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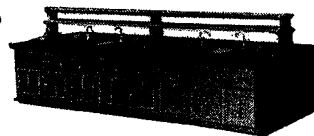
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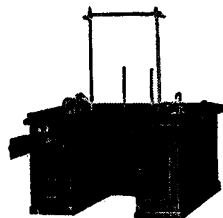
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## BIOLOGY AND EXPERIMENTATION<sup>1</sup>

Opening a new laboratory for experimenting on living things gives a thrill to any one who has pursued that adventurous occupation. The typical experiment on living things, according to the maxim of the older zoologists, is to kick a dog; the outcome is likely to be stirring, it may be astonishing and perturbing. And as biological experimenters we are in the blessed time of youth; we have not gone far enough to know what to expect. Great regions are still almost without a preliminary survey. General principles are still unsettled. Anything may happen.

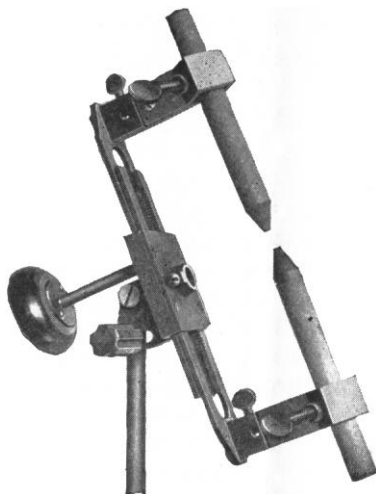
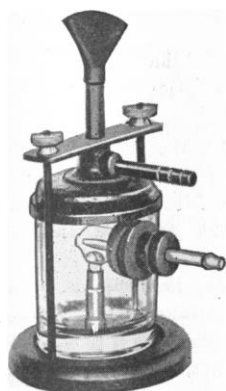
What shall we try to do in our new laboratory? Where can we best take hold? What may we hope to accomplish? Why do we work by experimentation? What *is* experimentation, indeed? What are its foundations, its principles? What must we look out for in experimenting on living things?

In thinking over these questions, it helps to look over the experiences that zoologists have had so far as they have gotten in experimenting on things alive. Although intentionally or unintentionally men have always experimented with living things, the use of experimentation as a systematic method of research in zoology, employed on a large scale, is very recent. But even in that brief period, we *have* found out something about the peculiarities of experimentation on living things; about how to experiment and how *not* to experiment. Application of experiment to living things turns out, with a thorough-going consistency, to be itself a great experiment; a proceeding by trial and error, like that of a rat in a maze. To learn how to experiment, the only method *is* to experiment; to make errors, and then later to avoid the errors. The errors are an essential part of the process; no errors, no advance. But after they are made they must not be repeated; no elimination of errors, no advance. And to eliminate them we must mark them.

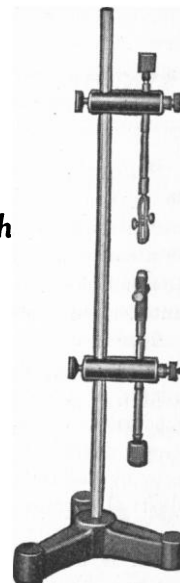
Living men, here present, can remember when zoologists did not work by experimentation. When I became conscious of the science, zoologists were doing descriptive work, and drawing far-reaching conclusions from that. Mainly these conclusions were as to the course that had been followed in their evolution by particular animals and by particular systems of

<sup>1</sup> Address at the dedication of the Whitman Laboratory of Experimental Zoology at the University of Chicago, June 4, 1926.

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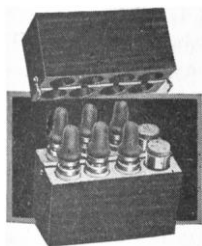
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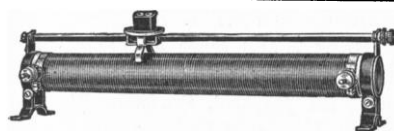
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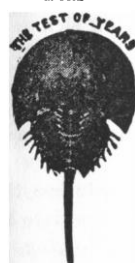
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