

# MARCH OF SCIENCE

## Synthetic Food and Clothing

### CHEMISTS TO SUPPLY WORLD

#### Laboratory Will Replace Nature

Science has already revolutionised transport. Prof. Kerr Grant, professor of physics at the University of Adelaide, in a striking contribution to the "Fifty Years Hence" series of "The Mail," states his belief that in much less than 50 years there will be a further metamorphosis by which the aeroplane will become the universal vehicle of passenger traffic, at least for distances of 500 miles or more.

He thinks that it is not only in mechanics that the life of the people is being altered. Working silently in the laboratories of the world, chemists are developing methods of feeding and clothing mankind which will render the human race independent of the beasts of the field.

The horse is almost a back number. The silkworm is not now necessary for the production of silk. Successively, Prof. Grant believes, the sheep and the cow will follow the horse into the limbo of forgotten things.

When the scientists have developed synthetic wool and synthetic milk to the stage at which they can be produced more cheaply than the natural article the sheep and the cow will be curiosities to be kept in zoological gardens rather than everyday animals to be seen in every paddock.

(BY PROF. KERR GRANT)

The stream of scientific discovery and of the practical inventions which follow in its train flows with a stronger current year by year. The scientific and technical journals, numbered now by hundreds and always increasing, can publish in full only a tithe of the thousands of communications which shower upon them from the workers in pure and applied science in universities and technical schools, observatories, research institutions, and laboratories, and all manner of private and unorganised sources.

Much of this work, it may be conceded, is in itself trivial—a curiosity of mathematical calculation or a slight variant of some well-worn theorem; a new instrument for measurement of the density or the elastic quality or the electrical conductivity or some other property of materials; an improved process; an addition to the tens of thousands of chemical compounds already known; a description of some recently discovered organism or feature of Nature.

These particularities, however, are but the bricks and mortar, the nails and bolts, the paint and the papering of the great temple of science. But, taken all together, they serve to complete and to strengthen and to upbuild the structure which rears itself on the foundation stones laid by the master minds of men like Galileo, Newton, Lavoisier, Darwin, Pasteur, and Einstein.

Doubtful as the profession of prophecy is, it is at least certain that the near future will see no cessation of effort or diminution of output in scientific achievement or in its technical applications.

The revolution, of which the last two decades have seen the beginning, in methods of distributing power, in the supplanting of human labor by power-operated machines, in modes of transport and communication, will unquestionably proceed to an almost unimaginable completeness.

Indeed, it requires no great imaginative effort even now to see "the heavens fill with commerce, argosies of magic sails."

#### PASSENGER TRANSPORT

In far less than 50 years the aeroplane will undoubtedly have become the universal vehicle of passenger transport, at least over distances exceeding 500 miles. And the electrical distribution of power, heat, and light is, in fact, already complete in many places in America.

I wish merely to indicate one of the many social reactions of these developments when I point out that they will almost inevitably tend to counteract the influences which make for an excessive urbanisation of population.

We are still on safe ground in predicting a vast extension and multiplication of synthetic products for the purposes of foods and clothing materials. Artificial silk is already a formidable rival to natural cotton; the production of artificial wool derived from the same abundant raw material is still in its infancy, but we may be certain that no effort will be spared to bring it to an early, if precocious and vigorous, maturity.

And if the efforts which colloid chemists are already making to prepare an artificial milk should be crowned with ultimate success, then the cow also would appear to be destined ultimately to follow the horse and the sheep into the

oblivion which awaits a discarded servant of mankind.

#### WILL CHANGE BE GRADUAL?

These changes, it may be hoped—but certainly it cannot be guaranteed—will be sufficiently gradual to prevent the economic debacle which pastoral communities such as our own would suffer if the world's market were suddenly to be flooded with the artificial substitute at a price lower than that of the natural product it supplants.

Such a fate, it may be recalled, did fall upon a community of indigo farmers in the Punjab some 30 years ago, when German chemists succeeded in producing synthetic indigo from coal-tar.

Since that date, the science and the art of producing more and ever more complex organic substances have advanced with seven-league strides. The synthesis of sugar is already possible in the laboratory, although it may be long before it reaches a stage where cost of production can be brought down to that of sugar made from cane or beet.

The far more difficult problem of building up the nitrogen-containing proteins, the dietetic necessity for which is the only real answer to vegetarian propaganda, has advanced to a point where complete success is in sight.

I make this statement with the sanction of one of the greatest authorities on proteid chemistry. Substances, he tells me, are already produced in the laboratory which, had they been discovered in living matter or its products, would unquestionably have been classed as true proteins. They differ only from those which form our foods in their relatively lesser complexity.

Should the progress in synthetic chemistry continue even without acceleration for another 50 years, it seems certain that this important accession to the human commissariat department will be in full production.

I have already remarked that discovery in pure science is followed by the application of the principles to practical ends. Newton's laws of motion and his theory of gravitation are abstract enough, yet it is safe to say that the construction of machinery and the art of navigation would never have reached their present state of perfection had they not been able to rest on these laws as a basis.

Faraday's experiments and theories concerning electro-magnetism were, as he admitted, as useless as a new-born babe. Yet on them rests today the whole vast fabric of electrical industry.

I would go farther, and assert with confidence that the more abstract and profound the scientific theory, the more removed therefore, as it might seem, from all contact with the concrete and utilitarian, the greater in the final issue will be the practical results which will flow from it.

The most profound scientific generalisation ever propounded is probably that concerning the nature and relations of space, time, matter, and gravitation which we owe to the genius of Einstein. To speak of any practical outcome of this theory today would seem to be a waste of breath. Yet it has already proved of the greatest value in attacking the very difficult problems of atomic physics. If we finally do arrive at an understanding of the ultimate structure of atoms, if we do finally acquire the key to the transmutation of the elements, if, for example, we seem even now remotely possible, we should be able to convert our virtually unlimited stores of hydrogen (all water contains one-eighth part by weight of hydrogen) into helium. There would then



PROF. KERR GRANT

be a consequent liberation of energy a million-fold exceeding that which we now derive from coal or oil or any other source, and then a new era in human history would begin.

The consequences which would flow from such a discovery would obviously be on a gigantic scale. The unlimited command of mechanical power would create an industrial revolution, the economic, social, and political consequences of which would transcend almost infinitely those of any previous epoch. But on such a purely hypothetical possibility it would be unwise to enlarge further.

The results of a mere continuation and intensification of present progress in physical science will be profound enough. The changes which they will bring about in human nature and in human institutions will be correspondingly profound. These changes are already in train. Difficult as it is to estimate a movement in which all of us, willy-nilly, participate, few can fail to observe the profound change of outlook and behaviour of men and women which has taken place in the last generation.

There are two other great fields of enquiry in which the attacks of science have as yet met with comparatively meagre success, and which remain, consequently, strongholds of obscurantism and reaction. I refer to the problems of the nature of life and of the nature of mind.

This is no place to enter upon a detailed discussion of theories still in the controversial stage, but I believe that many will share my conviction that in both of these realms discoveries remain to be made as unexpected, as inspiring, as prolific in practical consequences as any of the great discoveries in the realm of physical science.

#### GRAINS OF TRUTH

It matters little whether or not we ever attain to a final definition of life in physico-chemical terms. It matters enormously whether we can discover definite basic principles of any kind according to which life operates.

It is an article of faith in the creed of science today that there is no bar to the unlimited attainment of such knowledge, no limit to the control which it will give us over the processes of life even to the power of creating, ultimately, living

organisms from non-living matter. And in the realm of mind I venture, with the liberty those of an interested onlooker, to state my conviction that similar advances will take place.

Among the delusions, the fallacies, the absurdities, the superstitions with which the phenomena—if phenomena they can be called—of occultism, of spiritualism, of the hundred and one other vagaries and super-normalities in which hyper-emotional and mystical minds delight to revel, the searching scrutiny of scientific method may or may not find some grains of truth, even some pearls of price.

But, whether or not these grains are there, it is certain that the intensive study of the normal operations of the mind will surely bring knowledge of the most profound importance for the understanding of the deepest of all problems, and to a power of wisely directing our conduct and enhancing our powers which will surely lead to a higher level of human existence.

#### MAN'S DESTINY

Man, risen from the dust, and born of the brute; man chained for long ages of suffering and struggle to the Promethean rock of animality and ignorance; man, gnawed to the very entrails of his being by the vultures of hunger and disease and fear and superstition. Man, the insurgent son of Earth, begons at last to rise and free himself from fetters which have bound him.

Already he has made the lightning his slave and the tempest his steed. Already he has numbered the stars and probed the deep abusses of the mystery of matter. If he can add to these conquests of the external world the further conquest of the world within, then at long last a path will harmonious self-realisation for the whole human race.

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