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## THE STIMULATION OF RESEARCH IN PURE SCIENCE WHICH HAS RESULTED FROM THE NEEDS OF ENGINEERS AND OF INDUSTRY<sup>1</sup>

THE appreciation of pure science in all civilized countries has steadily increased over an indefinitely long period, but it is quite common to look back to Roger Bacon, or to printing presses, or to Francis Bacon, or to some other definite point whence the start seems to have been made. I doubt if any one time can be chosen over another. The first living cell which made new motions concluded as definitely and acted as consistently as a result of its experiments as we do. We are still infinitely removed from complete appreciation, and therefore not far from the amoeba. The laws illustrated by the amoeba tell us that there are good, bad and indifferent activities, that countless promising experiments may be made, that we may learn after the experiment whether we are better or worse off and finally that the habit of experimenting, or the character of curiosity, may be perpetuated, just as all existing types of plant and animal have been perpetuated.

But to shorten the story I start with Francis Bacon and then proceed at once to the Invisible College of England, about 1645. In 1662 this became the Royal Society for Improving Natural Knowledge, and it has been improving it ever since. Thousands of other groups of scientists and engineers, aiming to advance civilization, have cooperated to the same end. Certainly leading minds long ago recognized research in science as the proper means of human advancement and amelioration.

Gradually in each country accumulating appreciation of knowledge doubtless determined the increasing growth of organized experimental research in schools and universities. This in turn plainly acted on the growing industries, and a closer and closer cooperation became effective. Thus from a time when the monasteries were the schools and students cloistered monks, the old countries became ever more alert to the value of science in human affairs, and college-training put men into service, through the professions or the industries. These in turn still further pro-

<sup>1</sup> Address before the Section of Engineering, American Association for the Advancement of Science, Philadelphia, December 29, 1926.



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