On the other hand, the object of research itself is to discover new facts and concepts for the benefit of mankind. Big business has in recent years attacked the problems of pure science with the organizational precision that American business knows so well. The result of this business method in research has been a flood of immediately practical therapies that have rudely reversed the mortality figures in many diseases. In the ethical pharmaceutical field the pattern of research, of manufacture, and of distribution have reached an efficiency that has paid off in wide human benefits.

Not the smallest part of this pattern is the widespread distribution of information on new medical products, practically a continuing postgraduate course for all physicians. Here big business has taken the very wise stand that a reputation for honesty and reliability has tangible value, and the professions have been quick to recognize the importance of this flow of service data.

From the point of view of the patient—the average citizen—I hope that your correspondent will reevaluate his estimate of the situation.

PHILIP REICHERT
5220 Empire State Building, New York 1

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Interaction between Casein and β-Lactoglobulin on Heating

Electrophoretic evidence has been obtained which indicates that casein and β-lactoglobulin, the major protein constituents of milk, combine under the influence of heat, forming a stable complex (*1*). When a 1 percent protein mixture composed of 0.75 percent casein and 0.25 percent β-lactoglobulin in 0.1 ionic strength phosphate buffer of *p*H 6.86 was heated at 85°C for 30 min, and electrophoresis was carried out in the same buffer, the β-lactoglobulin migrated with the α-casein. Three well-separated electroproretic peaks (α- and β-casein and β-lactoglobulin) were obtained for the unheated mixture at this *p*H. A solution of 0.25 percent β-lactoglobulin in the *p*H 6.86 buffer, heated in the same manner, yielded two electrophoretic peaks. The more rapidly migrating peak had a mobility slightly lower than that of the α-casein peak in the unheated mixture but about the same as that of the proposed complex of β-lactoglobulin and α-casein in the heated mixture.

If β-lactoglobulin and α-casein had not actually formed a stable complex, it should be possible to resolve the two components by performing the electrophoresis at a different *p*H. In an attempt to so resolve the denatured β-lactoglobulin and α-casein components, electrophoresis of mixtures prepared and heated in the same manner was carried out in *p*H 2.45 glycine-HCl buffer of ionic strength 0.1. No component was present in the electrophoretic pattern of the heated mixture obtained at *p*H 2.45 that had the mobility of heat-denatured β-lactoglobulin. (Heat-denatured β-lactoglobulin showed a single peak at this *p*H.) The proposed complex, identified on the basis of the area of its electrophoretic peak, migrated with a mobility appreciably lower than that of heated or unheated β-lactoglobulin or unheated α-casein. The area of the complex peak at *p*H 2.45 was not as great as the area of this peak at *p*H 6.86, but it was quite evident from the dissimilarities between the ascending and descending patterns that interactions of an ionic nature occurred at *p*H 2.45 in the heated mixture. The ionic interactions introduced considerable uncertainty into the identification of the components other than the large peak that was assumed to be the complex between α-casein and β-lactoglobulin.

The evidence, although not conclusive, is supported by similar observations made by Jennings (*2*) and Krejci (*3*) that casein formed a complex with a horse serum immune globulin under the influence of heat.

Heat-induced interactions between proteins may be of considerable significance with respect to protein stability problems in food processing.

Work is in progress to confirm the existence of α-casein-β-lactoglobulin complexes in heated synthetic mixtures and in heated and dried milk.

WESLEY A. MCGUGAN
VIRGINIA F. ZEHREN
VINCENT L. ZEHREN
ARTHUR M. SWANSON
Department of Dairy and Food Industries, University of Wisconsin, Madison

References and Notes

1. This paper reports research undertaken in cooperation with the Quartermaster Food and Container Institute for the Armed Forces and has been assigned number 490 in the series of papers approved for publication. The views and conclusions are those of the authors; they are not to be construed as necessarily reflecting the views or endorsement of the Department of Defense.
2. R. K. Jennings and L. D. Smith, *J. Immunol.* **45**, 105 (1942).
3. L. E. Krejci, R. K. Jennings, and L. D. Smith, *J. Immunol.* **45**, 111 (1942).

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Antibiotic-like Substance and Cellulose Digestion Stimulator Found in Fermented Feeds and in Rumen Fluid*

Factors that stimulate *in vitro* cellulose digestion by rumen microorganisms have been found in fresh rumen fluid and its extracts (*1–3*). Cow manure and common feedstuffs have also been shown to contain similar factors (*4*). However, previous workers have not reported an antibiotic-like factor in these materials.

A factor, or factors, that stimulates the growth and cellulolytic activity of rumen microorganisms and inhibits the growth of microorganisms previously isolated as undesirable contaminants from the digestive tracts of ruminants has been obtained in crude form. Active extracts were prepared from four bovine ingesta, one ovine ingesta and two fermented feeds.