might undergo delicate alterations in ecological balance, due to reduced fecundity and vitality.[4] It might give, for example, to a more southern variety of otherwise similar habits, a chance to expand over the retreating range once held by a more rugged and cold-resisting form. Ultimately the latter might be bred out or replaced.

Bearing upon this point, there exists a certain amount of data from scattered sources which the writer believes are worthy of some degree of attention and which he has not seen organized with this problem in mind. First and most importantly, we encounter information detailing the effects of hot dry climate upon northern European cattle whose bovidean affinities are not too remote to invite serious analogies with the extinct *Bison taylori*. This latter animal, slightly larger and undoubtedly heavier pelted than the existing buffalo, moved in a cooler and more humid world than the historic species. Almost certainly he was capable of enduring more difficult winters. What happened, then, when the ice fell back?

The information dealing with European cattle, to which we now proceed, suggests a tentative explanation. Though climate may influence animals indirectly through its effect upon pasturage, for example, experimenters with live stock have noted that for these animals "there are optimum climatic conditions under which they will develop and produce best within the limits of their inherent capacity."[5] Many observations testify to the reduced vitality of European cattle under higher temperatures both as to milk production and fertility. Exposure to strong sunlight in summer causes a higher respiration rate, and the rise in body temperature indicates increased difficulty in the reduction of body heat. It has been observed that in hot climates cross-breeding of European cattle with tropically adapted bovids strengthens and improves the strains, suggesting favorable genetic distinctions in the ability of the southern types to adjust to warmer conditions.

Now the available evidence upon *Bison bison* suggests that in terms of ruggedness of physique, the northern phase or variety *Bison bison athabascae* approached most closely to the extinct *Bison taylori* in size.[6] Can it not be reasonably suspected, then, that *Bison bison* may have existed originally as a southern variant which, by reason of greater adaptability to heat and perhaps more impoverished and less succulent grazing conditions, expanded its range in the closing Pleistocene or early Recent at the expense of its larger and less heat-resisting relative? The paleontologist Hay, as a matter of fact, suggested as long ago as 1913, albeit in the course of a somewhat cursory survey, that he had noted some skulls referable to *B. occidentalis* "which might be looked upon as illustrating the transition from *B. occidentalis* to the existing American buffalo."[7]

The taxonomy, the morphological distinctions or relationships between the late Pleistocene bisons have never been examined with satisfactory thoroughness. Differences of opinion exist as to the relationship of these with the living form which can only be elucidated by more thorough anatomical and statistical studies than now exist. Perhaps, however, some of the assignments of southern limb fragments found with the Folsom culture are not valid in the light of hints of sizes ranging within *B. bison* specifications or not indicated at all. At all events the writer's purpose will be attained if this discussion leads to a more serious examination of the whole problem. The range, the intergradation of characters (if such exist) between *B. bison, B. bison athabascae*[8] and *taylori* should help greatly in clarifying a situation which has archeological as well as paleontological implications. Such a study, be it observed, will have to consist of more than the recording of the measurements of an occasional fine bull, of whatever species, and will have to take account of a possible progressive specific change which began earlier in the South.

LOREN C. EISELEY
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UNFERMENTABLE REDUCING SUBSTANCES IN MOLASSES

WHEN pure invert sugar is heated at P_H 4.5 over a period of ten weeks at 55° C, a considerable quantity of material is formed which is not fermented by bakers' yeast. From the unfermentable residue of sugar thus treated we have isolated a product with the following properties: It is acid to litmus, soluble in water and glacial acetic acid, and it vigorously reduces both Fehling and Tollens solutions and gives no positive murexide test. It melts with decomposition at 226.5° C.

Quantitative analysis:

C 45.11 per cent.	H 6.67 per cent.	N 8.57 per cent.
	P 3.79 per cent.	

[4] Even the living species, as pointed out some years ago by Seton, in spite of its vast numbers was subject to enormous losses from prairie fires, floods and blizzards, which led Seton to comment that it could have done no more than hold its own in the struggle for survival. (Ernest Thompson Seton, "Life Histories of Northern Game Animals," Vol. I. Scribners. New York, 1909).

[5] A. O. Rhoad, "Climate and Livestock Production," *1941 Yearbook of Agriculture*, Washington, D. C., 1941, pp. 508–516.

[6] E. H. Barbour and C. B. Schultz, *Bulletin Nebraska State Museum*, 1: 435–436, 1936. Seton, *op. cit.*, p. 250. S. N. Rhoads, Proceedings of the Academy of Natural Sciences of Philadelphia. Vol. for 1897, pp. 499–500.

[7] O. P. Hay, *Proceedings of the U. S. National Museum*, 46: 176, 1913.

[8] S. N. Rhoads (*op. cit.*) expressed the view that *B. b. athabascae* was taxonomically intermediate between *B. bison* and the most recent fossil species.

An empirical formula based on these values is

$$C_{30}H_{54}O_{18}N_5P$$

We have found organic phosphorus in commercially available distillery slops concentrates which would seem to confirm the belief that the above compound is essentially a yeast product.

F. W. ZERBAN
THE NEW YORK SUGAR TRADE LABORATORY
LOUIS SATTLER
BROOKLYN COLLEGE

CONTRACT BETWEEN THE SHELL DEVELOPMENT COMPANY AND THE CONGRESS OF INDUSTRIAL ORGANIZATIONS

A SATISFACTORY contract has been consummated between the Shell Development Company, Emeryville, California, and the Federation of Architects, Engineers, Chemists and Technicians (CIO) (Chapter 25). The contract was signed on May 25, 1942, at the conclusion of a mediation hearing in Oakland before Paul A. Dodd, public associate member of the National War Labor Board and professor of economics at the University of California at Los Angeles.

The following statement was given by Mr. J. F. M. Taylor, president of the company, and Mr. Marcel Scherer, international vice-president of the Federation of Architects, Engineers, Chemists and Technicians:

> The signing of a collective bargaining contract indicates remarkable progress in collective bargaining in this field. We look forward to setting high standards in labor-management relations which will result in furthering Shell Development's contribution to the war effort.

Some 275 laboratory, engineering and pilot plant technicians of the company will benefit from this agreement, which establishes a contractual basis for hours, working conditions and wages. The company recognizes the federation as the sole bargaining agent for the employes covered by the contract.

The contract provides for promotions based on merit, layoffs based on seniority, and time-and-one-half payment for required overtime work. Employees are protected against arbitrary discharge. In cases of dismissals for general inefficiency or low standards of work, warnings are given a reasonable period in advance in order to afford the employee an opportunity to correct them. A clause on hiring states that no person shall be discriminated against because of race, color, creed, nationality, sex or religious belief. Among the economic benefits gained under the terms of this contract is the acceleration of the rate of advancement within the existing wage scales. The agreement contains a maintenance of membership clause whereby the company recognizes the obligation of employees who are now members or may become members of the Federation of Architects, Engineers, Chemists and Technicians, to maintain themselves in good standing in the union for the duration of the contract.

The outstanding and unique feature of the agreement is the inauguration of a patent bonus plan, the benefits of which will be shared equally by all employees of the company. This plan will undoubtedly stimulate inventions among the employees and thus contribute largely to the war effort.

At the conclusion of the hearing Professor Dodd stated:

> Because of the high intelligence and education of the negotiators on both sides of the table, it has struck me that this case is one of the most unusual cases to come before the War Labor Board. I am sure that the enlightened spirit which has prevailed at this conference table will be continued with a resulting satisfactory bargaining relationship.

DAVID E. ADELSON

THE STATURE OF MEN

IN the May 22, 1942, issue of SCIENCE there appeared a communication (on page 529) from S. L. Calhoun, of Leland, Mississippi, mildly scolding a collaborator and myself for our promulgation of a "false hypothesis." This correspondent writes in part as follows:

> Recent articles in SCIENCE have left the reader with a certain amount of skepticism as well as a large amount of thought-provoking data.
>
> In the December 12 issue of SCIENCE (Vol. 94, No. 2450, pp. 552–553) Leonard R. Rowntree gives an average height of over 2,000,000 registrants examined as 67½ inches, the identical average of men in World War I. An increase in weight of eight pounds was shown.

Your correspondent then goes on to cite an article written by Richard G. Canning and myself which appeared originally in *Human Biology,* Vol. 13, No. 4, pp. 533–540, December, 1941, and which was discussed in SCIENCE, Vol. 95, No. 2454, *Supplement,* p. 13, January 13, 1942. We had shown that freshmen in the University of Cincinnati had increased over two inches in average height from 1916 to 1936. We had generalized from our data that men were getting taller. It seems that we had no right to do this, for your correspondent says:

> These observations would lead one to conclude that childhood care and advantages, which result in increased growth, are much greater for those students in the University of Cincinnati than for the United States as a whole, and that any conclusions drawn by Chenoweth and Canning should be confined and not generalized.

I think the explanation of the difficulty is a simple one. I have before me Medical Statistics Bulletin No. 1, National Headquarters, Selective Service Sys-