

- ance to the field program in Iraq, and for advice in the interpretation of its results, are due to Mr. K. F. Vernon, H. E. Dr. Naji al-Asil, Dr. J. C. Russel, and Sayyid Adnan Hardan.
2. R. M. Adams, *Sumer*, in press.
 3. A preliminary application of this approximate methodology to conditions prevailing in Iraq was introduced by one of us (T. J.) in the Diyala basin in 1936-37, and the results of that earlier survey have been incorporated in the present study. Fortunately for the archeologist, there is sufficient disturbance from routine community activities (for example, foundation, well, and grave digging, and mud-brick manufacture, and so forth) for some traces of even the earli-

- est of a long sequence of occupational periods to be detected on a mound's surface.
4. Partial town plans for the political capital of the region at Tel Asmar (ancient Eshnunna) and for two other slightly smaller centers are available from extensive Oriental Institute excavations carried out in the Diyala region between 1930 and 1937. See P. Delougaz, *The Temple Oval at Khafajah* [Oriental Inst. Publ. 53 (Univ. of Chicago Press, Chicago, 1940)]; P. Delougaz and S. Lloyd, *Pre-Sargonic Temples in the Diyala Region* [Oriental Inst. Publ. 58 (Univ. of Chicago Press, Chicago, 1942)]; and H. Frankfort, *Stratified Cylinder Seals from the Diyala Region* [Oriental Inst. Publ.

- 72 (Univ. of Chicago Press, Chicago, 1955)], plates 93-96. For recent general overviews of the history and culture of the earlier periods, see A. Falkenstein "La cité-temple Sumérienne" [*Cahiers d'Histoire Mondiale* 1 (1954)] and T. Jacobsen, "Early political developments in Mesopotamia" [*Z. für Assyriologie* (N.F.) 18 (1957)].
5. General accounts of political, social, and cultural conditions in Mesopotamia during the Persian dynasties and under the Caliphate are to be found in R. Ghirshman, *Iran* (Pelican, Harmondsworth, Middlesex, England, 1954) and P. K. Hitti, *History of the Arabs* (Macmillan, London, ed. 6, 1956).

Mr. Keynes and the "Day of Judgment"

How useful is the great economist's gloomy model
in the light of today's thought and experience?

David McCord Wright

If consistency is the bane of little minds, Lord Keynes had certainly a great one. No one who studies the work of John Maynard Keynes can fail to be impressed by the frequent brilliance of his insights and the usefulness of many of his tools of analysis. But he lacked that sober quality which causes a man to sit down and carefully consider the consistency of his various successive theories and pronouncements. Keynes at various times approved, in writing, the essentials of a number of different restatements of his system, including one written by me (1). But when we compare the different models, thus approved, we find them to vary widely among themselves. The trouble lies in the fact that his basic model was founded on extremely narrow assumptions, and that he did not bother always to make clear to what extent he felt these assumptions applicable at a given time, and how much, in any case, he was willing to relax them (2).

Keynes' successors and disciples therefore differ widely among themselves in their interpretations. Also, it is difficult to separate one part of Keynes' analysis

from the rest. However, since selection is necessary, I have picked out for explanation and criticism that interpretation of Keynes which has, unfortunately, become most widely connected with his name.

Few aspects of Keynes' system influence modern thought more than what one of his early reviewers has called "Mr. Keynes' vision of the day of judgment"—that oft expected crisis when unregulated capitalist expansion shall be brought to an end by overinvestment or underconsumption. So deeply has this picture affected the minds of a whole generation of economists that whenever—as in the last few months—the employment index falters, it requires unusual courage and balance for an economist to resist the cry that here at last is the predicted collapse.

Yet it is not easy to dig out of Keynes' *General Theory of Employment, Interest and Money* the reasoning which underlies his frequently gloomy views (3). The book is an unusually difficult and disorderly one. In essence it consists of three separate and distinct threads of analysis which Keynes himself and many of his disciples often confuse: (i) a very precise mathematical model

based upon factual assumptions which are frequently inapplicable, (ii) a set of tautological definitions which *sound* as if they conveyed meaning but which, as one acute critic puts it, "achieve a magnificent generality by being about nothing at all," and (iii) a number of practical policy suggestions, some of which are extremely valuable and some quite the reverse. Space is lacking here to review the complicated but arid field of Keynesian terminology. What I shall do in this article is, first, to outline Keynes' basic mathematical model on which his "day of judgment" ideas are based, second, to show how limited it is, and third, to show, from a study of these limitations, wherein scientific truth requires that his conclusions and many of his policy suggestions must be seriously modified.

How the Basic Model Works

Characteristically, Keynes deferred a statement of the basic assumptions of his fundamental model until the *eighteenth* chapter of his book, where they are often overlooked. Yet everything in his model depends upon these assumptions, and I am sure that if their limited nature were more widely recognized, Keynes' conclusion would have far less prestige. The crucial passage runs as follows:

"We take as *given* the existing skill and quantity of available labour, the existing quality and quantity of available equipment, the existing technique, the degree of competition, the tastes and habits of the consumer . . . the social structure including the forces . . . which determine the distribution of the national income. This does not mean that we assume these factors to be constant; but merely that, *in this place and context, we are not considering or taking into account* the effects and consequences of changes in them" (italics supplied) (3).

This passage (some of the more tech-

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nical sentences are omitted) assumes in effect that (i) there is no technical change or invention, (ii) there is no change in taste, (iii) there is no change in population or resources, and (iv) there are no changes in the preferences of the population between work and goods, on the one hand, and leisure, on the other. These assumptions, it will be seen, in effect “freeze” the system, and practically every dynamic element of capitalist civilization is removed. Of course, as he explains, Keynes did not mean that these forces were always lacking in reality. But what he did mean, and the point cannot be too often stressed, is that *in the basic model* on which his system rests, virtually *all the dynamic social forces are omitted*.

Let us, however, proceed. By a combination of intuition and mathematics, most, but by no means all, economists assume that *granted* such a frozen system, three absolutely vital conclusions can be drawn. These are: (i) Investment depends upon consumption. Nobody will build a new factory unless demand for its product is increasing. (ii) There is a fixed mechanical ratio, called by R. F. Harrod of Oxford “the relation,” between the flow of consumer goods and the amount of “capital” or equipment needed to produce them. (iii) Finally, and most important, it is possible under these fixed conditions to assume an ultimate condition of “full investment” or saturation. At this saturation point, a society has (i) accumulated as much equipment as it can usefully employ and (ii) is producing a maximum output of consumer goods. This does *not* mean that everybody has all he wants. It only means that given the existing state of knowledge and resources, and the given preferences between leisure and goods, expansion has reached a limit. People *could* make and enjoy more goods, but they would rather take a vacation.

Let us now proceed to the working of Keynes’ basic model, presenting it, however, in simple language, and not employing his special terms. An economic system, we may suppose, is beginning to expand from a state of unemployment. Or else a *given* set of new techniques is being introduced in some undeveloped country. What will happen? Keynes has two models. The first depends upon what he calls the “normal law of consumer’s behavior.” This means that, as output rises, consumption also rises, but not as fast. People get richer but do not increase their consumption expenditure as fast as their income is rising. Such a dif-

ference in production and consumption trends spells, he thought, inevitable crisis. For consider: *under our assumptions*, investment depends on consumption. Factories are not built unless their products are being demanded. Now, if more and more factories (proportionately) are being built, and less and less increase (proportionately) in consumption is taking place, there soon must come a point beyond which more equipment cannot profitably be built. Yet people are not spending their full income. The unspent money piles up in the banks, which cannot find solvent borrowers for it. Men are unemployed. There is a crash.

Keynes’ second version is more sudden. People, we may suppose, keep consuming the additional output of consumer goods right along. But finally the “condition of full investment” or saturation point is reached. There is no need for further construction of houses, factories, and equipment. Only replacement is needed. But society has gotten itself into the habit of saving more money than is needed for mere replacement. This habit, it is said, will persist though no longer needed. Again money will go unspent. Funds will pile up. There will again, but more suddenly, be a crash. The capitalist urge to accumulate survives its usefulness and produces unemployment. This is the Keynesian vision of the day of judgment (4).

The Heretics versus the Orthodox Economists

Curiously enough, once we scrape all the verbiage off Keynes’ model, as has been done in the preceding section, and omit his special analytical constructs, it will be seen that the model is not particularly original. Much the same line of reasoning can be found in the work of the “heretics”—Marx and Veblen, for example. Still more remarkable, many of the same assumptions, but with quite different conclusions, appear in the work of the “orthodox” economists, notably David Ricardo (*circa* 1810) and John Stuart Mill (*circa* 1848) (5). Ricardo and Mill both often used models that were just as “frozen.” They both assumed a “saturation” point was possible. They both often felt that investment depended on consumption. Yet they came out at quite a different place. How was this possible?

The difference lies in the fact that Ricardo and Mill switch the argument over from how much investment is

needed to why people save. They considered motives, and by considering motives got very different consequences. “Why,” Ricardo asked, “did a man build a new factory?” “Why, because he expected to make a profit from it,” was the answer. “Why,” he asked further, “did a man save money?” “Well, because he wanted to get interest on his savings” was Ricardo’s answer. “Suppose I expect to make a considerable profit from a new factory,” said Ricardo, “but I don’t have enough money to build it. What will I do?” The answer seemed obvious: “Use part of your expected profit to pay interest on a loan from someone else.”

From these ideas it was possible to deduce a complete theory of adjustment. If, as at the beginning of an expansion, there are many prospects of profit, profit expectations will be high. Many people will be wanting to borrow money to build new factories to take advantage of them. Competing against each other for a limited supply of savings, they will force up the price of loans—the rate of interest. But on the other hand, thought Ricardo, if interest rose, more people would want to save. Thus his argument was as follows: A need for new construction will produce high profit prospects. High profit prospects will increase borrowing for investment and force up the rate of interest. But higher rates of interest will increase saving. This will make it possible to expand even faster.

Still more important, the argument can be put into reverse. As society approached a saturation point, profit prospects, Ricardo thought, would fall. Fewer people would want to borrow. In consequence, the rate of interest would fall. But if interest rates fell, fewer people would want to save. Thus, as the need for saving declined, the urge to save would drop with it. People saved for the same reason, say, that they grew potatoes. If the price of potatoes is high, more potatoes will tend to be grown; if lower, fewer. So it was also, Ricardo thought, with saving and the rate of interest. While at one point there might be high interest and high saving and investment, and at another low interest and low saving and investment, there would, it is true, be adjustments back and forth, but never serious unemployment. Ricardo’s theory was followed by Mill. And with much refinement and elaboration this remained the accepted, orthodox theory of interest, saving, and employment until the publication of Keynes’ *General Theory* in 1936.

Wherein, again scraping off special

verbiage, does Keynes spoil this pretty picture? He does it in two ways. First of all, Keynes points out, people do not save money merely to get interest. In the short run they may have quite other motives—to provide for old age, for instance. Thus a drop in the rate of interest, because of a drop in expected profit, need not stop people from trying to save, or start them spending. On the contrary, they may, for quite a while, not react at all. But the situation is even worse. For, said Keynes, people do not merely save money to lend at interest. They can also merely *hold* money, or accumulate stocks of it. And a man may be unwilling to let go his stock of money unless he is paid for doing so. Thus Keynes said that the rate of interest was the price “paid for parting with liquidity.” Men want at the very least to be sure of getting their principal back. And when there are many risks they must be paid a premium to compensate for bearing them (6).

An elaborate and complicated analysis has been built around these questions. All that we need to remember here, however, is that the rate of interest is determined not merely by the profit prospects of the borrower interacting with the desire of people to save, but also by the “liquidity preference” or caution of lenders. The repercussions upon the optimistic interest and employment theories of Ricardo and Mill are most severe. For not only does consumption not necessarily rise as the rate of interest falls, but also, even though society is thought to be experiencing a glut and hence profit prospects are low, the rate of interest may not fall at all, since “liquidity preference” may have risen in an offsetting manner. There are thus not two but three possibilities: continual smooth growth, Ricardian adjustment to saturation, and unemployment crisis.

It is from this analysis that most pessimistic “day of judgment” theories take their beginning. Forgetting the limited nature of the basic model upon which their ideas depend, many modern economists assume: (i) investment depends on consumption; (ii) a glut of equipment or “condition of full investment” is possible; (iii) when profit prospects rise or fall the rate of interest need not move with them because liquidity preference may be shifting independently; (iv) consumption does not necessarily shift with changes in the rate of interest. Add all these assumptions together and the possibility of devastating and even permanent crisis arises. But a scientific

economist cannot stop at this point, for we have not yet considered the validity of the basic assumptions. Our job next, therefore, is to carry the argument back to its base and to show wherein its ultimate foundations are inadequate.

Validity of the Underlying Assumptions

Does investment necessarily depend upon consumption? I mean, is it true that investment in the real world will be made only on a rising demand? To show how mistaken the idea is, when stated as a universal principle, let us ask ourselves under what circumstances a brewer, say, might build a new brewery even though the volume of total beer sales or the price of beer, or both, were falling.

There are three cases: the better beer, the cheaper beer, and what I have called the “bullheaded brewer” (7). If a man invents a new kind of beer which he thinks is going to attract sales from other brands, it may pay him to build a new brewery even though general beer sales are falling. And the shot in the arm given by his new construction *could* raise not only general beer sales but employment in other lines as well. Next, if a man gets hold of a new and much cheaper method of brewing, it may pay to build the new brewery even though beer sales and prices are falling. For though prices are declining, say 2 percent, if costs are reduced 20 percent, a substantial profit margin remains. Finally, a business man may simply feel that he is smarter than the market and he (the “bullheaded brewer”) may go ahead and build though things are still depressed. And it is again undeniable that his courage and the stimulus of the construction he is carrying through may start the economy once more expanding.

One final case must be mentioned in which investment does not depend upon present consumption. That is the case of investment made on a basis of long-run trends, say of population growth, and not on the basis of present demand. Among such projects are tunnels, highways, subways, and railroads. Such projects are actually stimulated by depression. For in depression, interest rates are often low, and costs low, and since it is the long-run trend that is the motivating force, and not present consumption, the immediate drop in demand will not be important. Thus, as one well-known writer has put it, “the system can be dragged out of depression by that sec-

tion of construction which belongs to the future.”

One does not get the full impact of what we have been saying until one realizes that the economic system is not just a two-story affair of machines and consumer goods. Rather, it is set up in many layers, like a cake. There are the machines that make consumer goods, and the machines that make machines, to say nothing of the machines that make machines that make machines, and so on ad infinitum. The problem is further complicated by many loops and whirlpools in the input-output flow. Now *anywhere*, and at *any time* or point in the flow, the cheaper and the “better” product may be being introduced, or some businessman may think he can outguess the market, or investment of a very long-term nature may be stimulated. Thus, while department store sales, let us say, have dropped 5 percent, this does not necessarily mean a drop in investment. New inventions may at the very same time be *boosting* investment demand by 10 percent. The economic system in a capitalist economy (and in most socialist ones) is not, practically speaking, a single, tidily articulated mechanical flow. All sorts of spontaneously occurring changes up and down the stages of production may completely nullify the effects of either a drop or an increase in consumer purchases.

Businessmen, who, to succeed, have to be good practical economists, usually know the leeway there is in the system for unexpected change. Consequently, a businessman is much more interested in his expectations regarding his immediate market than in fluctuations in demand for more remote industries. Consumption is therefore only one factor in the situation, and not necessarily a controlling one. Furthermore, even consumption does not behave with the mechanical simplicity postulated by Keynes. Many consumers have cash or can obtain credit. So far from always lagging during expansion, consumption can sometimes rise faster than general expansion. This would reduce inventories and stimulate the economy still further. The statistical record is clear that, in the real world, we must be prepared for highly erratic, unpredictable shifts in the general level of consumption (8).

So much for the vagueness of the relation between consumption and investment. What about the point of general saturation, or “full investment”? Here, too, precision vanishes as we approach reality. For, again, the statistical record

is clear that in the real world human wants do not stay put. As output rises, wants, on average, tend to rise with it. Luxuries become necessities and erstwhile necessities drop out altogether. Even a monastery of contemplative monks can generally use a larger library! And Lewis Mumford lists among the necessities of life "Poetry, drama, and idle play," all of which, if one knows anything of comparative civilizations, can absorb immense amounts of capital.

The problem, then, is not so much a lack of general desire, as an inability, in the short run, of the directors of production perfectly to foresee the shifts of consumers' desires and to adjust the pattern of production to them. Were businessmen or socialist bureaucrats equipped with x-ray eyes which would enable them to read off the wants of the consumer six months *before he knew he had them*, and able to make quick and perfectly accurate adjustment to these wants, there would never be a glut. But the expanding society (any expanding society) is always advancing into what I have called a "fog of futurity." There are bound to be mistakes. Such advantages as socialism possesses in the matter of stability lie largely in the ability of socialist bureaucrats to refuse to gratify the known wants of consumers and to slow down the whole process of growth-change to a slow enough pace (frequently very slow) for them to handle (9).

The problem in fact is best visualized in terms of *flows of demand* of various sorts, plus *rates of change* of those flows. We can think of a certain proportion of the output of society being used to produce, say, wheat, so much used to produce cloth, and so forth. We can think also of such and so many men being employed in technical change, so many in simple expansion, so many in replacement. The essence of the problem is that all these rates of flow are, in an expanding society, constantly shifting. We get full employment when all of these shifting relationships add up to full employment. We get pressure toward inflation when they exceed that amount, and deflation when they fall below it. But the movements of these flows do not conform to the simple rules of the Keynesian model. In practical experience, the Keynesian forecasters have quite a poor record (10). On a purely pragmatic basis, therefore, we have excellent grounds for questioning the adequacy of the Keynesian models.

What determines the rates of change?

Here the mathematical economist must call in the sociologist and many other social scientists, besides the accountant. Advertising, the anthropological culture concepts of a people, even their religion and politics, will deeply affect the rate and direction of their shifting patterns of wants.

Yet, confining the question to the purely economic calculus, I have already demonstrated enough in this article to call in question much of Keynesian thought. While Keynes himself knew better (and often remembered to say so), the general trend of his argument, and the normal reaction of most of his disciples is: In the face of a drop in output and employment, just stimulate demand (11). Put in more money, it will be said, say by increasing the national debt through bank credit, or discourage saving by "soaking the rich."

Now so far as I am concerned, it cannot be denied that circumstances could arise in which it would be desirable to inject more money, rather than risk a general collapse. But I hold that Keynes' one-eyed concentration upon consumption, and the "soak the rich" policies often deduced from it, constitute very often an important barrier to real understanding of the problem. In other words, his remedies are sometimes not merely useless but actually harmful. For they keep us from thinking about the main problem.

A Practical Example

A practical example will be helpful, and it is ironic that the one most easily cited is the crisis from which Keynes wrote his book: the English unemployment crisis of the 1920's. There, the real trouble lay in a lag in the relative technical productivity of British industry which placed British goods at a disadvantage relative to those of Britain's competitors in export trade. Because the United Kingdom's industry was lagging technologically, her prices were high and sales low. Because her prices were high, investment prospects were unprofitable. Because investment prospects were unprofitable there was unemployment. The real need was thus for modernization. Keynes, however, picking up the argument in the middle, talked about increasing consumption, or tinkering with exchange rates. These remedies were in the nature of treating a fever with aspirin. They could at best be short run.

But not only in the case of countries

like the United Kingdom which depend on export trade, is Keynes often misleading, but in general analysis as well. The real motive power of industry as it advances into the future is not just consumption, but what might be called the perspective of profit, seen over several years, between expected price trends and expected cost trends (12). It is true that business does not take advantage of every immediate profit. It takes a long view, often forgoing short-run advantage for the surer gains of prolonged "good will." It is true that some investment is made in which profit considerations have no part. But there is a critical margin in which they are enormously relevant.

Now the real cause of a depression can sometimes be not a lack of consumption but a maladjustment of cost and prices. Wages can be rising faster than productivity, and hence the prospect of profit is reduced. Or taxes may be so heavy as to have the same effect and leave little incentive. Under these circumstances, just putting in more money will not help the basic problem. And there is one further problem that can never be forgotten. The extra money put in during depression to stimulate the economy may not *at first* cause inflation, but that money will not just die. As after World War II in the United States, the piled up accumulations of years of deficits may later on suddenly explode, plunging the nation into severe inflation.

References and Notes

1. A word is in order concerning my relationship to Keynes. I had published an article in the *Economic Journal*, of which he was editor, and sent him a copy of my first book, *The Creation of Purchasing Power* (Harvard Univ. Press, Cambridge, Mass., 1942). Shortly thereafter, I received a letter from Keynes commenting upon it at length. This began a correspondence which lasted down to his death; indeed, the last letter which I received from him reached me after I had read of his death in the newspapers. Thus, although I never met him personally, I do feel that I have some knowledge of one side, at least, of his outlook. My interpretation of Keynes' system, which Keynes himself approved in general and in writing, is given in my article "The future of Keynesian economics," *Am. Econ. Rev.* (June 1945). A good, brief explanation of the more mechanical approach to Keynes' work will be found in Joan Robinson, *Introduction to the Theory of Employment* (Macmillan, New York, 1937). Extensive bibliography and biographical data, as well as technical essays, are to be found in S. E. Harris, *The New Economics* (Knopf, New York, 1947). See also R. F. Harrod, *The Life of John Maynard Keynes* (Macmillan, New York, 1951). My reservations concerning the general line of interpretation followed in these titles will be found in my review article "The life of John Maynard Keynes," *J. Public Law* (Emory University, Ga.) (Spring, 1952).
2. How far Keynes himself was from a merely mechanical application of his model will be seen by the fact that he wrote me that he agreed with me that we would not be likely to have unemployment and saturation after World War II "for some time to come," but rather inflation. This was at the time when most of his American disciples were predict-

- ing an unemployment crisis practically immediately upon the conclusion of peace.
3. J. M. Keynes, *The General Theory of Employment, Interest and Money* (Harcourt Brace, New York, 1936).
 4. There is a special possible exception to this theory of collapse. It could be that about the time further *net* accumulation ceased to be necessary, the replacement demand to maintain the (hitherto) growing stock of capital would increase. Thus the gross demand for newly produced equipment and capital goods would not drop, though demand for a *net* increment had fallen to zero.
 5. See J. S. Mill, *Principles of Political Economy*, ed. 6, book IV, chap. IV, sect. 4 "Such a country . . . is habitually within as it were a hand's breadth of the minimum and the country therefore on the verge of the stationary state." Ricardo's views, which I here paraphrase and summarize, will be found scattered through his various books, pamphlets, letters and notes, all set forth in *The Works and Correspondence of David Ricardo* (10 vol.) edited by Piero Sraffa with the assistance of M. H. Dobb (Cambridge Univ. Press, London, 1951). A typical quotation from Ricardo's works (vol. 2, p. 438) is as follows: "no mistake can be greater than to suppose any evils whatever can result from an accumulation of capital. The sole consequence might be an indisposition to accumulate further from the fall of profits."
 6. The special risk, which Keynes particularly elaborated, is that of a capital loss if prosperity returns and the rate of interest *rises*. A perpetual income of a dollar a year at 2

- percent has a capital value of \$50. At 4 percent its capital value is only \$25. Because of this special danger of capital loss, men may hold money rather than invest it at low interest rates. Keynes called this the "speculative motive" of "liquidity preference." The subject has become much tangled in elaborate verbiage. Increasingly, however, it is being realized that Keynes' theory can be treated as supplementary to, rather than contradictory of, "orthodox" theory. See my "The future of Keynesian economics" (1) for a technical discussion.
7. An elaborate explanation of this problem, in simple language, will be found in D. M. Wright, *A Key to Modern Economics* (Macmillan, New York, 1954), chap. IX, sect. 2. The reader is referred to this book for general elaboration of the points set forth in this article.
 8. I have given an elaborate theoretical analysis of the interrelations (and lack of interrelation) between markets in "What is the economic system?" *Quart. J. Econ.* (May 1958). The egregious failure of most Keynesian forecasts after World War II was very largely due to an unexpected upward jump of the consumption level. Similarly, in 1953 and again in 1958 the Keynesian models of mechanical interrelationships between investment and consumption did not work out. Of course this does not prove that his model cannot sometimes be useful. It only proves that it is not universal or reliable.
 9. For an analysis of some of these problems of speed which the socialist planner encounters, see D. M. Wright, *The Economics of Disturb-*

- ance* (Macmillan, New York, 1947), chapters III and VI. This book was written during the war and its analysis was worked out entirely from *ad hoc* logic, given a few premises which I believed to be true. It has, therefore, been extremely interesting to watch the subsequent accumulation of an immense mass of data illustrating the practical occurrence of the dilemmas therein predicted.
10. Examples of failure of the postulated Keynesian relationships are mentioned in (8).
 11. Keynes' views on wages have been particularly often misunderstood and misstated. How many people, for example, remember that Keynes wrote the following: "When we enter on a period of weakening effective demand a sudden large reduction of money wages to a point so low that no one believes in its indefinite continuance would be the event most favorable to a strengthening of effective demand" (3, p. 265). Or, "a general reduction [of money wages] may also produce an optimistic tone in the minds of entrepreneurs, which may break through a vicious circle of unduly pessimistic estimates . . . and set things moving again on a more normal basis of expectation" (3, p. 264). Finally, in his *Essays in Persuasion* [(Harcourt Brace, New York, 1932), p. 341] he refers to the labor unions as "once the oppressed, now the tyrants, whose selfish and sectional pretensions need to be bravely opposed." The truth is that, scientifically, Keynes was a highly schizoid character.
 12. Concerning the "perspective" of profit, see D. M. Wright, "What is the economic system?" (8).

Science Teaching Improvement Program

Changes in interest in science education point to gains, if regional effort can be increased.

John R. Mayor

In the 3 years since a grant from the Carnegie Corporation enabled the American Association for the Advancement of Science to begin its Science Teaching Improvement Program (STIP), a very substantial change has developed in the United States in the interest in and attitudes toward the teaching of science and the education of science teachers. Most of the change has been in attitudes and interest, for a 3-year span is not long enough for alteration in the materials actually taught or in the ways in which teachers are prepared for their responsibilities. But the changes in interest and

attitude are forerunners of changes in practice, and already it is evident that major changes in practice are coming. The great expansion in number of summer and academic-year institutes for teachers and the several well organized efforts to prepare up-to-date course material of high quality in physics and mathematics are outstanding examples. Further evidence is provided by the increasing number of colleges and universities that are offering special science and mathematics courses for teachers and prospective teachers, the number of states and universities in which special committees of scientists and educators have been established to work together

on problems of teacher preparation, the increased number of studies being conducted of the science curriculum and of science teaching materials, and the greatly increased willingness of scientists to devote time and thought to the problems of education below the collegiate level.

There is no way of knowing—and we have made no attempt to find out—how much of the credit for these changes can properly be given to the AAAS and its Science Teaching Improvement Program. The STIP staff and publications, and the annual meeting and committee resources of the AAAS have been wholly or in part directed toward these ends. Part of the change can no doubt be credited to the Association's activities.

Instead of considering the unanswerable questions of proportion of credit, it will be more useful to describe the work done.

Use of Science Counselors

Many persons teaching high-school science and mathematics courses are not adequately educated in the fields of knowledge they teach. As one means of improving the quality of teaching in science and mathematics, arrangements were made with the state universities of Oregon, Nebraska, and Texas, and Pennsylvania State University, to employ two

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