

This Week's Citation Classic

Lis H & Sharon N. The biochemistry of plant lectins (phytohemagglutinins). *Annu. Rev. Biochem.* 42:541-74, 1973. [Department of Biophysics, Weizmann Institute of Science, Rehovot, Israel]

This is an update and extension of our review entitled 'Lectins: cell-agglutinating and sugar-specific proteins/ published in *Science*.¹ [The *SCI*[®] indicates that this paper has been cited in over 705 publications since 1973.]

Halina Lis and Nathan Sharon
Department of Biophysics
Weizmann Institute of Science
Rehovot 76 100
Israel

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"Having just completed our sixth or seventh major review on lectins,² it is most gratifying to know that our first two reviews on the subject are still being cited very frequently.

"On a previous occasion, when our first review on lectins was identified as a *Citation Classic*,³ we described briefly how we became involved in research in this area. Because of a lack of space, we could not pay tribute to Aaron Altschul, a distinguished plant protein chemist, then at the Southern Regional Research Laboratory, New Orleans, Louisiana, who as early as 1959 convinced us by his enthusiasm and zeal to embark on a study of plant proteins, a long neglected subject. For nearly ten years, our efforts were concentrated mainly on the purification and characterization of the lectin of soybean. Although we made several contributions which, in retrospect, appear to be significant, such as the first identification of a plant glycoprotein (soybean agglutinin) and the first demonstration that lectins occur as families of closely related isolectins,⁴ our work attracted little attention. The situation changed dramatically with the realization, in the late-1960s, of the key role that cell surface sugars may play in cell growth and differentiation, in interactions of cells

with their environment, as well as in a variety of pathological processes.

"Being aware of the enormous potential of lectins as tools for the study of glycoconjugates, both in solution and on cell surfaces, and the lack of a critical and informative review on the subject, we wrote our article for *Science*. We felt, however, that this did not do sufficient justice to the subject. We therefore proposed to E.E. Snell, the editor of *Annual Review of Biochemistry*, that we prepare an article for this series. Although the second review was completed less than a year after the first one, it contained nearly 100 references to papers published during that year. In addition to updating the literature, we discussed in this review the physicochemical properties of the half dozen lectins purified by then and dealt with some new topics, such as the structure of cell receptors for lectins. We also made the prediction that 'with the increased availability of purified lectins, extensive utilization of these proteins for preparative and analytical purposes may be envisaged.' Recent developments have more than justified this prediction. They include the application of lectins for the separation of protein variants that differ only slightly in their degree of glycosylation, for the fine resolution of complex mixtures of glycopeptides, and increasingly as reagents for histochemical and cytochemical studies. Most exciting is the demonstration, originally made in mice⁵ and more recently in humans,⁶ that lectins can be used in the fractionation of bone marrow cells for successful transplantation across histocompatibility barriers.

"We believe that the favourable response to the review is attributable not only to the tremendous growth of interest in lectins but also to the fact that we succeeded in conveying to the readers our fascination and enthusiasm for the subject."

1. Sharon N & Lis H. Lectins: cell-agglutinating and sugar-specific proteins. *Science* 177:949-59, 1972.
2. Lia H & Sharon N. Lectins—properties and applications to the study of complex carbohydrates in solution and on cell surfaces. (Ginsburg V & Robbins P, eds. *Biology of carbohydrates*. New York: Wiley. Vol. II. In press, 1983.
3. Sharon N & Lis H. Citation Classic. Commentary on *Science* 177:949-59. 1972. *Current Contents/Life Sciences* 25(21):20, 24 May 1982.
4. Lis H, Fridman C, Sharon N & Katchalski E. Multiple hemagglutinins in soybean. *Arch. Biochem. Biophys.* 117:301-9. 1966. [The *SCI* indicates that this paper has been cited in over 55 publications since 1966.]
5. Reisner Y, Itzicovitch L, Meshorcr A & Sharon N. Hemopoietic stem cell transplantation using mouse bone-marrow and spleen cells fractionated by lectins. *Proc. Nat. Acad. Sci. US* 75:2933-6. 1978.
6. Reisner Y, Kapoor N, Kirkpatrick D, Pollack M S, Dupont B, Good R A & O'Reilly R J. Transplantation for acute leukemia using HLA-A, B nonidentical parental marrow cells fractionated with soybean agglutinin and sheep red blood cells. *Lancet* 2:327-31, 1981.