

Letters

Scientists and Jesuits, Gypsies and Jews

Much recent discussion in the pages of *Science*, as well as elsewhere, has carried the implication that scientists should become more mature citizens, by conforming more to the customary behavior of other citizens. Among the hidden assumptions is the idea that conformity is nearly always in the direction of maturity, and that becoming more like other human beings means that one is truly more humane.

The assertion is frequently made these days that scientists are human beings. Is this so? I've watched scientists for 20 years, and my observation is that nearly all are human. Of course, as always, the exceptions are important.

But going further, these days it is frequently claimed that scientists are *more or less like other human beings*. I haven't found this to be true in the case of good scientists. Why should it be true? Or if they are not like others, why should we try to change them?

Why should not distinctive occupations make us distinctively different? We would like our Einsteins to be brains *and* to be citizens, but do they have to be Rotarians? As a matter of fact, *the* Einstein was a citizen. But I find it ridiculous to imagine him at Rotary meetings wearing a button, "Call me Al." My thesis is that outstanding people in any occupation are not like the average man or like each other; I think this is particularly true and as important for the scientist as it is for the artist.

A case can be made that there are very few occupational or ethnic groups which are really quite different today and which are continuing an ancient and different tradition. Let's look a little at "the different ones." They include a motley bunch of tribes, from mathematicians to merchant mariners.

What groups, tribes, or subcultures have the following traits: that they are a definite in-group, that their special

tradition goes back for generations, and that they are truly international, maintaining their language, their rituals, and their own purposes in different countries? There are the Bohemians, from the Left Bank to the beatniks, there are the Jesuits, the gypsies, the ballet dancers, the Jews, and the professional naval officers. (The latter may risk or give their lives for a nation-state, but their tradition is truly an international one.)

I doubt that anyone who has observed ballet dancers, or anyone who has listened to professional naval persons, would argue that they are not a special subculture or, speaking more freely, a genuine tribe set apart from the rest of us. All of us seem to like it that way. But how many such groups still exist today? My observations on the research scientist are that although he is not born into his tribe as are the gypsies and others, he is self-selected through his own tremendous drive, and is accepted or not accepted by the group through informal customs now more important than the rigid ritual of the Ph.D. Scientists are a race or tribe or an ethnic group. Their customs and codes do not come through a hereditary chain, but they are transmitted generally through a strong father-son relationship, between mentor-and-student, and idol-and-follower. The young scientist then learns languages or special languages which are known only to the members of his tribe or of his subtribe. The scientist's continuing tribal education gives him not just a way of earning a living and of expressing himself, but in most cases dominates his philosophy of life. In fact, he often dangerously stretches that tribal philosophy to cover the whole sphere of existence, something which it is not designed or equipped to do.

The scientist is so professionally preoccupied with the novel that he does not think of his tradition as an old one. But there are very few international groups, even unorganized ones, as old

as the international community of science. In the organized line, there are the Communists, the Catholics, and the U.N. civil service. Who else? That is just about all the organized international communities that we have. There are even fewer *old* unorganized communities—that is groups which have maintained their basic tradition for more than one generation. There are those we have mentioned, such as the Bohemians and gypsies. There are not many more even if you include the Mafia. In the world we can document, science is now one of the oldest distinct traditions still represented in a living community.

Why should we belabor this point that scientists are different?

Because exceptions are always important. They mean. We do not now know what this "differentness" means although it seems obvious that independence of mind usually flourishes with an independence of spirit.

I venture the opinion that there is something crucial to the scientific process and to the human spirit in this differentness. Today this differentness is very much threatened. We must be on guard against the most well-intentioned efforts towards smoothing out the craggy and cranky scientist. The insolence of office and the law's delay now surround this rare bird. The friendly neighbor, all smiles, is wanting to make a pal out of this strange goose which he thinks lays golden eggs. Scientists would indeed be geese if they stopped being cranky and different and started to be merely neighborly.

Nearly every scientist can understand that an egg of gold is not intrinsically worth more than an egg of lead. It takes something more than neighborliness to appreciate a process, and it takes real originality—differentness—to understand the values of those genuine living eggs which produce more life and more eggs in the beautiful and mysterious process we call science.

Therefore, perhaps we had better let these rare birds be. Let them remain as mobile as gypsies, as disciplined as Jesuits, as arrogant as naval officers, and as different as they please. We do not know that this differentness is important. We do not—as of now—have the tools to cut them apart in order to find out just how these birds do their play which the indifferent ones call their work.

Let us then not cut them open nor even put them in any kind of cage. Let us let them run wild—let them waddle

or strut or flap their wings and squawk. Let them push each other about, or swim, or sit still and blink in the sun, as they will. Let them otherwise develop their lives—for they sometimes bring us truth and beauty quite beyond what most men call golden.

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Responsible Scientific Choice

Alvin Weinberg's criteria for responsible scientific choice, and his suggestions for improving our system of making choices, are not only sound but inspiring. What prompts me to write, however, is your singling out of one of Weinberg's arguments as "particularly apt" in your editorial of 13 September. This is the idea that the field with most scientific merit is one which contributes "most heavily to and illuminates most brightly its neighboring scientific disciplines."

If this and the other criteria offered by Weinberg are valid, it seems to me that the NASA space program, or at least most of its scientific component, comes off rather well. Space science seems to meet, at least adequately, all the criteria mentioned in your editorial.

I think "space science" measures up quite well mostly because, one could say, so little exists that is "space science" in itself. Earth satellites serve geophysics and its sisters and cousins—upper-atmosphere and ionospheric physics, geomagnetics, and others. Both earth satellites and deep-space probes serve solar physics, astrophysics, and solar-system astronomy—the last having been rather neglected for decades because the earthbound tools we have had could do more in galactic and extragalactic astronomy. Space tools will serve galactic and extragalactic astronomy as well, along with cosmology and (once lunar landings have been made) even geology once again.

Unless its development is throttled, the space program shows promise of determining within a few years whether vital spores of any kind can be found on the moon or in space itself. Within a few years after that, the question of life on Mars will surely be "settled." Certainly "settling" these gross questions will raise many more provocative

questions for biology—and probably most of all for molecular biology. The Space Administration seems to be preparing to meet these questions: it was at the NASA Ames Center here in California that ATP was first synthesized.

Certainly the answer is "yes" for both of Weinberg's "internal" criteria: "(1) Is the field ready for exploitation? (2) Are the scientists in the field really competent?" To laymen, the answer might seem to be "no" for the second, because of the early failures in making pre-NASA and NASA hardware work. But the scientists who designed the payloads knew what they were instrumenting for, how to instrument for it, how to retrieve the data, and what to do with the data. This adds up to competence, whatever the engineering difficulties.

Whether or not space activities can be promoted or defended on the three "external" criteria of "technological merit, scientific merit and social merit" depends greatly on the point of view. Some critics seem to begin with an a priori principle that space activities are simply not worth the candle, and it is impossible to show them evidence of merit; they have defined the merit away. At the other extreme are what are best termed "space fans," for whom space activities are a "race"; they are always eager to have *Ourside* do something Bigger, Better, and First-er than *Theirsides*.

Space has stimulated interest in science, among laymen generally and among school children (and their teachers) in particular, more than any other scientific development in modern times. To most people, nuclear energy is just bombs, and particle physics is more bombs; chemistry used to be nylon and buffered aspirin. It was the traumatic opening of the space age that brought a real and deep ferment in education; this ferment has not produced much yet, but it is going on at the usual *social* pace—not the pace of science or technology. Space offers mankind an opportunity to channel deep, unconscious, irrational competitive drives into directions other than toward warfare—though the opportunity may be missed. It can be missed if we go on arguing whether we would rather have a lunar landing or a cancer cure (or some other "more worthy" objective); we all know in our hearts that these things are not alternatives. Space also, as Eugene Rabinowitch recently pointed out, offers unprecedented opportunities for international

cooperation. Even this much adds up to social merit.

As for scientific merit, "space science" not only serves and illuminates its neighbor sciences but also stimulates science in general and stimulates support for science. Would there be bitter and prolonged disputes today over \$10 million for a Hale-Palomar observatory or a preliminary Mohole drilling? The sheer size of the space effort has made "unreasonably" expensive ventures "reasonable." The head of a great oceanographic institute informs me that his budget has tripled in the last few years, and he thinks "space has helped."

The "trouble" with space science is that it requires such frightfully expensive hardware. But this general kind of hardware is being built anyway, for its destructive potential. Without deliberate space efforts it would not serve science directly at all, and it serves society only by providing a deterrent to someone else's destructive use of similar hardware. Or so society hopes. No worthwhile suggestions have been made for getting cheaper hardware or for using the expensive stuff more efficiently; we shall learn how to do these things by using what is available "inefficiently" for a time. Certainly we shall not have cheaper space programs by stretching them out, or waiting indefinitely. Nor would stretchouts or arbitrary waiting periods serve society any better right now when we have idle industrial capacity and people out of work—and while we can still afford unlimited supplies of lipstick and pizza.

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Research Grants—

Are They Worth Saving?

The recent recommendations of the Committee on Sponsored Research of the American Council on Education relative to payment of faculty salaries from research grants deserve very serious consideration from the academic community and government agencies. These proposals represent a further step in the direction of approaching all university research support on a strict contractual basis. They also represent a step away from the view that the faculty members of universities have scholarly interests for which they seek financial help and for which they