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Bigness Has Its Place

With government appropriations for scientific and technological projects growing ever larger, some scientists are coming to wonder whether success will spoil basic research. Instead of seeking answers to questions that puzzle them, so the argument runs, scientists are caught up in projects that have little to do with basic research, however important these projects may be from the viewpoint of our military security or of our efforts to promote international good will. Moreover, the argument continues, the projects are designed on such a grand scale that many scientists spend their time in administrative activities rather than in creative thought. We agree that there is something to this line of thought, but if prosperity has some pitfalls it also has a few advantages.

Work on some of the most fundamental and interesting scientific questions seems now to have reached a stage where further progress requires the construction of extraordinarily expensive and complicated equipment. In the study of the structure of matter, for example, many physicists are puzzled by the apparently large number of elementary particles. The feeling is that elementary particles, if really elementary, must be few in number. Consequently, physicists suspect that a closer look at their structure will reveal an underlying, unifying pattern, much as resulted from a closer look at the structure of the chemical elements. But a detailed probing of the elementary particles of physics requires nuclear accelerators even more powerful, and hence more expensive to build and more complicated to run, than those now in operation.

Another example of the possibility of a program of great size leading to a fundamental advance in science may be taken from the broad field of space exploration. Recovery of materials from Mars or Venus, or the study of such materials by remote sampling techniques, may produce results bearing on such basic questions as the origin of life. Everyone knows, of course, that life does not now arise spontaneously on the earth, but the theory of biochemical evolution holds that life develops spontaneously when the conditions are right and that once upon a time on the earth conditions *were* right. Proof that life exists on another planet, and the study of its forms, could fill important gaps in this theory.

Our defense of bigness, then, is that in some areas of research it may be a necessary condition for further advance. We hardly wish to claim, however, that bigness is also a sufficient condition for that advance. The value of the arguments of those people who have doubts about bigness lies in their refutation of this latter claim—which, of course, is never stated so baldly. One measure sometimes proposed as an aid to basic research is that the government should not finance projects but support people. It should give blank checks to the best scientists to work on problems that interest them. But one can favor support for some individuals and still see value in the support of projects employing large groups of specialists operating as teams.

It certainly is no secret that the reason why the government is playing such a large role in the support of science is that science is playing such a large role in the prestige and power of nations. New appropriations for research do not spring from sudden increases in the love of learning. But perhaps in the not-too-distant future, scientists will say of some of our present huge projects that the resulting gains in our understanding of nature fully warranted the effort, even though hope of such gains was not the only reason why the projects received support.—J.T.