Comments and Communications

Methionine Content of Teosinte

MELHUS, Aguirre, and Scrimshaw [SCIENCE, **117**, 34 (1953)] have stated that "from the data presented teosinte should be further studied as a potential source of vegetable protein of relatively high methionine content." However, the data presented do not show any such thing. From a comparison of the methionine/nitrogen ratios it will be seen that the protein of teosinte is just about as deficient in methionine as the protein of maize. Consequently, because of well-known laws of amino acid nutrition, teosinte could hardly be expected to correct a methionine deficiency, any more than a higher level of maize in the diet would correct it.

The ultimate solution to the problem of correcting methionine deficiency in the vegetable protein diets of humans in underdeveloped areas appears to lie in a different direction. Nutritionally available synthetic methionine can be produced in unlimited quantities. It is already so cheap that it is widely used in chicken feed. Surely a way could be found to take advantage of the availability of synthetic methionine for correcting human dietary deficiencies as well.

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WHEN calculated on the basis of 16% nitrogen the four teosintes described average 2.25 mg % methionine and the two corns 1.68 mg %. Thus, part of the superior methionine content of teosinte when it is reported on the basis of 10% moisture is due to the higher total protein content, but not all of it, as Dr. Patton implies. The data presented enabled the reader to make the calculation of methionine content on a 16% nitrogen basis (or estimate the methionine/nitrogen ratio) if he were especially interested. However, we regret that we did not present the data both ways in the table in order to avoid any misunderstanding.

Even if there were no difference on an equal protein basis, teosinte would still be potentially useful in improving the methionine content of Guatemalan diets. Many adults consume 500 g of whole corn daily, prepared as tortillas, obtaining thereby as high as 80% of their calories and 70% of their total protein. This quantity of corn supplies approximately 63% of the methionine requirement (Aguirre, Robles, and Scrimshaw: "The Nutritive Value of Central American Corns. II. Lysine and Methionine Content of Twenty-three Varieties in Guatemala." *Food Research,* in press.). The extent to which the requirement is further met by the cystine in corn is still under investigation. When teosinte is substituted for corn or mixed with it, it replaces an equal weight of corn. Thus any significant use of teosinte in the preparation of tortillas would increase the methionine in the diet without a significant change in dietary habits on the part of the people.

We have emphasized the improvement of diets rather than the use of synthetic nutrients, no matter how cheap and plentiful, because the Guatemala Indian culture with its independence, isolation, economic rigidity, and conservatism makes their introduction highly impractical. Whether synthetic methionine might be of value in some other underdeveloped areas is beyond the scope of this discussion, but the practical difficulties in the way of its introduction, distribution, and control would appear formidable.

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The "Great Fireball Procession" of 1913

IN C. C. Wylie's account of the "great fireball procession" of 1913 (SCIENCE, **118**, 125, 145 [1953]), it is perhaps not made sufficiently clear that this description of the phenomenon differs considerably from that which has previously appeared in the astronomical literature. The version of the event so severely criticized by Professor Wylie is not (as readers of his article might tend to assume) a post-factum "popular" accretion, but is that presented in the original report on the occurrence by C. A. Chant of Toronto, the editor of the *Journal of the Royal Astronomical Society of Canada* (*1*). Subsequent writers on the event (*2, 3*) saw no grounds for questioning Chant's treatment, and were even able to unearth further data of a strongly confirmatory character (*4, 5*). Professor Wylie's statement that closer study reveals the facts to have been entirely different from what these astronomers thought them to be is therefore more novel and surprising than his rather casual reference to the matter might lead the reader to suppose. What Wylie in 1953 confidently identifies as "an excellent shower of shooting stars" was positively stated by Pickering in 1922 (*2*) to have been "in no sense a meteor shower, but a different kind of event altogether."

It is to be hoped that Wylie's new interpretation will soon be supported by a more formal publication with citation of evidence, since at present it must be acknowledged that it is difficult to connect the description given by him with the original observations as published by Chant (*loc. cit.*). These very numerous reports unanimously described a unique procession, lasting for three minutes, of a great number of bright fireballs in clusters moving slowly and strictly horizontally. Wylie's description of the event as local in character is likewise a revision of the previously accepted version and is not easy to reconcile with the data. An extraordinary fireball procession moving

from northwest to southeast was seen successively in Saskatchewan, in Ontario, over the North Atlantic, in Bermuda, and finally by a ship in mid-Atlantic south of the Equator (*2, 4, 5*). These successive appearances defined a trajectory (roughly a great circle) 5200 miles long. "A very few fireballs or shooting stars observed in other places" does not seem to be an adequate summary of this situation. If it is to be argued that these successive appearances of a unique phenomenon were due to mere coincidence, strong evidence will have to be adduced.

A fully satisfactory explanation of this spectacular occurrence of 1913 has never been achieved. Wylie's proposal to explain it as simply an ordinary event which was misinterpreted is, at least, a fresh approach. However, it should be recognized that the recorded evidence is difficult, if not impossible, to reconcile with Professor Wylie's description.

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UNDER date of April 29, 1953, I wrote the editor of *Sky and Telescope,* Harvard College Observatory, suggesting that in view of the sensational features appearing in popular magazines on the meteors of February 9, 1913, it might be well to publish another article giving a more factual account of the occurrence. The editor replied that since he had published in March, 1952, an article by Professor Pruett, of Oregon, in which it was shown that the popular version was impossible, he thought another article at this time was not necessary; but he added, "Perhaps in a couple more years it would be interesting to remind people of the situation once again."

Professor Chant, of the University of Toronto, published some 140 reports by observers of these meteors (*1*), but not being a meteor man he accepted the popular version although he had difficulty fitting the observations to the supposed path. A meteor man would have interviewed a few observers of the display within twenty-four hours of the occurrence, and determined the radiant from a plot of the reported paths.

Calculations made from the data published by Chant were made and published later (*2, 3*), however, and show the following.

1) A fireball as bright as the brightest reported by Chant, and traveling at the height and speed of the popular version, would survive only a few miles, instead of the supposed 5000 miles, against the resistance of the air.

2) None of the more than one hundred reports mention seeing a fireball either rise from, or drop behind, objects on the horizon. As this has been reported regularly for fireballs with path lengths of say 100 miles, none of the 1913 meteors can have had a path length greatly in excess of 100 miles.

3) The popular version assumes a path passing close to the cities of Regina, Winnipeg, Duluth, Toronto, Buffalo, Rochester, and New York. At Toronto, Professor Chant was called by telephone immediately after the display, and scores of letters were received from Toronto and the adjacent territory. No reports were received from any of the other cities.

To show what might be expected, a single moderately bright fireball falling at 6:30 P.M. on September 28, 1953, was reported by newspapers in Philadelphia, Harrisburg, Baltimore, Scranton, Binghamton, and elsewhere. It is inconceivable that the "procession" of the popular version would have passed unnoticed all of the cities excepting Toronto.

4) The information published by Chant is quite sufficient for a determination of the radiant, or the direction from which the meteors came. The meteors in the Toronto area were falling downward at an angle of about 20°, and traveling roughly in the direction of Washington, D. C., instead of horizontally and toward New York City as the popular version requires.

5) The reports published by Professor Chant show, for the supposed path over North America, only one object bright enough to be called a fireball. This moderately bright object disappeared at a height of about 25 miles near Hamilton, Ontario. The other meteors were definitely in the class of ordinary shooting stars.

To summarize, the meteors of February 9, 1913, were a shower of shooting stars, plus a bright fireball in the Toronto area. Compared with other fireballs and meteor showers, they attracted relatively little attention outside of the Toronto area. The study of Chant's fundamental data was accepted at once as conclusive, in both Europe and America, and since its publication astronomers have not included the popular version in either textbooks or popular articles.

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Erratum. In the article "Newer Synthetic Structures of Interest as Tuberculostatic Drugs," SCIENCE **118**, 497 (1953), an error appeared in the data in Table 1, p. 501. Under the heading "Approx. dose, mg/kg," in column 1, the figure should be 50 in every case instead of 125. These data were culled from the publication by Grunberg and Leiwant (*21*) and the error in translation can be ascribed to sheer inadvertency.

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