Secondly, model-building, based on the structure of Spencer *et al.*[2] with two minor bases in the supposed coding triplet, and opposed to appropriate triplet sequences of major bases in a model or models of template RNA might reveal whether anything approaching the expected specificity can be obtained. A major base in the centre of the transfer RNA triplet flanked by two minor bases might tend to arrange the proposed four specific hydrogen bonding sites in the most effective pattern to give maximum stability to a molecule 100 Å long held by one end to the template and holding an activated amino-acid in line at the other.

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[1] Bergquist, P. L., and Matthews, R. E. F., *Biochem. J.*, **85**, 305 (1962).
[2] Spencer, M., Fuller, W., Wilkins, M. H. F., and Brown, G. L., *Nature*, **194**, 1014 (1962).
[3] Woese, C. R., *Nature*, **194**, 1114 (1962).
[4] Littlefield, J. W., and Dunn, D. B., *Biochem. J.*, **70**, 642 (1958).
[5] Smith, J. D., and Dunn, D. B., *Biochem. J.*, **72**, 294 (1959).
[6] Dunn, D. B., Smith, J. D., and Spahr, P. F., *J. Mol. Biol.*, **2**, 113 (1960).
[7] Cohn, W. E., *J. Biol. Chem.*, **235**, 1488 (1960).
[8] Amos, H., and Korn, M., *Biochim. Biophys. Acta*, **29**, 444 (1958).
[9] Dunn, D. B., *Biochim. Biophys. Acta*, **38**, 176 (1960).
[10] Brookes, P., and Lawley, P. D., *J. Chem. Soc.*, 539 (1960).

Comparison of the Caseins of Buffalo's and Cow's Milk

By comparing the major non-casein proteins of the milk of the Indian buffalo (*Bubalus bubalis*) with those of cow's milk, it has been found[1] that the single β-lactoglobulin component produced by the buffalo is very similar in properties to one (*B*) of the two genetically controlled variants (*A* and *B*)[2,3] produced by the cow. Likewise, the single α-lactalbumin of buffalo milk resembles one (*A*) of the two variants (*A* and *B*) of this protein which occur in the milk of African[4] and Indian humped (zebu) cattle[5]. (Non-zebu cows have only one α-lactalbumin which is like the *B*-variant of zebu milk.) Thus there are striking similarities in the corresponding non-casein milk proteins of buffalo and cattle, two species incapable of cross-breeding.

We have now extended the comparison to the casein complex to see whether such similarities might also pertain to the components of the principal milk protein. Milk samples from individual buffaloes, zebus, Jersey cows and some zebu–Jersey F_1 crosses were prepared for, and subjected to, paper electrophoresis in the manner recently described for cow's milk[6]. Examination of the results, of which an example is given in Fig. 1, showed that two of the three major components, β- and κ-casein, were of comparable electrophoretic mobilities. (The apparent slower movement of the Jersey β-casein in Fig. 1 is fortuitous: the particular animal happened to be homozygous for the slower-moving *B*-variant occurring in Jersey milks.) No evidence of β-casein polymorphism was seen with any of the buffalo and zebu milks, but too few samples were examined to exclude the possibility that variants exist. In contrast to the β- and κ-components, the α-caseins showed quite marked differences in their rates of migration, not only between buffalo and cattle but also, more surprisingly, between zebu and non-zebu cows. The differences are larger than those due to the α-casein polymorphism recently observed in the milk of Holstein cows[7], differences which cannot be resolved by the paper-electrophoretic technique as applied here.

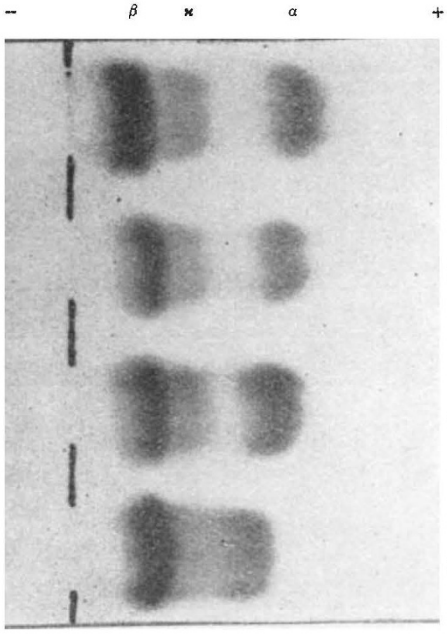

Fig. 1. Bovine caseins. Paper electrophoresis at *p*H 7·15

This preliminary study has shown that each of the main protein components of cow's milk has its counterpart in buffalo milk. More detailed physico-chemical studies are needed to establish the identity or near-identity of the isolated constituents, a finding which would lend support to the attractive hypothesis of a common origin of the bovine genera under discussion. Such a hypothesis might hold in spite of the non-identity of the α-caseins, since the difference in electrophoretic mobility between zebu and buffalo seems to be no greater than that between zebu and non-zebu cattle.

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[1] Sen, A., and Sinha, N. K., *Nature*, **190**, 343 (1961).
[2] Aschaffenburg, R., and Drewry, J., *Nature*, **176**, 218 (1955).
[3] Aschaffenburg, R., and Drewry, J., *Nature*, **180**, 376 (1957).
[4] Blumberg, B. S., and Tombs, M. P., *Nature*, **181**, 683 (1958).
[5] Bhattacharya, S. D., Roychoudhury, A. K., Sinha, N. K., and Sen, A. (following communication).
[6] Aschaffenburg, R., *Nature*, **192**, 431 (1961).
[7] Thompson, M. P., Kiddy, C. A., Pepper, L., and Zittle, C. A., *Nature*, **195**, 1001 (1962).

Inherited α-Lactalbumin and β-Lactoglobulin Polymorphism in Indian Zebu Cattle. Comparison of Zebu and Buffalo α-Lactalbumins

It has been shown by paper electrophoresis that genetically different types of β-lactoglobulin[1,2] and α-lactalbumin[3,4] occur in cow's milk. While genetic polymorphism of β-lactoglobulin is general among the cattle of different countries, that of α-lactalbumin has only been observed in two breeds of African zebus, the Nigerian White Fulani[3] and the boran[4] cattle of Kenya, but not in Icelandic, British[3], Danish[5] and North American[6] (Holstein) cattle. Blumberg and Tombs[3] noted the Nigerian White Fulani cattle to be similar in appearance to the 'Brahmin' cattle of the East, which were probably brought into Africa by the nomadic Fulani people, and suggested that α-lactalbumin-*A* might serve as a marker by which the affinities of the zebu cattle, and indirectly of the Fulani people associated with them, could be traced. We have now examined the α-lactalbumin and β-lactoglobulin polymorphism in Indian zebu cattle with the view of getting further information on this aspect.