An Introduction to the Protein Problem

MAX MILNER
UNICEF, United Nations, New York

In opening today's discussion on the protein problem, I do not plan to present an exhaustive analysis of this very large subject. Rather, by way of introduction to the other papers which will deal more specifically with its various aspects, I should like to reflect briefly on only several of the many facets or variables of this major problem, which must be "plugged in" to any over-all hypothetical "equation" defining the world protein situation and its solution. Then, in outline only, I will indicate some of the responses which this problem has begun to stimulate.

First, may I refer to the now familiar litany of evidence indicating that the world is outstripping its capacity to feed itself? In spite of recent encouraging increases in food production in many developing countries, the per capita food supply in the world is less this year than it was during the last. Unless in the next 15 years population growth can be effectively curbed and food production in the food-needy countries accelerated at an even more rapid rate, then we face some difficult times indeed, of which current events in India are only a modest forerunner. Furthermore, in this race between population and food it is clear that the protein supply is already more critical than are calories.

The next point I wish to make is that if one matches total world food production (as it can best be estimated) against current population numbers, assigning uniform minimal nutritional standards in terms of per capita protein and calorie requirements, it can be shown that at this time we are apparently not even in a crisis. It must be emphasized that this concept and such calculations are misleading and indeed dangerous because they do not take into account the obvious facts—that the problem lies in the maldistribution of food—not only between the food-needy and the food surfeited countries, and between the rich and the poor, but more critically in the inadequacy of the diets of infants and young children even in societies where over-all food supply may appear to be adequate.

It has been pointed out that protein intake falls into roughly three categories in terms of world populations. In the first are the approximately 1 billion people in the industrialized countries who have excellent diets high in animal products and where protein nutrition is therefore adequate or better than adequate both quantitatively and qualitatively. The second group, about 2 billion in number, subsists largely on cereals (wheat, rice, maize, sorghum, millet). If this group of cereal eaters is able to satisfy its calorie requirements, then average quantitative protein intake may approach that of the first group, however, the protein quality of these diets may be quite another matter. The third world population segment is the few hundred million, subsisting mainly on starchy roots and fruits, which are of such low protein content that quality is hardly a consideration and protein supplementation must be available from other dietary sources such as legumes. Improvement of the nutrition of the latter two groups is clearly a major challenge to plant scientists.

Another vital factor in the total protein picture which emphasizes the problem of inadequate distribution, relates to the special needs of the so-called vulnerable segments of food-needy populations and particularly to those of infants and children between 6 months and 6 years of age. For every kilogram of body weight, a 6-months old infant requires 2.5 times as many calories and 3 times as much high quality protein as the average adult. At 2 years of age, the child needs twice the calories and protein of an
adult per unit of body weight. Putting the matter in another way, adults (except for pregnant and nursing women) can apparently get along remarkably well for their protein supply on say 2,500 to 3,000 calories-worth of rice daily, whereas an infant, requiring 800 to 1,000 calories, cannot ingest enough rice alone to obtain its protein needs.

These points highlight the health and social aspects of protein/calorie malnutrition in infants and young children in the food-needy countries where malnutrition is the root cause of high mortality rates and where one third may die before attaining school age. The damage to physical development and the possibility of mental retardation as well, in those that survive, may indeed be the most significant cause of the slow pace of economic, social and agricultural development in these countries.

May I stress the quality aspect of the protein supply from a more fundamental point of view? The nutritional value of plant proteins in contrast to that of animal foods is invariably inferior because of inadequate levels of one or more essential amino acids. However, relatively small quantities of animal proteins, as well as synthetic essential amino acids, can make up quality deficiencies of plant protein, and thus the mixture may provide nutritional benefits equivalent to the same quantity of animal protein. By the same token, mixtures of vegetable proteins which supplement each others' amino acid deficiencies, can also approach animal proteins in biological quality. Of interest nutritionally, but inefficient economically, is the fact that to a considerable extent the amino acid deficiencies of plant proteins can be made up by eating more of them. These elemental principles of protein nutrition have been practiced for many decades in the feeding of our livestock but their rational application to human diets and particularly to the problem of world protein scarcity has hardly begun. Moreover, the protein quality principle must be interpreted and applied carefully. Growing animals and humans which may be barely surviving on restricted calorie intake will derive little benefit from improvement of quality in their dietary protein. Under these conditions the body will satisfy its caloric requirements first, so that little improvement will be achieved even from a high quality protein.

Another important factor in our over-all protein equation involves the frequently unenlightened dietary practices which exist among families of many populations, which allocate the best foods protein-wise to the wage earner and other adults in the family, and leave for the child the starchiest residues. Thus, kwashiorkor can be a serious problem even among societies which have excellent agricultural potential, for example, some of the countries in West Africa. This situation will persist until communities, families, and particularly the mothers of these countries will begin to comprehend the elementary food needs of the infant and young child. There is no question but that a great deal of the protein-related infantile malnutrition which occurs widely among subsistence and low-income urban populations of developing countries could be eliminated if these facts were better understood not only by mothers but also by public health officials and the marketers of processed foods. Subsistence and urban groups living in low economic circumstances must be taught to utilize properly certain foods, legumes for example, which when correctly prepared and fed to young infants as supplements to breast milk or later as weaning foods, greatly reduce the occurrence of protein malnutrition in this critical age group. I stress this point because we should not overestimate the potential impact of processed protein-rich food supplements, which we hear about so frequently these days, without acknowledging the cultural and social problems affecting their acceptance by families with little formal education, and the need to design educational, marketing, and promotional programmes with these facts in mind.

And last but not least in my elementary and admittedly limited list of variables in the over-all protein equation, may I revert to my first two points, namely, the effect of the population explosion on world food supply and the imbalance in food distribution? I refer to the impact on world food scarcity of what Lester Brown refers to as the income explosion in the industrially developed countries, which permits them to demand inordinate quantities of cereals and protein supplements in order to humour their appetite.