

GENERAL SCIENCE

Research Receiving Trivial Portion of Recovery Funds

Only One Third of One Per Cent. of This Year's Ten Billion Cost of Government Being Spent For Scientific Research

JUST ABOUT one-third cent out of each dollar being spent by the United States Government during the present fiscal year ending on June 30 of this year goes for scientific research. This is less than 30 cents for each man, woman and child in the U. S. A., and about 30 cents out of each \$100 Uncle Sam is spending this year.

The total cost of running the government this year will amount to nearly \$10,000,000,000. The exact figures, as revealed in the stupendous volume on the U. S. Government's budget, recently submitted by President Roosevelt to Congress, amount to \$9,403,006,967, of which \$3,045,520,267 is for the general expenditures of the Government, and \$6,357,486,700 for the emergency expenditures attendant upon the recovery program. Another \$488,171,500 might be added to represent the public debt retirements, bringing the grand total up to the awesome sum of \$9,891,171,500.

This money is being spent to prepare for war and to pay for past wars, to build roads and post offices, to insure bank accounts, and to make the farmer self-sustaining. But only a tiny slice of it, less than one-third of one per cent., goes for scientific research.

Even when allowance is made for money allotted from the public works and relief funds for work of benefit to science, the total expended for science and research is estimated to be only about \$29,500,000. This is three tenths of one per cent. of the total general and emergency expenditures, not including the public debt retirements. It is less than 30 cents for each \$100 if the public debt figures are considered in the grand total.

Or, if the emergency expenditures are left out of the picture, the Government's money invested in scientific research still amounts to less than one dollar to each hundred of the total general expenditures for the year.

It is interesting to compare the amount spent for science with the amount going for interest on the rap-

idly accumulating public debt. Uncle Sam's bill for interest for the next fiscal year will come to \$824,349,000, an increase of \$82,349,000 over the present year 1933-1934. This year's bill amounts to \$742,000,000.

In other words, Uncle Sam spends only 3.58 cents for science for each \$1 he pays out for (*Turn to Page 46*)

GENERAL SCIENCE

New Budget Only Slightly Reduces Scientific Funds

THE NEW Federal budget for the year 1934-35 just submitted to Congress by President Roosevelt does not propose any substantial slashes in funds for scientific bureaus below the funds that were available for use during the present fiscal year.

Of the funds appropriated by Congress last year for use during the fiscal year 1933-34, approximately \$34,768,000 was for the support of scientific research. But this sum was greatly cut by the Budget Bureau after the beginning of the Roosevelt administration.

PALEONTOLOGY

Triple-Sized Bison Lived In California Long Ago

THE SKULL and horns of a giant bison which roamed over the hills of northern California about a million years ago have been found in Shasta County, near the town of McArthur. The discovery was made on the Jim Day ranch.

The fossil remains are now the property of the University of California museum of paleontology, where they are being studied in the light of our knowledge of present day bison. Dr. C. L. Camp, director of the museum, states that the specimen is valuable, because it is one of the very few in existence today.

Figures appearing in the new budget volume indicate that only about \$28,893,000 was actually allowed the Bureau for scientific work. A somewhat smaller amount for scientific research is allowed in the new 1934-35 budget for the fiscal year starting next July 1. Probably not more than \$27,735,000 will be available for this purpose during the coming year.

Most of the bureaus affected, however, have just as much as they did during the present year, or a little more.

The Bureau of Standards is allowed \$1,437,702 instead of \$1,336,000. The Bureau of Mines gets \$762,926 instead of \$694,985. The Naval Observatory gets \$169,994 instead of \$160,025. And other scientific bureaus or offices are given sums similarly close to the figures apportioned to them this year.

The main exception is the Department of Agriculture. Although this Department is allowed under the budget greatly increased funds, these are mainly for administrative purposes and particularly for the carrying out of the recovery program. It is too early yet to know just what proportion of the total will be apportioned for research, but it is believed that not more than \$15,700,000 will be devoted to this constructive work as against \$18,000,000 available this year.

If Congress approves the budget as submitted, it will mean that scientific funds will be cut about 4 per cent. below the funds available for the present fiscal year, and 34.5 per cent. below the \$42,375,000 spent on research during the fiscal year 1931-1932.

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a strong magnet, which turns the moving positive and negative particles in opposite directions.

In one pair of photographs, the nearly straight original track of a fast moving electron is seen to give rise to two oppositely curved tracks. The velocity of the particle causing the track may be estimated from the curvature of the path, the slower the movement the greater being the curvature. Thus it can be calculated that the formation of positive and negative electrons in the above mentioned instance was accompanied by a loss of energy equal to their mass multiplied by the square of the velocity of light—just as is the case when cosmic and gamma rays are changed into matter.

The fundamental law of the transformation of energy into matter seems therefore to have been exemplified for a second time, in a different manner.

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interest on his debts, and the science investment is less than 36 per cent. of the increase of next year's interest over this year's.

This small fraction of the federal expenditure that is being spent for scientific research will pay into the purses of the public, in savings, better living and increased earnings, dividends of thousands per cent. in the coming years. Some of the most outstanding industrial developments of today had their roots in Uncle Sam's delving into science in past years and the contributions made to human health and happiness, not always to be evaluated in dollars and cent. are legion.

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PHYSICS

Advanced Physics Theory Lags Behind Experimentation

THE MOST highly developed parts of that highly developed field of the new physics, quantum mechanics, are not good enough to predict the results of clever experimenters. The Zeeman effect, which describes the behavior of an atom in a magnetic field, and the light given out by the hydrogen atom are the subjects under fire.

So complacent is the physicist about these matters that the discrepancies would not be believed were they not put forward by the highest authority in the field. Prof. V. W. Houston, who has announced these results obtained at the California Institute of Technology with the collaboration of Prof. Y. M. Hsieh of Yenching University in China and L. E. Kinsler, a graduate student, is known to have done the best experimental work in both these fields. He is at the same time one of the country's foremost theoretical physicists so that his interpretations must be considered as quite reliable.

Prof. Houston had worked up a method based on the supposedly sound theory of the Zeeman effect for measuring the specific charge of an electron. His results were accepted and revised all previous work. Now with Mr. Kinsler he has found that in the simplest and apparently surest case, namely that of helium, the specific charge seems to come out wrong. Any physicist would

have bet a hundred to one against this result.

In the other experiments with Prof. Hsieh on the fine structure of the hydrogen spectrum the results are startlingly different from the predictions of the equation of Prof. P. A. M. Dirac, British physicist. This equation represents the pinnacle of achievement in theoretical physics and was the main contribution of Prof. Dirac, who recently was awarded the Nobel Prize. But Profs. Houston and Hsieh show that even this equation is not good enough for exact work.

The difficulty with the theory seems to be that it treats the atom as if it were alone in space. Actually it is connected with its surroundings through electromagnetic fields. In other words it is part of the whole universe. How to take this interaction into account is likely to prove a highly difficult problem.

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PSYCHOLOGY

Stuttering Children Found to be Talkative

CHILDREN who stutter are more talkative, and use more words when they talk, than do children in an "average" group, Dr. H. Meltzer of the St. Louis Psychological Service Center has discovered. He applied the same test, consisting of the imaginative identification of the shapes of a number of ink blots, to fifty child stutterers and an equal number of children of the same ages taken from the general population.

The small stutterers were found to be nearly forty per cent. more talkative than the "control" group, that they averaged 200 words apiece as against 135 for the other children, and that they responded to the question "What could that be?" quite as quickly as did those without speech impediments.

"If the number of words used in the total time taken is considered as an index of rate of talkativeness, the mean rate for stuttering children is 51.08 per cent. greater than it is for the control group," Dr. Meltzer commented.

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