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Milk Supply in Relation to National Health

THE milk supply of Great Britain is engaging—as indeed it should—a large and increasing measure of public attention. The difficulty of securing a remunerative price for milk is vexing more and more the minds of dairy farmers and of all who hold that a prosperous agriculture is the corner-stone of an enduring edifice of national prosperity. Prominent members of the House of Commons, animated by a desire to increase the consumption of milk and to improve the health of the people, are advocating that all children in State-aided schools should receive a daily ration of milk. Many of the medical profession, whilst strongly in favour of this and other proposals designed to promote the drinking of more milk, insist as guardians of the public health that milk must be pasteurised. The recently formed Milk Board is preparing to engage in a campaign in which all the arts of publicity will be used to promote the milk-drinking habit; and to these present and prospective efforts the *Times* is lending public-spirited and invaluable support by opening its columns generously to correspondence from all quarters.

The Committee of the Economic Council, the appointment of which some time ago is proof of the Government's deep concern in questions relating to milk supply and consumption, has completed its labours, and its report will doubtless increase yet more public interest in a subject of which it is not possible to exaggerate the importance. The moment is therefore opportune for a consideration of the problem of the national milk supply from a biological point of view.

This consideration is to be justified on the ground that, apart from its political and economic aspects, the national milk supply is, in its essentials, a biological problem. At the very root of it lies the question: how to secure to the nation a copious and constant supply of milk of the highest possible quality?

The biologist will regard it as self-evident that the health and strength of mankind depend more on milk than on any other nutrient agent whatsoever: more perhaps than on all the other agents put together. In milk, health and strength have their origin and sustenance. To this conviction all the new and rapidly accumulating knowledge of the many and decisive parts played by vitamins and by minerals in promoting growth and maintaining health lend unequivocal support. It does

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more. The new knowledge brings a new hope to the world. The new-born hope sees the vitamins, the children of light, fully engaged in the service of man. They prevail against the children of darkness. The microbes that make so many maladies are vanquished one by one. Mankind rejoices in an ever-growing freedom from disease. The new knowledge brings also as its first fruits a salutary uncertainty to science. It is a new wine that will burst many old bottles. The whole science of nutrition will have to be reconstructed on the basis of this knowledge, and the first step toward reconstruction must be a re-investigation of the nutritive value of milk.

At present no one knows how great that value is. The mystical opinion is prevalent that milk is a composite principle: an embodiment of good and evil. It will be discovered presently how to make it wholly good. The current opinion may be due to a simple cause. Experiments carried out before it was possible to make a physiological analysis of milk—and it is even now not yet possible to make a perfect analysis of it—led often to conclusions which cannot be accepted as final because of the uncertainty of the composition of the milk with which they were made. For, like Cleopatra, milk is of infinite variety. It may be rich or it may be poor in health-giving properties; and so all the old experiments which seemed so conclusive must be redone with material of known and high quality.

Summer milk from cows grazed on pastures of young grass—the sweetest thing that grows—is rich in vitamin A and its precursor, carotene. It has a comforting and agreeable flavour. There is life in it. Winter comes. Growth of grass declines as the sun declines. The lowing herd winds from the pasture to the byre. Natural food gets scantier. As winter pursues its sunless tedious course the vitamin A and carotene in the milk from the stall-fed kine get progressively less, not to increase again until spring comes, and with the resurrection of the life of the pastures the dairy herd goes back to Nature for its food. Can it be doubted that other equally and even more important seasonal variations in the composition and virtue of milk still await discovery: seasonal variations in the amount of available bone-building lime, of phosphates, iodine, other minerals and other vitamins! May not these seasonal deficiencies be the ultimate cumulative cause, generation after generation, of malnutrition and disease? They come at a time when their effects are doubly

disastrous; in winter, when the sun itself grows pale and leaves health least fortified against attack.

If, however, these things are true of the children who drink the milk, they must be true no less of the cow that makes it. Like the pelican she gives her life's blood to feed the young. In summer the sacrifice is light, but in winter how severe! May not bovine tuberculosis and other of the diseases which affect dairy herds be but the belated consequences of seasonal deficiencies of nutrition imposed by climate upon cattle? In the lowered state of resistance, pathogenic micro-organisms find their occasion, and a symptom of malnutrition comes to be regarded as a cause of disease. "Where the carcase is the eagles will be gathered together."

It is said that tuberculosis is rare or non-existent among cows of the Jersey breed so long as they stay in that fortunate island; but that when they go elsewhere they leave their immunity behind them. If this be so, must not the resistance and susceptibility alike have their origin in nutrition? In the longer grazing season and in their fuller access to food from well-managed pastures the cows find strength, but in a shorter season of less nutritive pastures they lose it, and in losing it become a prey to disease. Whether the example be well-founded in fact or not this at all events is indisputable: the task of securing the best possible milk for the nation must be begun at the source—England's green and pleasant land, the green pastures. Jerusalem, if ever to be builded here, must be built on them. A defectively nourished people will never build it. No man who travels in autumn time from the radiant valleys of Savoy to the sullen highlands of Auvergne will ever doubt again that health and happiness come to mankind by a tortuous route; from heaven via the earth.

The cultivation and management of pastures must serve as the basis on which a copious and consistent supply of rich milk must be established. Those pastures can be made to yield all things necessary to health and strength. The cows that graze them will give milk excellent in quality and delicious in flavour; a flavour which children will be eager to enjoy.

The pleasant taste of milk and butter from cows fed on rich pastures is bound up with the presence of vitamin A and carotene, as though Nature were trying to coax the children of mankind to feed on what is good for them. If therefore

young England is to become a confirmed and heavy drinker of milk, palatability must be taken into consideration. For in this as in most matters the child has the last cry. Few mothers and fewer fathers dare impose their will on a reluctant babe.

This apparently trivial but really essential aspect of the subject bears on the problem of pasteurisation: a thorny subject. The biologist who approaches it finds himself like Issachar "a strong ass couching down between two burdens". On one side is the weight of his respect for medical opinion; on the other, the uneasy load of his belief that raw milk of high quality will prove superior to pasteurised milk. Accustomed to compromise by the baffling complexity of the phenomena with which he habitually deals, the biologist would accept pasteurisation of milk open to suspicion as a provisional and precautionary measure, provided that any enforcement of it were recognised explicitly as no more than precautionary and provisional. Nor would insistence on the safeguarding clause be dictated solely by doubt. It would also be inspired by the belief that search for other ways of preventing the carriage of pathogenic micro-organisms by milk would find better ones.

Finally, the biologist cares not at all if the views which have been expressed find little acceptance so long as what is implicit in the argument is made to take immediate effect. It is that a great national effort must be made to discover means of securing to the people, all the year round, plentiful supplies of the best milk that Nature and art can produce. The effort must not be confined to experts only. It must have "the help and advice of persons experienced in the right application of things". The effort must be initiated by the most powerful authority in the land—the Government itself. It must be directed to outlining and getting carried out a programme of comprehensive investigation extending from the pasture to the larder, and including dairy herd and farm water supply, cowman and milkman. There is old knowledge, massive and confusing, to be reviewed, and new knowledge to be won. The reapers are many but, though skilled, they are scattered. With these energies joined together the harvest would soon be plentiful.

Let the Government set up forthwith a small commission with large powers to lead the attack on a problem the solution of which would result in the rejuvenation of the race.

F. K.

### Biological Philosophy

*Allgemeine Biologie: eine Einführung in die Lehre vom Leben.* Von Dr. Max Hartmann. Zweite, vollständig neubearbeitete Auflage. Pp. xii+792. (Jena: Gustav Fischer, 1933.) 38 gold marks.

IN the issue of NATURE of December 17, 1932, we had the pleasure of reviewing a bold and original work on general biology by Prof. Woltereck, and now we have before us a still longer and more elaborate work on the same subject by Dr. Hartmann, who is a member of the staff of the Kaiser Wilhelm Institute for Experimental Biology at Dahlem. Naturally the subject is treated very differently by the two authors, for whereas Woltereck has attained world-wide fame as a zoologist and embryologist, Hartmann's claims for distinction rest chiefly on researches on the Protista (Protozoa and Protophyta) and on the Thallophyta amongst plants. Then again, Woltereck came courageously into the battle, by asserting that in all living things there is a vitalistic factor regulating their actions which is not to be accounted for by the structure or mutual positions of their constituent molecules. Hartmann, on the contrary, whilst repudiating materialism as a system of thought unworthy to be regarded as a 'philosophy', nevertheless holds that science can deal only with living things as lumps of matter: it must argue 'as if' materialism were true.

Hartmann clearly recognises that human consciousness is the foundation of all our knowledge, that what we call 'matter' consists of presentations to this consciousness, and that most of the qualities with which we invest 'objects' do not inhere in them, but are given to them by the human mind. But there is the further difficulty, that only one consciousness is directly known to us, and that is our own. We infer a similar consciousness in our fellow-men from their actions, that is, their movements, and if the view that the human race has grown out of some lower race of animals is correct, then it is impossible to deny something like consciousness, at least to the higher animals. Hartmann's limitation of the ambit of science to the study of material changes, if logically carried out, would condemn us to a philosophy of 'solipsism', which of all forms of philosophy is the most unpractical. We should be forced to attempt to explain the actions of our fellow-men by the chemical and physical structure of their bodies, leaving entirely out of sight their thoughts,