Now— measure calcium ion *directly*

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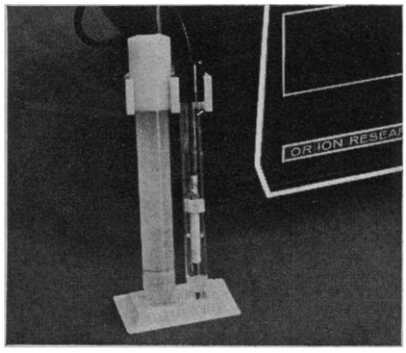

First in a new series of specific ion electrodes, the Calcium Activity electrode of Orion Research Incorporated provides rapid continuous measurement of calcium ion activity in aqueous solutions. It permits direct measurement in solutions with concentrations ranging from saturated to 10^{-5} moles/liter. The electrode is an ideal endpoint detector for EDTA titrations.

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The Orion unit detects calcium ion by developing a potential across a thin layer of ion exchanger that is highly selective for calcium. Measurements can be made in a millimolar calcium solution with negligible error despite the presence of a 100-fold excess of sodium or potassium. The electrode is at least 50 times more sensitive to calcium than to magnesium.

INSTRUMENTATION

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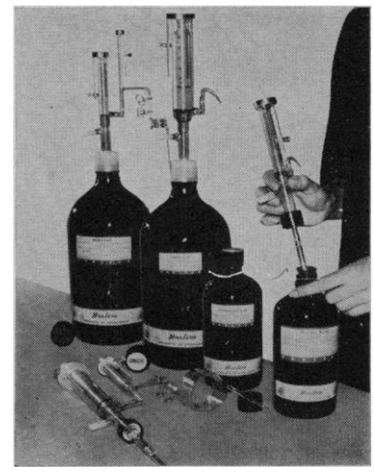
How To Write a Thesis

On Selection of a Research Project. Be sure to select a topic which has been thoroughly explored by previous graduate students in your department, so that characteristics of your organism will be well known and basic procedures fully established. Also, you can borrow reagents, ideas, and perhaps data from your colleagues. Select a very limited, circumscribed, orthodox aspect of this topic for your investigation—preferably one where you don't have to believe the results of your work, certainly not one in which you will become emotionally involved. Don't attempt to discover anything new—you can do that later on a higher salary—concentrate simply on obtaining data, quickly and in quantity.

Experimental Approach. Set up experiments which will give meaningful results regardless of whether data are positive or negative; once you set up a procedure, never, never alter it or you will have to explain how and why and what difference it made. Restrict your study to a single variable so that you don't have to concern yourself with complicating factors and there will be no necessity for a comprehensive discussion. Avoid experiments which must be presented in the form of figures or graphs and, by all means, exclude photographs. If all data can be summarized in typewritten tables you will save yourself time, money, and frustration. (It's even better if you don't need tables!)

The Literature Review. If you've followed the advice above, your review will have been written for you by a former student and all you need to do is paraphrase it slightly and bring it up to date. If you should work on a topic which hasn't been reviewed recently, depend exclusively on *Chemical and Biological Abstracts* for information for your own review. Thus you will avoid the problem of trying to track down journals which were hidden away at the bindery all the time; you'll also save yourself many hours of reading and trying to organize experimental details which only make those lovely, sweeping generalizations more difficult. It goes without saying that you should have made sure there is no significant amount of foreign-language literature on the subject. Remember to document thoroughly every statement you make. It really doesn't matter that the idea is now out of date or that the author



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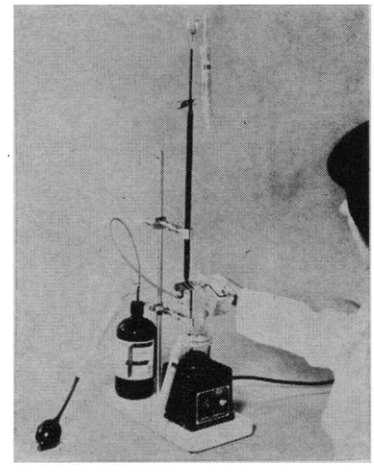

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turned out to be an idiot—just so it's been published. One thing you don't have to worry about is punctuation; trust your committee to put in any commas you have omitted and to delete most of those you have used; it salves their consciences for failing to understand or not caring about what you have to say.

General Principles. Be sure that the organization of your thesis follows established, accepted, orthodox, conventional, recognized, approved, hallowed precedents. Whenever questions of form arise it is safest to check with the graduate school, though this may require a lot of hiking. Never, never do anything new, even to improve clarity of presentation, unless you can cite an established, accepted, orthodox, conventional, recognized, approved, hallowed precedent. Always keep in mind the basic purpose of the thesis: to satisfy the graduate school. Unequivocal presentation of data is far more important than unequivocal data. But most important of all is that the margins are correct.

A. W. JAMES

Department of Biology,
Canisius College, Buffalo, New York

Performance of Retarded Children

Zigler and his co-workers have amassed considerable and impressive evidence demonstrating that a large portion of what has been described as "rigidity" on the part of the mental retardate may be due to such motivating factors as social deprivation ("Familial mental retardation: a continuing dilemma," 20 Jan., p. 292). However, we feel that he has minimized certain other motivating factors which influence the behavior of the noninstitutionalized retardate. Specifically, we refer to the feelings of inadequacy which are inevitably generated as a result of the noninstitutionalized retardate's daily experiences with the normal child. Indeed, in this sense, the noninstitutionalized retardate probably is under more environmental pressure than his institutionalized counterpart.

In an unpublished study (*1*) we have compared the performances of normal children and institutionalized and noninstitutionalized retardates under various rewards. The noninstitutionalized retardate was found to perform for a significantly longer period of time and at a faster rate than either of the other two groups under "social" reinforcement (presence of the examiner and verbal encouragement). Thus, we feel that "success deprivation" may be as important an influence on the behavior of noninstitutionalized retardates as social deprivation is on the behavior of institutionalized retardates.

J. ROBERT NOONAN
JOHN R. BARRY

Department of Psychology,
University of Georgia, Athens 30601

Reference

1. J. R. Noonan and J. R. Barry, *J. Educ. Res.*, in press.

Attention Research in 1896

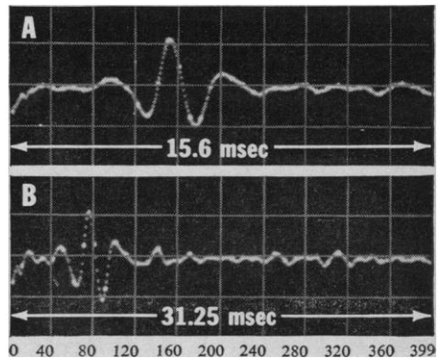
Hess and Polt in two papers published in *Science* [**132**, 349 (1960); **143**, 1190 (1964)] have demonstrated an effect of cognitive variables on the size of the pupillary opening. Great interest has been generated by their findings that interesting visual stimuli and mental arithmetic produce pupillary dilatation. The availability of a subtle indicator of attention holds promise in a number of fields ranging from psychophysics to personality.

Recently, while surveying literature on early work on attention, I came across an anticipation of cognitive pupillometry in a paper by Heinrich, *Zeitschrift für Psychologie und Physiologie der Sinnesorgane* **9**, 343 (1896). He measured pupillary diameter with an ophthalmograph while the subject tried to identify a letter on a card which was fixated centrally and at varying angles into the peripheral field. Pupillary diameter tended to increase with peripheral vision; this is attributed to the greater attentive effort required for peripheral vision. Heinrich also anticipated the work of Hess and Polt on the effect of mental arithmetic on pupillary size. He found that difficult mental multiplication was accompanied by a marked increase in pupil diameter, 39 percent in the case of one subject and 100 percent for another subject. Heinrich made use of the data to refute Helmholtz's contention that attention need not be correlated with changes in the sense organ.

PAUL BAKAN

Department of Psychology,
Michigan State University,
Lansing 48823

Our signal averager uses all its data points for better resolution.



DATA POINTS

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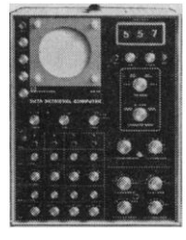

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