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THE LIBRARY \* LABORATORY RESEARCH

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The library is one of the most important adjuncts to the tools of the laboratory research worker. It assists him in the planning of his work, as well as determining his course as the work progresses. It provides him with information unattainable elsewhere, and, at the same time furnishes a source of inspiration.

The progress of any branch of science depends how far the research workers within that field cooperate with one another in developing scientific knowledge and in applying that knowledge to the satisfaction of mankind's common needs.

The unselfish nature of the research worker dictates that he relate his experiences and transcribe his conclusions. The methodical character of his technique requires that he have a plan. Therefore, it is natural and easy for the research worker to give a logical account of his work. The great number of scientific articles bear witness to this fact.

The rapid advance in applied science must be in part attributed to the methods whereby the printed word of many workers is made available to an individual research worker. Whatever may be the problem or the technique of research, the successful research worker will make use of other conclusions, facts and arrangement of facts provided by other workers.

Research may be classified into two <sup>broad</sup> broad phases namely; scientific research and philosophical research. The province of the former is to ascertain what happens when certain things are done and the latter to determine values or what course of action should be followed under certain conditions.

Any laboratory research problem will necessarily incorporate the methods of one or both of these phases in its solution. The research worker in setting up his problem finds at once the necessity of obtaining information which will enable him to delimit his problem within the scope of his facilities and determine his method of approach.

Unless he has had considerable previous experience, his knowledge of the particular problem, must be supplemented by the experience of others in his field or allied fields. The fundamental laws and principles pertaining to his set-up must be understood. Newer concepts and ideas must be known to prevent him from wandering uselessly. Already proven facts must be his to direct his work into profitable courses.

This information can only be obtained from the written word of other investigators. The library is the only logical source for this information. Every research laboratory must possess access to an adequate library and every research worker must understand the use and importance of the library.

Unless the research worker understands the use of this repository of knowledge, his efforts in the use of the library may be wasteful and fruitless. It has been surprising to the writer how many times it has been necessary to train college graduates in proper preparation of

bibliographies and proper use of reference materials. To the interested reader, I should like to refer him to a bulletin entitled "Principles and Mechanics of Research" by John Edward Seyfried, University of New Mexico, Vol. 9, No. 1. This bulletin gives a short concise chapter on the use of the library as well as a chapter on Research References and Bibliographies.

The value of library research cannot be overestimated. F.V. Reagal in a paper before the American Association of State Highway Officials, 1939, entitled "Is There Duplication of Research" says: "Perhaps we should give separate classification to library research as a requisite to the efficient prosecution of any investigation." Failure to inquire into the results of other investigators before starting a research problem may lead to duplication and wasteful effort. Of this, Reagal says: "There is duplication of research and that may be desirable. There is also the inexcusable duplication of research brought about by the failure of the research worker to prepare for his research by familiarizing himself with work already completed by others interested in the same or allied problems."

Library research should be an important part of the research program of a research organization.

Wilhelm Ostwald, in "Fundamental Principles of Chemistry", states: "Two tasks are set for the worker in any science. One of these is to enrich the chosen field by discovery of new facts and the statement of new experiences. The other - - - is to arrange the facts already

known in the best order and to bring out the relations between them as closely as possible. Whenever progress in the first of these tasks has been rapid, the second becomes the more necessary for it offers the only possible way of attaining mastery - - - - and of bringing the science as a whole into a convenient and serviceable form."

Many research organizations limited in funds and personnel could render a great service, if they would direct their efforts to the second task which Wilhelm Ostwald so ably states.

In the highway field, considerable individual research has been done upon such problems as bituminous stabilization, load transfer in concrete pavement, proper thickness of flexible pavements and many others. To date, no effective summarization of this information has been brought together. Perhaps there are research workers considering these problems in this manner and soon we will have these compendiums so necessary to standardized practice. Nevertheless, these problems serve as an example of the work that can be done in library research.

A discussion of the library and laboratory research would not be complete without a few remarks concerning reports and articles prepared by research workers. It is unfortunate that so few workers have had the opportunity of proper training in report writing.

Too often the author of written material requires the reader to laboriously decipher his work, when a little more effort on the part of the writer would have saved the reader valuable hours.

A research report is essentially an account of some matter specially investigated which will be used by someone to a particular end. The principal criterion of its success is its careful planning in order to meet all the conditions under which it is to serve.

A successful report must be coherent and easily read. It must produce within the reader satisfaction for having read it. And, above all it must demonstrate that the writer has presented competent information concerning his subject in all of its phases and details.

More time spent on planning a report, more time spent on correlating the data, with statements of definite conclusions, will aid the library research worker in his important task.

It should not be interpreted that the writer advocates the acceptance of the conclusions of every written article. Yet, every article has a purpose and some thought was necessary in its preparation. Even a casual review of it may serve to some good end, for those who read cautiously.

In conclusion, it might be well to admonish all research workers - to cooperate with his fellow worker in writing concerning his experiences and thoughts - to learn to write informatively by writing more often and to encourage others to do likewise by reading and constructively criticizing their work.

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