics* **13**, 555 (1957)] this region voted to establish a committee that would improve communication with the medical organizations. No functioning committee has ever been appointed. Yet 3 months ago I sat in the office of the associate editor of one of the largest medical journals extant and listened to his pleas for a series of articles on basic statistics. So if I am skeptical of Neyman's claims concerning activities of statistical organizations, it is because my feelings are based on years of experiences that do not support his statements.

Those who control the activities of the statistical organizations are just as sincere in their views as I am in mine. My point here, however, is that the AAAS may base its own program on mistaken beliefs if Neyman's statements about statistical organizations are taken at face value.

He says that Section U should be "largely limited to the popularization and decompartmentalization of research." This sounds to me more like the job of a science writer than the function of a section. He also states that Section U might bring statisticians and scientists together for exchange of information. I have already mentioned what the Eastern North American Region of the Biometric Society accomplished in this regard! The American Statistical Association has a similar record.

Is there anything positive which might be said about the functions of Section U? By all means, yes! It should perform a statistical-service function for the AAAS. I do not know enough about the statistical problems faced by the AAAS and its members to describe these services in detail. If someone were to appoint me "chief of Section U," however, I would first go around asking AAAS officials what they thought their statistical problems were. Then I would attend many AAAS sessions, listening to the programs through "statistical ears." From the resulting information, a program for Section U would be designed. I have practiced this statistical-service philosophy in my own field, medical statistics, for years. I would not want to do otherwise.

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Science Fairs

Perhaps some comments by a former entrant may be relevant to your editorial on science fairs [*Science* **140**, 1055 (7 June 1963)]. Although the science fair movement in Canada and particularly in Alberta is quite new, it has all the faults you mention.

A distinction may be made between a creative science project and a display. The latter is often a collection or illustration of some process or law that is made solely for a fair and is all too often abandoned afterwards. The creative project—very rare in a city-wide fair—is well described in the editorial: ". . . to formulate a problem, design his approach, make the necessary observations, and then attempt

to draw the conclusions that are justified by his work." As a general rule such a project has been started out of curiosity and is often continued for several years. For the junior scientist, who is bound to fumble frequently, the creative project may not make good fair material. The student collecting alloy specimens has a much easier task than the student attempting to study their properties. It would seem therefore that the creative project could be aided by an entry class involving the presentation of a paper and, if possible, a relevant display.

Students often have difficulty in finding apparatus for studying their projects. The stock reply to this is to tell them to improvise and construct their own instruments. This is excellent as long as the construction of the apparatus does not require too much time as a student must devote what spare time he has after school hours to his project, and the continuing construction of his apparatus often robs him of time in which to follow his true interest. A great deal of ingenuity is employed in the "liberation" of instruments and apparatus from commercial and university laboratories. It is unfortunate therefore that judges frequently consider the project involving home-built devices as having more merit. They do not realize that the best instrument is only a tool—what is done with that tool is what is of primary importance.

The encouragement of student science which is said to accrue from science fairs is equally well accomplished by a well-organized science club. By collective action, interested students are able to obtain grants and good apparatus. As a former member of such a group I feel that it has done much more good than the science fairs. I regret to add that since the advent of science fairs in Calgary the number of creative projects being produced by this group has decreased greatly, although many displays are being produced.

Suitably modified, the science fair may have a place in the education of science students, but it must never be considered as the only vehicle for student science.

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Perhaps one solution to the problem of managing science fairs would be to reorganize the system. Let the young people organize and sponsor the local fairs through their science clubs. Let them manage the local fairs without aid or interference from adults. And, above all, let them aid in the selection and judging of the entries. It is easier to give, and to accept, criticism from one's peers than Olympian degrees from a designated "expert" in the field.

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We question the value of the fairs in general. The emphasis on proficiency in technology rather than discovery in science seems to be at least as serious a criticism as the mandatory participation of dull students, the demands for showmanship instead of intellectual achievement, and the unhealthy aspects of competition. Yet there is a real need to encourage original research in high school students; the handful of truly good studies by teenagers each year attests to the latent potential.

We suggest that encouragement ought to be patterned along more traditional academic lines. We envision a journal for the publication of scientific papers by high school students; perhaps this could be merely a section of the existing *Science News Letter.* This system would put a premium on the whole complex of attributes which make up a scientist, including relevance of the problem, experimental design, integration with past literature, and clarity of presentation. Scholarship prizes to high school seniors would be awarded on the basis of manuscripts received by the spring of the senior year. In this way we would hope to de-emphasize the technological and showmanship aspects, to increase the number of parameters by which young scientists are judged, and to bring the students' rewards and satisfactions (and frustrations) closer to those experienced by older scientists.

JACK P. HAILMAN
PETER H. KOLPFER
Duke University, Durham,
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There is one very important aspect of science fair competition which was not mentioned in the editorial. This is the fact that most of those who participate—that is, those who conceive a problem and attempt to solve it on their own—often become so involved with their project that they forget that school is still going on, and usually are very lucky to get a passing grade in their subjects. Even their science teachers are known to give a passing grade solely for their work on projects, since that is all the science they have done for 2 or 3 months.

I have more than enough class work for my students without attempting to burden them still further with extraneous work which will not enter into considerations of how much science they have learned in class work.

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Your editorial on science fairs points up some of their faults and also praises some of their values.

Certainly there are flaws in connection with science fairs. Because well over 1 million students made and showed projects at science fairs leading directly to the 14th National Science Fair–International in 1963, some "faults" or "sponging on scientists" might be expected.

You charge that a high school teacher condoned and aided fraudulent entry of exhibits that were not built by the students. However, most regional science fairs and the NSF-I require a statement describing the work actually done by the student and a record of the equipment purchased or borrowed. Judges are especially instructed to give credit only for the work actually performed by the exhibitor. How well this is done at the local school level will depend largely on the expertness of the judges and the instructions the entrants are given. Every fair seeks to select its best.

Science Service receives hundreds of inquiries each year from students who need information they have been unable to get from their teachers, libraries, or other sources. Until such facilities are adequate, "sponging" will exist. One way of controlling this seems to be working well in the Washington area. The Joint Board on Science Education of the Washington Academy of Sciences and the D.C. Council of Engineering and Architectural Societies provide a scientist consultant for every junior and senior high school in the area. This person may be consulted freely by any student who needs help. Similar projects exist in other areas and could be introduced everywhere.

You state: "Children who are too young are encouraged to enter." Our statistics, based on 2042 NSF-I finalists' questionnaire reports, prove that more than 10 percent of the finalists

became interested in science before they entered kindergarten [*Science News Letter* (15 Sept. 1962)]. A recent study reported in the *Journal of Abnormal and Social Psychology* (June 1963) tends to show that the most imaginative children are 8- to 10-year olds [*Science News Letter* (20 July 1963)].

Many scientists have reported that their greatest drive toward a scientific career occurred when they were required to carry out a project. Of course, the best performance probably will be from those who possess a desire to excel and have the skills and facilities for doing so. The majority of award-winning projects result from science club activities and extracurricular effort. Similarly, extracurricular effort is necessary for recognition in sports, arts, or letters, too.

The editorial also suggests that ". . . school, city, and state competition should be limited to the more advanced students." A visit to an elementary school science fair will disclose considerable originality of thinking and presentation even by kindergarten children. A student of any age takes pride in exhibiting a project which he has dreamed up. He also shares his joy with those who have encouraged and guided him.

The editorial states: "Greater emphasis on science instead of gadgetry and showmanship is desirable." There was not a single gadget among the 411 exhibits shown at the 14th NSF-I (catalog of exhibits available to anyone on request). Gadgets rarely if ever bring top recognition at regional fairs. Accepting the editorial statement that children are plastic, they quickly learn to shy away from things which cannot win.

Any student who says, "but this makes a better exhibit" either has not been in a fair before or has not paid attention to the judging criteria or their values. Dramatic value—showmanship, if you will—counts for only 10 points. Creative ability and scientific thought provide 60 points. Nearly all local fairs use the same criteria and point values as the NSF-I, and these point values hold for all levels.

Science Service will not only welcome but will provide every assistance possible toward a study of science fairs. Science Service, which stimulates nationally and internationally the science youth program, including science fairs, is very cognizant of the need for minimizing the less desirable aspects of science fairs. It is encouraging that the science fairs are receiving attention and appreciation, which is most evident through the helpful criticism of details of operation.

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Jets, Meteors, Missiles, or Rockets?

The "cloud" described by J. E. McDonald [*Science* 140, 292 (19 Apr. 1963)] is quite similar in appearance to one that I photographed in Sunnyvale, Calif., at 5 P.M. on 1 May 1963.

I first saw this cloud at 4:50 P.M. and it stayed visible as a circle until almost 6:15 P.M. by which time it had spread out and was dissipated over a very large area. It was the only "cloud" in an otherwise perfectly clear sky. My "cloud", however, was nothing more than a contrail formed by a jet aircraft maneuvering at high speed.

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In connection with the stratospheric cloud formation over Flagstaff, Arizona, the estimated 35 kilometer altitude should be well within the capability of the X-15 rocket aircraft—operated from Edwards Air Force Base, roughly 350 miles away—for forming condensation trails due to its high energy exhaust. This distance and the necessary elapsed time are not unreasonable for the winds of 150 or more knots frequently reported at stratospheric altitudes. Stability of a cloud over such a time period might be questionable, but the cloud was not changed sufficiently to be reported over an observation interval of about half an hour. The cloud formation shown on the *Science* cover, indicates considerable structuring currents and differential winds at various altitudes and positions, such as are usually seen in lower contrails. It also appears in the picture on page 293 that the cloud need not be a closed loop, but a highly curved line. Winds could have a suitable effect here too.

Infrequency of X-15 flights might make it worthwhile checking on the possibility of a missile launch from the Pacific Missile Range—about 150 miles further west than Edwards.

Another possibility lies in the reports collected by H. H. Nininger [*Out of the Sky* (Dover, New York, 1959)] of highly curved dust trails left by friable, low density meteors and of wind distortion of these trails. Figure 7 on page 46, and Figs. 3, 4, and 5 of plate II opposite page 130 (discussed on pages 51 to 58 and 114) show some very large initial curves and spirals, which might, in this case, have served to reduce the required elapsed time for differential wind formation of the horseshoe line shape. In recent years such spiralings have become well understood as cases of meteors with flattened shapes of high aerodynamic lift and relatively low weight. McDonald's reported observation of a small looped cloud to the northwest of the main cloud might also be consistent with a recent meteor entry at a very shallow angle, a rocket plane trajectory, or a much earlier vertical launch of a very high energy rocket.

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Bertone has evidently overlooked the third-from-last paragraph in my report, since I pointed out two conclusive reasons why the Flagstaff cloud could not have been a contrail. We have no operational aircraft that can maintain level flight at the altitude of the Flagstaff cloud, and it is not physically possible for jet contrails to form at that altitude in the first place. . . .

Thermodynamic computations indicate that the maximum altitude to which the X-15 engines might lay down condensation trails is about 27 km, whereas my present estimate of the altitude of the Flagstaff cloud is 43 km.

Edwards Air Force Base officials have sent me the X-15 flight schedules, and no flight was made on that day or within several weeks of that date. Finally, burnout altitude on the X-15, in a high-altitude mission, happens to be almost exactly at the cloud's altitude; hence no sort of 150-mile-long trail could be caused by the X-15 in its present state of development.

Howard's further suggestion that this might have been some sort of rocket debris is being very thoroughly checked.

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