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This Week's Citation Classic

Miller G L. Protein determination for large numbers of samples. *Analyt. Chem.* **31**:964, 1959.
[Pioneering Res. Div., Quartermaster Res. and Engineering Ctr., Natick, MA]

Protein analysis of large numbers of samples by the Lowry method was facilitated by addition of the color reagents with enough force to ensure complete mixing and by brief heating of the mixtures to ensure full development of color intensity. [The *SCI*® indicates that this paper has been cited over 830 times since 1961.]

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"The resolution of fungal cellulases by starch-block electrophoresis was found to be improved with the use of longer blocks and narrower sections; this led to the production of large numbers of fractions that required analysis for protein content. Because of the time-dependent development of color in the Lowry protein method, analysis of numerous samples necessitated the addition of the color reagents and the reading of the color intensities on a controlled time schedule for each sample. To avoid these restrictions, a modified procedure was developed, whereby the different steps could be performed more at one's convenience. The analysis was facilitated by addition of the color reagents with enough force to ensure complete mixing and by brief heating of the mixtures to ensure full development of color intensity. A few weeks of easy experimentation were all that were required to solve this problem, and wide use of the modified procedure by investigators with similar needs was anticipated. The article describing the work was rejected successively by two journals, then accepted by *Analytical Chemistry* after editorial compression of the text to only a few sentences and elimination of kinetics curves that demonstrated the incomplete color development in the original Lowry procedure and the complete color development in the modified procedure.

"The more charitable of my friends were pleased by the recognition, pointed out by *Current Contents*®, that this article received;[1] less charitable friends noted that methods articles are likely to be cited more frequently than other types. The number of requests for reprints was small compared to the number of citations. This was probably due to the shortness of the article, since it could easily be copied by hand, if not memorized.

"Recognition in any field doubtless has elements of chance in it, and perhaps one should not be too particular as to the form in which it comes. It seemed to me to be ironic, however, that this particular contribution should receive recognition instead of others that I had made. For example, my work on tumor-specific cytotoxic heterologous antiserum against human cancer cells required over two years of difficult, obstaclebeset experimentation, and I viewed the final accomplishment as a major contribution.[2] The published work attracted a thousand requests for reprints but no recognition in terms of grant support for further work. The inexorable consequence of the lack of grant support was a loss of job, 18 months' unemployment, and eventual change of career. Now a technical writer in the Carcinogenesis Testing Program at the National Institutes of Health, I am glad to be able to contribute in some way to the cancer effort, but I should have much preferred the challenge of laboratory experiments."

1. **Garfield E.** Highly cited articles. 39. Biochemistry papers published in the 1950s. *Current Contents* (25):5-12. 20 June 1977.
2. **Miiler G L & Wilson J E.** Specificity of cytotoxic heterologous antiserum to cultured human cancer cells. *J. Immunology* **101**:1078-82, 1968.