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## SOME CONDITIONS FOR EFFECTIVE RESEARCH<sup>1</sup>

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THE first requisite for effective research has to do with the make-up of the research worker. Although it is outside the province of this paper to enter into an exhaustive discussion of the qualifications of a scientist, it is pertinent to point out some of the most essential characteristics. Training, intellectual power, physical fitness, application and integrity are requirements which need no explanation. Stability is a trait which is often given too little weight. Some of the ablest men are affected with a restlessness which impairs their usefulness. We need investigators who will devote a lifetime, if necessary, to a single problem instead of pursuing the latest scientific fad. In research, as in other fields, he who would succeed must be able to stand up under the strain of criticism, disappointment and failure. It is well to get away from the notion that the research man must be a genius or an abnormal type. With occasional exceptions he is merely an average person whose training and experience have fitted him for research and perhaps rendered him unfit for other vocations.

Assuming that we have the right type of investigators, what is needed to make their efforts most productive? The time was when the research worker's equipment consisted almost solely of an inquisitive frame of mind. This is still a primary requisite, but this alone is not enough. We are in an era of experimental research where facts count for more than logic. The world is no longer satisfied with general laws and principles. There is a call for specific information on thousands of subjects ranging from the education of children to the prediction of weather. Modern research requires modern facilities. This may mean laboratories fitted with expensive instruments, or it may mean comparatively limited apparatus but abundant facilities for travel and transportation. Research is as dependent upon equipment as is the modern factory.

The volume of work is so great that only a small part of it can be performed by investigators of first magnitude. This situation can be met by delegating work of a routine character to assistants who are trained to perform such duties but who for one reason or another are not qualified for independent research. Where a large number of instrumental

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