

GENERAL SCIENCE

# Scientists Combat Contention That Science Destroys Jobs

## Leaders, Armed With Facts, Show That New Industries Employ Many More People Than Old Ones They Replace

**S**CIENCE makes many more jobs than it destroys. Science has made our civilization and is not at the root of our economic and social ills.

This was the contention of leaders of science, including Drs. Karl T. Compton, R. A. Millikan and F. B. Jewett, all members of President Roosevelt's Science Advisory Board, who joined in condemning as "insidious" and dangerous to the nation the idea that science is to blame for unemployment and the depression.

America would be barred from rising to a higher level of living and we would suffer from industrial advances in foreign countries if NRA codes are allowed to stifle further technical improvements in manufacturing or if propaganda against science reduces support of scientific work, the scientific leaders made clear in a meeting arranged by the New York Electrical Society and the American Institute of Physics.

Dr. R. R. Millikan, of the California Institute of Technology, declared that labor-saving devices do not in general destroy jobs that demand intelligence.

"They cannot do it," he continued. "The heavy, grinding, routine, deadening jobs are the ones that machinery destroys. The progress of civilization consists primarily in the multiplication of human wants. If you want a stagnant civilization you have only to destroy the influences that cause these wants to multiply. . ."

Dr. Compton, president of the Massachusetts Institute of Technology and chairman of the SAB, stated that if 30 years ago there had been a successful attempt to restrain so-called "technological unemployment" in the carriage and wagon industry through legislation or codes that prevented the rise of the automobile, the source of income that now supports about 10,000,000 of our population would have been eliminated.

"Previous to the days of the automobile the 1900 census lists 976,000 individuals employed in the carriage and wagon industry, as manufacturers, driv-

### THE PRESIDENT'S LETTER

Dear Dr. Compton:

The value to civilization of scientific thought and research cannot be questioned. To realize its true worth, one has only to recall that human health, industry and culture have reached, in a century of progress, a far higher state than ever before.

The idea that science is responsible for the economic ills which the world has recently experienced can be questioned. It would be more accurate to say that the fruits of current scientific thought and development, properly directed, can help revive industry and markets for raw materials.

Very truly yours,

FRANKLIN D. ROOSEVELT.

ers, draymen, livery stable managers, blacksmiths, etc.," Dr. Compton said. "Thirty years later, with the advent of the automobile, based on innumerable scientific discoveries and engineering developments, the census lists 2,405,000

individuals engaged in this industry, exclusive of those involved in oil production. These figures have been corrected to allow for the increase in general population in the same interval. They show that while the advent of the automobile produced technological unemployment among carriage and harness makers, yet the net result for labor has been a 250 per cent. increase in the number of jobs."

Dr. Compton combatted the widespread idea that use of labor-saving machinery on highways has thrown out of work any men who would otherwise be employed in road construction. The 20 years from 1910 to 1930, which witnessed development of most of the road-building labor-saving machinery, show an increase in the number of employees in road construction and repair from 203,000 to 339,000 individuals, with figures corrected for increase in general population.

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PSYCHOLOGY

### Children Learn Best at "Psychological Moments"

**P**SYCHOLOGICAL moments, or periods, occur in the life of each child at which time he can profit best from a certain type of instruction. Teaching him any skill or subject too early or too late means a waste of the child's energies and the instructor's. This was one of the points emphasized by Dr. Edgar A. Doll, of The Training School, Vineland, N. J., in an address before the Conference on Child Development, Care and Training held in Washington under the auspices of the Mooseheart Laboratory



#### ELECTRIFICATION

*While some railroads build aluminum alloy, internal combustion-engined, streamlined train units, the Pennsylvania pushes to completion with recently acquired PWA funds the electrification of its main line from Wilmington, Del., to Washington. Plans call for employment on the project to increase to 6,000 men. The picture shows the kind of passenger express that is expected in 1935 to link the nation's capital with New York City. Already 72 such locomotives operate on 200 route miles.*

for Child Research.

"We are only just beginning to realize that child development is an orderly procedure following a preordained pattern which is modifiable only within narrow limits by the forces of education," Dr. Doll said.

"The real problem of education is to capitalize these genetic periods, or psychological moments, of growth and development for instructional purposes. We are greatly confused in our instruction both at home and at school, and we waste our own energies as well as the child's by offering much instruction either too early or too late in his life. Moreover, we tax the child unduly by

teaching before he has the capacity to learn, or we confuse him sadly by teaching him too late.

"One of the critical problems in the clinical psychology of childhood is the scientific determination of the child's abilities at any given time and the tendencies of his active development. These facts are needed to determine what kind and degree of instruction may be most practical and at what time and under what conditions this should be offered."

These "psychological moments" do not occur at the same age for each child, Dr. Doll explained, but probably the order of such development is similar.

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SURGERY

## Functions of Brain Areas Revealed by New Technique

### Surgeons Now Able to Make Layer by Layer Study Of Nerve Cells in Thin Outer Coat of Gray Matter

**A** NEW TOOL for physiological and brain surgeons the precision of which will surpass the keenest of scalpels and steadiest of hands was described by Dr. J. G. Dusser de Barenne, Sterling Professor of Physiology at the Yale School of Medicine. Speaking before the Association of Yale Alumni in Medicine, Dr. Dusser de Barenne explained the technique, devised by him, whereby any number of the consecutive layers of nerve cells in the cerebral cortex, the thin outer coat of gray matter of the brain, may be destroyed at will.

This method solves one of the difficulties long encountered in studies to determine the functions of the different areas of the cortex controlling bodily activities. Hitherto investigators have not been able to distinguish between the functions of the different layers because there has been no way of eliminating one or more layers selectively. The cerebral cortex consists of only six layers of nerve cells, except in the motor area where there are five.

"Laminar thermocoagulation of the cortex," brought about by the local application of moderate heat for a short period of time to the exposed surface of the brain, is the new technique announced by Dr. Dusser de Barenne. The depth to which the tissue is killed depends upon the temperature and the

length of time heat is applied.

It was found that heating to between 90 and 100 degrees Centigrade for five seconds results in death of all the nerve cells in the heated area throughout the whole thickness of the cortex. By heating to about 70 degrees Centigrade from one to two seconds, it is possible to kill the nerve cells of only two layers.

As an example of results which can be obtained by the new method in determining the functions of the different layers of the cortex, Dr. Dusser de Barenne said that he had found that the movements obtainable on electrical stimulation of the motor cortex are due to direct stimulation of the two inner layers and in all probability to the direct stimulation of the large nerve cells of the fourth layer.

Microscopic studies reveal that this method of destroying a predetermined number of layers of nerve cells over a large or small area does not damage the immediately adjoining cortex, and that the dead tissue is resorbed within a few months without leaving any scar or distortion. This new method of nerve cell destruction is expected to prove useful in human brain surgery in special cases such as cortical focal epilepsy, in which a sharply localized extirpation of part of the cortex is necessary.

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PSYCHOLOGY

## Occupation Sampling Suggested to the Young

**T**HE PROBLEM of assisting graduates of an organization such as Mooseheart to place themselves vocationally is much more difficult in the modern economic world, Dr. C. A. Prosser, of the William Hood Dunwoody Institute, warned officials of the Mooseheart Laboratory for Child Research at the Conference on Child Development, Care and Training held in Washington.

The young person today should not be crammed with useless facts, soon obsolete, about occupations, Dr. Prosser said. He should be put through experiences in sampling and exploring occupations; in the testing of his own likes and dislikes among occupations; in the further study of the occupation or occupations in which he is especially interested; in the investigation of the occupation to find whether it is a desirable one to follow; in checking his own qualifications against the requirements for success in the occupation; in finally choosing an occupation to follow; in selecting a suitable employer for that occupation; in applying for a job; and in selling his services to an employer.

"All this constitutes what is here called, for want of a better name, developing the technique of vocational adjustment—of looking after yourself in this matter of employment," Dr. Prosser said. "Like all other technique, it cannot be developed by preachment or suggestion or fact peddling but only through directed practice in thinking and doing with the aid of usable facts."

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### ▼ NEW CROPS FOR THE AMERICAN SAHARA

**R** an address by

**A** Dr. W. T. Swingle  
Of the Bureau of Plant Industry, U. S. Department of Agriculture

**D** Wednesday, March 7, at 4:30 p. m., Eastern Standard Time, over Stations of the Columbia Broadcasting System. Each week a prominent scientist speaks over the Columbia System under the auspices of Science Service.

