Letters

Criteria for Research Grants

Where large sums are dispensed for research, selection of a basis for judging applications becomes of the utmost importance. Ernest M. Allen, chief, division of research grants, National Institutes of Health, is certainly to be commended for publishing these criteria, as applied by NIH [*Science* **132**, 1532 (1960)].

Obviously, these criteria will be effective in eliminating ill-considered, thoroughly weak applications. But how would the strong, unconventional approach fare—the application in support of research that breaks away from precedents to blaze new paths?

To answer this question, it may be of interest to examine how some of the research projects of the past, which are today considered milestones of medical progress, would have fared had they been submitted to a National Institutes of Health of their respective times and judged by the accepted authorities of their day, organized as study committees and judging the applications by the criteria published by Allen.

To take a few examples: If William Harvey, whose brilliant studies led to the understanding of blood circulation, had applied to an NIH of his time for a grant to explore this subject, it would no doubt have been rejected under Allen's shortcoming No. 3 ("The problem is more complex than the investigator appears to realize").

Prior to the work of Albert von Haller, it was believed that the nerves were tubes which pumped "nerve fluid" into the muscles, thereby causing them to bulge and contract. Von Haller disproved this and introduced the modern concept of irritability and response to stimuli. An application for support from von Haller to an NIH of his time would apparently have been rejected under Allen's shortcoming No. 21 ("The investigator is spreading himself too thin; he will be more productive if he concentrates on fewer projects"), for von Haller was ranging widely between poetry and plant physiology.

Any support for William Beaumont's pioneering studies on gastric function would have been precluded under shortcomings Nos. 13 and 15 ("Controls are either inadequately conceived or inadequately described," and, "The number of observations is unsuitable"), for Beaumont worked with a single subject, a fur trader who had a permanent opening in his stomach as a result of an accident with a musket.

If A. L. Lavoisier had applied for a grant from NIH to extend his quantitative combustion studies to human metabolism, he would have been turned down under shortcoming No. 24 ("It appears that other responsibilities would prevent devotion of sufficient time and attention to this research"), for Lavoisier earned his living as a tax collector.

If Louis Pasteur had applied for a grant to an NIH for support for his work on bacterial vaccines, he would have been turned down under shortcoming No. 17 ("The investigator does not have adequate experience or training . . . for *this* research"), for he was a chemist and had no training in medicine or physiology.

The criteria now being applied in the National Institutes of Health, according to Allen, would have resulted in refusal to support those investigations which became milestones of progress in medicine.

Is this the kind of thinking that should guide us today?

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The Author as Indexer

As a newcomer to specialized fields of information handling, I certainly profited from Helen L. Brownson's comprehensive summary, "Research on handling scientific information" [*Science* **132**, 1922 (1960)]. The amount of effort going into development of systems for indexing documents through text analysis is impressive. Many of the systems are to be fully automated, the need for human judgments thus being eliminated.

Inclusive as the summary was, one very important aspect does appear to have been overlooked—namely, the author's role. Since the greatest authority on any item of literature is the author, is he not the one best able to classify the item properly? Would it not also simplify the whole matter of information handling if each author provided the necessary index terms with his manuscript? I am sure an author would readily accept this slight extra burden in order to make certain that the fruit of his labor attains its maximum usefulness.

For classification to be performed by the author, only the development of suitable standard systems of indexing would be required. From standard instructions the author could easily supply the index terms directly in coded form, providing further simplification.

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