

Dogma Disputed

THE GREAT PROTEIN FIASCO

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Summary The concept of the much-publicised world protein "gap", "crisis", or "problem" arose from the description of kwashiorkor in Africa in the 1930s and the assumption, which has turned out to be wrong, that malnutrition in children takes this form throughout the world. As a result, measures to detect protein deficiency and treat and prevent it by dietary means have been pursued until the present time. The price that has had to be paid for these mistakes is only beginning to be realised.

You see, but you do not observe.

The Adventures of Sherlock Holmes: A Scandal in Bohemia.

THERE is mounting recognition that the emphasis which has been given to the role of protein in human undernutrition, resulting in the claim that there is a global protein "gap", "crisis", or "problem", is wrong. Its major protagonist, the Protein Advisory Group (P.A.G.) of the United Nations System, was created nearly 20 years ago to "help W.H.O. advise F.A.O. and UNICEF on the safety and suitability for human consumption of new protein foods—and has evolved into a major force in the fight to close the protein gap".¹ The P.A.G. is now caught in a crossfire of criticism and is experiencing a crisis of identity. The underlying causes of this display of disarray may not be immediately evident. This is an account of what is seen to be a long and disastrous train of events which, once set in motion, led inexorably to the present crisis. The underlying causes can best be understood if the contributory factors are considered in chronological order (see table I). These elements broadly are of four kinds involving (1) clinical description, (2) combat measures, (3) field assessment, and (4) U.N. agency involvement.

CLINICAL DESCRIPTION

For centuries malnutrition had been recognised in infants in Europe and later in North America, usually taking the form of marasmus. By the 1920s and 1930s it was being studied in great detail with available methods. It will probably never be known whether marasmus was also common at that time in the tropics or was just ignored. There were descriptions of nutritional disease in children from various parts of the world, but it took the appointment of the first woman medical officer to the Gold Coast in the person of Cicely Williams to give us the first substantial description in 1932 of "a deficiency disease of infants" in which "some amino acid or protein deficiency cannot be excluded". This discovery of kwashiorkor has recently been celebrated and attractively documented on the occasion of Dr Williams's 80th birthday.² It is only fair to her to quote from a recent letter in which she says "For the last 20 years I've been spending my time trying to debunk kwashiorkor." During the late 1930s and 1940s, when international meetings were virtually non-

existent and travel was limited, discussion of the nature of undernutrition in children was carried on through the correspondence columns of journals mainly between workers in different parts of Africa. After the 1939–45 war the newly formed United Nations organisations W.H.O. and F.A.O. took up the theme and initiated several surveys, the most notable being that entitled "Kwashiorkor in Africa".³ Without reference to the rest of the world and other forms of malnutrition the authors concluded in a much-quoted statement that kwashiorkor "is the most serious and widespread nutritional disorder known to medical and nutritional science". Thus the pattern was firmly set with emphasis on kwashiorkor, soon known as "protein malnutrition",⁴ and interest was focused mainly on the rural African scene. Confirmation that kwashiorkor was primarily protein deficiency came with initiation of cure with skim milk.⁵

However, some were not satisfied with this oversimplification. There is evidence of a broader concept in the discussions that took place at a meeting in Jamaica in 1953,⁶ and this theme was repeatedly aired when I was with B. S. Platt⁷ in the mid-1950s. Jelliffe's W.H.O. monograph⁸ on infant nutrition published at this time, while emphasising kwashiorkor, acknowledged that marasmus had been neglected in the tropics. Thereafter increasing recognition has been given to the dangers of bottle-feeding-induced marasmus and the need to advocate the proper utilisation of Nature's best protein source for infants, breast milk.

In 1959 Jelliffe⁹ introduced the term still in common use, "protein-calorie malnutrition" (P.C.M.), to cover not only the entire clinical spectrum of marasmus, kwashiorkor, and intermediate forms, but also mild and moderate subclinical stages. I worked from 1957 until 1962 in East Africa, where kwashiorkor was the prevailing form of childhood malnutrition. The move to Beirut in 1962 provided a sharp contrast, with almost every severely malnourished child suffering from marasmus. Out of this experience came a fresh look at the pathogenesis of these conditions¹⁰ (see table II).

As a broader approach to clinical investigations was

TABLE I—TIMETABLE OF THE PROTEIN FIASCO AND COUNTER-ELEMENTS

Elements for the fiasco*	Year	Counter-elements
Kwashiorkor in Gold Coast South and East Africa	1930	
Serum-albumin	1940	
"Kwashiorkor in Africa" "Protein malnutrition" Cure with skim milk, "p.r.f.m.", P.A.G.	1950	"Multi-mixes" Weight/age classification Rehabilitation centres, "P.C.M."
Aminoacid ratio	1960	Mothercraft, rise of marasmus, "p.r.f.m." challenged
Lysine supplementation		Anthropometry, lysine challenged, multifactorial nature
Protein "crisis", "gap", &c. Multiple tests	1970	Planning, "E.P.M.", energy "gap"
		? ← Task force → ?

* Criticism only of the unwarranted generalisations made from these contributions to knowledge is implied.

TABLE II—FEATURES OF MALNUTRITION IN CHILDREN IN TANZANIA AND IN LEBANON

	Tanzania	Lebanon
Clinical picture ..	Kwashiorkor	Marasmus
Age	2-4 yr.	3-9 mo.
Biochemistry ..	Markedly deranged	Unremarkable
Season	Any time	Summer and autumn
Infections	Acute (e.g. measles)	Chronic, "gastroenteritis"
Feeding	Breast	Bottle
Community	Rural	Urban

adopted around the world, it gradually became clear that, while both these above situations were exceptional, the consensus lies between but well on the marasmus side.

About this time evidence became available from Santiago de Chile¹¹ and elsewhere that the trend was for kwashiorkor to give place to marasmus under the influence of rapid social change and that one could speak of "the rise of marasmus"¹². In a recent letter Waterlow rightly points out the lack of proper documentation. At a recent international symposium the term "energy-protein malnutrition" (E.P.M.) was freely in use as an expression of a generally agreed emphasis at the present time.

COMBAT MEASURES

Once the emphasis had been firmly placed on kwashiorkor and protein deficiency, it followed that protein should be prescribed as the cure. To some this still means "produce more food" and secure "freedom from hunger"¹³ and it is also the reason why it is so difficult even today to convince those ignorant of the nature of childhood malnutrition that more and better protein is not the answer. The only clear exception is those populations subsisting largely on starchy roots such as cassava and yams, or plantain, which are very low in protein. However, these people form only about 5% of the world's malnourished and owing to changing food habits and the urban drift they are diminishing actually and relatively.

After the 1939-45 war dry skim milk became available in the United States of America as a "fortunate by-product of a domestic surplus-disposal problem"¹⁴. It was clearly more satisfactory in every respect to dump it in developing countries than to have to bury it in the United States as was contemplated by the Department of Agriculture at one point. In 1964 it became evident that U.S. milk surpluses were much less than predicted, and the supplies of skim milk began to dry up. Local sources of protein were sought and "protein-rich food mixtures" (p.r.f.m.) began to be formulated, not just as a treatment for kwashiorkor but as the main drive to prevent childhood malnutrition. The biscuit developed by Dean in Kampala was one of the first of these, as was 'Pronutro' in South Africa. F.A.O. made its position very clear at this time: "the No. 1 problem for F.A.O. and for national agricultural departments is the production of protein foods of good quality"¹⁵.

At the International Congress of Nutrition in Hamburg in 1966 I challenged the philosophy behind the development of protein-rich food mixtures.¹⁶ This immediately brought public rejoinders from "the establishment" defending the party line, but in private I was told by many delegates that they agreed but were afraid to say so aloud for fear of having their support cut off. Several attempts by me to have the matter discussed at a policy-making level were thwarted and conclusions reached along these lines by delegates to one seminar were actually deleted from the report by the secretariat. It is perhaps hardly surprising that in these circumstances much of the protest evaporated in an "if you can't beat them join them" attitude.

Scores of these food mixtures have been produced but the majority of them, such as 'Laubina' of the American University of Beirut, to develop which the entire Nutrition Research Program was set up and which I strongly resisted from the beginning, have never reached commercial production, and most of the others sooner or later proved financial failures. The original principle of using locally available vegetable-protein sources has been largely abandoned, and the major share of world production in 1971 consisted of c.s.m. (corn-soy-milk) and w.s.b. (wheat-soy-blend) in the United States. Today 'Incaparina', the most publicised mixture, costs nearly four times as much as the cornmeal it replaces, would use up more than one-sixth of a Central American peasant's daily wage to feed one 12-month-old child, and even in its home country "has not been consumed in nutritionally significant quantities"¹⁷. 'Vitasoy' constitutes 25% of the soft-drink industry of Hong Kong, but they have had no malnourished children there for years. Elsewhere another product sells mainly as a pet food. There is not a single study to show that these mixtures can justify under practical field conditions the extravagant claims made for them. After years of misguided effort a food-mixture factory is about to be opened in this part of the world amid prevailing disillusionment.

By about 1966 protein sources which started as a byproduct of the dairy industry began to yield some ground to a byproduct of the nylon industry. Lysine supplementation of wheat commenced. It has proved extremely difficult to demonstrate any benefit from this to humans, even under very artificial conditions. Human dietaries are usually not especially deficient in lysine; and other foodstuffs—legumes or milk—tend to make up for the deficiency in bread.¹⁸

Only recently has the P.A.G. shown any evidence of a change of emphasis by promoting a "manual on feeding infants and young children"¹⁹ which devotes nearly half its pages to formulating "multi-mixes" of local foodstuffs and gives scant attention to commercial mixtures. This has been instinctive practice for centuries all over the world, and parboiled wheat/chickpea mixtures were used successfully by W.H.O. and U.N.R.W.A. in Lebanon and Syria more than 20 years ago.⁸ Clearly the left hand of the United Nations did not want to know what the right was doing.

Years before this, in 1955, Bengoa of W.H.O. had advocated nutrition rehabilitation centres (N.R.C.), and out of these arose the mothercraft-unit concept²⁰ with emphasis on helping the mother to be a good mother rather than just feeding the child. These measures are realistic in that they tackle the problem on a sufficiently broad front with minimal expenditure of local human and other resources. Finally, only in the last several years have we seen attempts by economists and others to find ways to include nutrition in policy planning at national level, spurred on by the increasing realisation that good nutrition can be a positive asset to, and not just a byproduct of, development.²¹ This change of attitude can be attributed in large measure to the evidence obtained for the probable relationship between malnutrition in early childhood, especially of the marasmic type, and subsequent impairment of mental development.

FIELD ASSESSMENT

In the 1930s clinicians were looking for signs of disease and some simple biochemical derangements. They were struck by the changes in the skin, hair, and other tissues in kwashiorkor and later by the low serum-albumin.²² Marasmus, on the other hand, has little to characterise it except the wasting. In the 1940s and early 1950s isolated field observations were made of many clinical signs in the hair, skin, eyes, mouth, &c., thought to be indicative of early

nutritional deficiency. Most turned out to be unrelated to nutrition and the rest proved non-specific. A different approach by Gomez²³ using actual/expected weight for age per cent gave a crude but simple and valuable classification of malnutrition, for the first time including the sub-clinical degrees. However, the biochemically inclined soon applied such techniques as chromatography and enzyme assay as they became available, and aminoacid ratios²⁴ and many other tests became the vogue. One eminent senior scientist went around the world at this time to set up aminoacid analysers, which in his opinion would solve the problem. Most of these tests were markedly abnormal in kwashiorkor, undisturbed in marasmus, and too affected by infection and other factors to be of practical use in detecting marginal states in the field. As recently as 1970 the supposedly authoritative International Union of Nutritional Sciences was advocating a whole battery of tests.²⁵ However, the contemporary literature reflects considerable disillusionment, and a review of the subject at the last International Congress of Nutrition in Mexico City in which the personal view was expressed that biochemical tests are with few exceptions of no value in field studies went unchallenged.

Somatic measurements, on the other hand, have steadily gained favour. It has always been recognised that they are non-specific, distinguishing neither nutritional from non-nutritional causes of retardation, nor the various types of nutritional retardation, the one from the other. However, used correctly they have certain unique capabilities: (1) effects of both remote and recent influences are imprinted; (2) several gradations of abnormality can be readily made (e.g., mild, moderate, severe); and (3) over-nutrition, as well as undernutrition, can be delineated—e.g., obesity (>120% expected weight for height). Several methods using simple measurements such as weight, height, head circumference, and mid-arm circumference are under consideration at the present time.²⁶⁻²⁸ Only recently has W.H.O. begun to collect world-wide data on all degrees of E.P.M., but even now the relative prevalence of marasmus and kwashiorkor has not been established although the predominance and increase of the former are suspected.²⁹

U.N. AGENCY INVOLVEMENT

In the reports of the Expert Committee on Nutrition of F.A.O./W.H.O. from 1950 to 1971 and other documents published by these agencies and UNICEF, one can readily trace the involvement of the U.N. agencies in the protein fiasco. The undue emphasis put on protein deficiency and on the measures related thereto is clearly documented. After the establishment of the Protein Advisory Group in 1955 the approach became phrenetic, reaching its zenith with an unsuccessful attempt to set up a world council on protein and an abortive effort to convince the U.N. that there was an impending protein crisis.³⁰ In a recent pronouncement³¹ Scrimshaw now tries to explain the "protein problem" in terms of "an unequal distribution of world protein supplies"—something hardly likely to be remedied by protein-rich food mixtures or lysine supplementation.

One final consideration must not be ignored. Politicians and scientists alike have chosen to be voluble on the wide prevalence of malnutrition in young children and its many disastrous effects. If this is true, then a heavy load of responsibility rests upon them if they allow considerations other than the welfare of these children to sway them. It is common for the cost/benefit analysis of a given measure to be computed. Perhaps someone should try to work out a cost/detriment analysis of the protein fiasco. The cost in money and time would include that of numerous research and development projects, count-

less meetings scientific and non-scientific, a multitude of publications, and all the food-industry and public involvement. Important negative aspects would comprise the progress which might have been made with better use of the same human and financial resources and all of the children lost in the unchecked scourge of malnutrition. It is cold comfort to learn at this stage, when more children suffer from malnutrition than ever before, that an "international task force" has been appointed "to designate priorities and programs in child nutrition for the various United Nations' organisations, in particular UNICEF".³² Clearly, the closing statement of the P.A.G. in one of its recent publications¹—"the P.A.G.'s effectiveness will be judged largely by the improved prospects for future life of preschool children"—has come home to roost.

CONCLUSION

It is perhaps informative to speculate as to how the protein fiasco originated. If childhood malnutrition throughout the world had consisted of kwashiorkor due to protein deficiency, there would have been no fiasco, for the measures taken to identify and combat it would have been appropriate. The entire edifice was built upon erroneous world-wide generalisations made from correct but limited observations in atypical situations such as rural Africa. Lest I should be accused of misrepresentation, this is how one of the major actors in the play saw his own role as recently as 1969 (translated from the French)³³:

"Since 1951-2 after having identified and established the incidence of protein malnutrition in Africa and in Latin America, and considering our years of experience in Asia, we had written that protein malnutrition constituted the No. 1 nutrition problem of the 20th Century; and that, much more than deficiency in calories, it was deficiency in protein that threatened the development of the human race."

He went on to say:

"It is difficult to arrive at a precise estimate of the 'Protein Gap,' but it is certain that the deficit is so great that all provisional objectives of production of protein foods for the next decades have no chance, under any circumstances, of being surpassed."

Where are we today? We know that kwashiorkor is produced in children and in animals by severe protein deficiency. This may, in some instances, be secondary to severe energy restriction.³⁴ Marasmus results from grossly restricted intake of all nutrients and energy. Dietary factors, especially in marasmus, are of second-line order of importance, and in a multifactorial aetiology poverty, ignorance, bad housing, poor hygiene, and lack of family planning all conspire.^{35,36} Food-consumption data³⁷ and dietary surveys^{38,39} incriminate energy rather than protein deficit. Increasing the energy intake and not that of protein has produced catch-up growth in undernourished children.⁴⁰ Lack of nutriment in general with an energy gap rather than a protein gap is the crux of the matter; but how to match the intake of the child with its requirements remains a problem of puzzling complexity.

After the notable "vitamin era" in which some of the most exciting contributions to biochemistry and medicine were in the field of nutrition, we find

ourselves in the doldrums scientifically. Although the present time has been described in glowing terms by F.A.O. as "the protein era" there is little evidence for the claim. We still do not know, for instance, whether or not many of us are actually eating levels of protein that are harmfully high. The experts now talk of the "safe level of protein intake" but have been unable to set its upper limit.⁴¹ The recommended dietary protein intake has been progressively lowered by the experts in recent years so that it is now about where it was nearly 70 years ago.⁴² It is interesting to note that in this process the "protein gap" has been unwittingly closed. The magnitude of the "saving" by this manipulation is of the order of more than 10 million tons of protein each year, worth more than 100,000 million dollars. Sir Peter Medawar might have had nutrition in mind when he said: "Sciences not yet underpinned by theory are not much more than kitchen arts."

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Personal Paper

THE STYX

THE fear of death may come upon a man, particularly in a foreign land, as he lies awake too early to rise. To die on alien soil, remote from the daily particulars—those little matters which provide us with the association that gives us place and attachment—to die thus is to die a nuisance, alone, unknown, unloved, with nothing tangible for support on the way out, no helping crutch as one hobbles through the mirror. But should it be so? Out of nothing we come to nothing we go; so better, surely, as a preparation, to be a solitary man when facing the mirror, in order to accustom oneself. And yet it is not so.

From nothing we come: is there a clue here as we break through the dark amnion to the reflection of life for the first time? From darkness, from nothing, directly into the lap of possession and love, both created by the sudden revelation of self for others to behold. Encapsulated by love we go forward as yet unaware and unaccustomed; to substance, to substances in fact which give us place and awareness of terra firma. Gradually the securities of love are imparted to possessions: the toy, the room, the very sheet that wraps us. The transition may be total, but for most the abstraction continues entwined with the material; for a few the abstraction remains total, leading to total dependence. Either way familiarity provides the nidus of security.

Have you ever arrived alone and unknown in a distant land to discover that the airline has sent your baggage elsewhere, that you are left with nothing but your overnight case? Suddenly you are utterly alone, utterly homesick; it is then a relief simply to read the toothpaste tube at the bottom of the sponge-bag mercifully still at your side. The meaningless words are familiarity; they have become a touchstone indicating the reality of your presence, from which new material realities may be formed and with them human contacts. So strong is our need for touchstones to place us in reality that the ill-considered trifle, seen daily with disregard, will serve at this moment—a moment of temporary extinguishment, of threatened annihilation. The urge is so strong that we cannot deny it, so fundamental that we hardly see it for what it is.

But do we need it at death, or, rather, when dying? On the way back to nothing how unnecessary are the touchstones which told us we were alive and which placed us within the framework of consciousness. It is innate in us to desire them because the journey has been undertaken but once and then in reverse at birth; so the course has only one chart, and that is back-to-front.

Fear of death has three components: fear of the injury, the disorder which must precede death; fear of the prospect; and fear of the event. All these fears are experiences of the living, the healthy, the whole body. The first is justified; but experience of the event is impossible, and so its terror is misplaced. The second fear is illusory, for imminent death carries no terror after the injury which is its prelude, whether due to vascular, traumatic, or other accident. The cries of the battlefield are those of pain; mortal danger is sensed by the urgently ill (those who are conscious), but within their reaction and their response fear of death is not expressed. It is the living around them who impute the fear, because they are living and well, and subject themselves to transference, unaware that the sick man before them has passed into the shadow where the touchstones the observer still needs are irrelevant and meaningless to the dying man, and are being discarded by