



SATURDAY, JULY 20, 1929.

CONTENTS.

	PAGE
The Future of Agriculture	81
A Philosophy of Biology. By Prof. E. W. MacBride, F.R.S.	83
Chemistry and Monographs. By J. F. T.	86
School Physics. By A. J. White	87
Our Bookshelf	88
Letters to the Editor :	
Observations of the Total Eclipse of the Sun at Alor Star, Kedah, on May 9.—Dr. J. Jackson	90
A Possible Origin of Faint Fraunhofer Lines.—Daulat Singh Kothari	90
Fine Structure in the Helium Band Lines.—Dr. G. S. Monk and Prof. R. S. Mulliken	91
Use of the Thermionic Valve in Measurements of Ionisation Currents.—J. A. C. Teegan	91
A Relation between Raman Spectra and Ultra-Violet Absorption.—A. Langseth	92
Raman Effect in Carbon Dioxide.—Prof. P. N. Ghosh and P. C. Mahanti	92
Further Investigation on Incoherent Scattering in Gases.—F. Rasetti	93
Statistics in Biological Research.—“Student”	93
The Long Period Variations of UZ Persei.—W. Zessewitsch	93
Rapid Approximate Calculation.—R. d’E. Atkinson	94
The Spectrum of the Corona.—E. M. Lindsay	94
The Ovarian Hormones.—Dr. F. H. A. Marshall, F.R.S.; The Writer of the Article	94
Mineral Metabolism : Iodine and Sulphur	95
Polyploids and Polyploidy. By C. D. Darlington	98
Giant Aeroplanes and their Design	100
Obituary :	
Mr. M. R. Oldfield Thomas, F.R.S. By M. A. C. H.	101
Prof. Henri Andoyer. By H. C. P.	102
News and Views	103
Our Astronomical Column	106
Research Items	107
Annual Meeting of the Royal Society of Canada	110
Afforestation of Peat Lands in Sweden	111
University and Educational Intelligence	112
Calendar of Patent Records	113
Societies and Academies	113
Official Publications Received	116
Diary of Societies	116

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The Future of Agriculture.

A REMARKABLE suggestion has lately appeared in certain well-informed quarters of the American press, namely, that there are far too many farmers, that there is even now considerable over-production of farm produce, with still greater potential risk of such over-production, and that the only real remedy, drastic as it may appear, is the return of millions of farmers and their families to city life and work—if it can be found. It is estimated that there are about 6,500,000 farmers now engaged on American soil, but only a mere fraction of these are really efficient, up-to-date, prosperous, and contented; and the vast majority, more than five millions of them, have a desperate struggle to make a living. A vigorous agricultural deflation programme is seriously recommended.

It is very doubtful if such a proposal, though backed by many plausible and at first sight very convincing arguments, will prove very acceptable either to the farmers themselves or to the general American public. The latter, from President Hoover downwards, has for at least twenty-five years past constantly and consistently called for a vigorous and far-reaching policy of ‘back to the land’. It has, of course, always been firmly held by a certain and predominating type of mind, especially of the physiocratic sort, that a numerous and, if possible, prosperous peasantry or yeomanry is a basic factor in national strength and balance; and if, as is generally assumed, it be the only or the most important source of the stronger and more vigorous elements in national life, there is much to be said in its favour. However, the most favourable ratio between town and country, between the agricultural and industrial parts of the population, is a highly complex problem and cannot be fully discussed here; although one may pertinently inquire if England, for example, is weaker because nine-tenths of its population is urban.

In America it has scarcely been seriously questioned that a large farming community is a necessary condition of strength. ‘Back to the farm’ has been a national cry, despite the terrible crisis of 1920–21. The farmers have been looked upon as constituting one of the largest and most valuable parts of the home market: a view which has also been consistently held in Great Britain, not without a tinge of envy at America’s supposed very favourable position in this respect.

This complacent state of mind has now suffered a severe shock. Of the 6,500,000 farmers in the United States, it is alleged that only about one-

eight, or say 800,000, have taken full advantage of the most advanced scientific methods and use of machinery. The others, constituting the vast majority, are, it is stated, hopelessly inefficient and on the brink of destitution and ruin. If this be true, it is a really remarkable state of affairs in view of the present position of agricultural education, both in theory and practice, in the U.S.A. After so many years of continuous and high pressure endeavour on the part of nearly every responsible person in America—statesmen, economists, social reformers, educationists, the all-powerful ubiquitous press—to foster and perfect agricultural education and bring the benefits of the latest research to the most remote corner of the country, is it possible, one may well inquire, that five million American farmers remain inefficient and unprosperous? Further, what have the makers of farm machinery, of concentrated fertilisers, of improved, selected seeds, and other farm requirements, been doing all this time?

The worst of the tale is, however, not yet unfolded. Over-production with low price level is held to be the root cause of the American farmer's plight to-day, and notwithstanding the voluminous flood of legislation, aiming at his assistance and relief, starting with the Fordney Emergency Tariff Bill and finishing up with the luckless and oft-defeated McNary-Haugen Bill, and the more recent and ambitious Farm Board proposal, there is little hope of real remedy except in a drastic reduction in the number of farmers. At least that is the view which appears to be gaining ground in some quarters. Then, if this be so, not only are we to believe that the great majority of American farmers are backward and inefficient, but also that it is, in a sense, fortunate that they are so! If all of them became as up-to-date as the small minority, then production and output would reach such vast proportions, and prices would fall to such extremely low levels, that the plight of the farmers would be far worse than it is now.

A pretty dilemma, to be sure, and a very curious paradox; not exactly gratifying to the protagonists of agricultural research and of improved methods, or to the sellers of machinery and fertilisers. It forms a strange commentary also on Sir Daniel Hall's presidential address on food and population to Section M (Agriculture) of the British Association in 1926. As a specific illustration the case of wheat has been taken. The present production of wheat in the U.S.A. is about 800,000,000 bushels per annum, which means a low average yield of no more than 13 bushels to the acre (as compared with

about 32 in England and 41 in Denmark). Of this amount, about 200,000,000 bushels is exported. It is assumed, perhaps a little rashly, that under improved methods the yield per acre could be doubled. Modern science can doubtless do much, but still the law of diminishing returns is even so not yet quite obsolete and still operates though sometimes very much in the background; and it does appear a rather hazardous assumption to suppose that the yield of American wheat per acre could be doubled and at a lower or equal unit cost. But without quibbling about the precise increase possible under better methods, even a 50 per cent increase would be disastrous, since there is already over-production with present yields.

The further assumption is made that no great extension of demand is possible either in the home market or in the export trade. The American citizen is not likely to be able or willing to eat more, and in fact the modern tendency under the latest nutrition and hygienic teaching is to eat less, so that the branches of agriculture devoted to the production of human food cannot look for much increase in demand in the home market. As for the export trade in food, this is already declining in the direction of Europe, and despite recurring famines and a more or less chronic state of malnutrition near approaching starvation in many parts of India and China, these poverty-stricken parts of the world cannot afford a larger share of American agricultural abundance at prices satisfactory to the American farmer. In regard to the production of raw material, such as cotton, it is likewise assumed there is little prospect of substantial increase in demand.

It is therefore concluded that the only true remedy is a large reduction in the number of farmers. Whether this means that the farms so abandoned are to go out of cultivation or are to be absorbed by the minority of efficient and prosperous farmers is not quite clear; but apparently the great bulk of the land would have to go out of cultivation, since, if worked by the successful farmers, output and over-production would be on so vast a scale as to be unthinkable. It might be possible, perhaps for a few of the inefficient farms, say up to 100,000, to join the present 800,000, but no more. Hence the only possible solution appears to be the removal of about 5,000,000 farmers from their present homesteads to the cities, that is to say, an exodus from farm to city of approximately 14,000,000 persons.

It looks as if such a drastic 'remedy' would involve greater problems and difficulties than those

already existing. It is pointed out, however, that the absorption by manufacturing industry in the cities of such a vast number would not be more difficult, if spread over a period of ten or more years, than the like absorption of about one million immigrants from Europe every year before the quota policy was introduced. Also, there is already in evidence a certain migration of population from the country and farm life to the towns, especially since the disastrous farming years 1920 and 1921. It is estimated that, since those years, about four million persons have returned to the cities; and if immigration could be still more rigorously restricted, this transfer could be greatly accelerated.

The position of American agriculture, as above described, contrasts strongly with the interesting thesis discussed by Sir Daniel Hall in his presidential address to which reference has already been made. In that address he presented data showing that the average consumption of food and raw material by white peoples requires from 2 to 2½ acres per head; also that the white population of the world is increasing at the rate of about five million per annum, involving a commensurate increase in cultivated land of 12½ million acres per annum, or alternatively a proportionate increase in yields on the existing area, since there are no new areas worth speaking of to be opened up. The only way to meet the enhanced demand for farm produce is by means of more intensive culture, more scientific methods, and in particular the much more considerable use of synthetic fertiliser.

This, of course, may still remain true as the expression of a general tendency for the greater part of the world which is bound to operate in the long run; but if the American position is really that which has just been described—namely, over-production even though the great majority of the farmers are producing at a very low level—then it would seem that the general rule enunciated by Sir Daniel Hall appears to be subject to substantial local or temporary checks; although, on the other hand, it is quite possible that the American position has not been quite correctly diagnosed, and certainly some rather large assumptions have been made. One may yet conclude that the bounty of Nature and science is far greater than we have ever envisaged in our wildest dreams, that the law of diminishing returns may be suspended almost indefinitely, and that there is—and will be for some time—an economic limit to the extent to which the world, as a whole, can employ the mighty powers and resources of modern science in the realm of agriculture.

No. 3116, Vol. 124]

A Philosophy of Biology.

Theoretische Biologie. Von J. von Uexküll. Zweite gänzlich neu bearbeitete Auflage. Pp. x+253. (Berlin: Julius Springer, 1928.) 15 gold marks.

THIS is a really great book, well worthy of close study not only by biologists but also by all scientific men. For is not biology the science of life, and the first and most fundamental question raised by that science is "What is life?" The author endeavours to look this question, and the other far-reaching questions which arise out of it, fairly in the face, and it is then seen that not only is biological science in the narrower sense involved, but also all other science of every description. Life is primarily our own existence, and secondarily the nature of other 'things' in which we suspect an existence in some respects at least similar to our own. The first problem presented, therefore, to biology is the analysis of our own existence.

All science, physics and chemistry no less than biology, consists in the study of 'phenomena', that is, of 'appearances' to our conscious minds, and the question to be settled is how much of the 'appearance' is due to the structure and working of the mind itself, and how much to an event independent of the mind. In endeavouring to answer this question, Uexküll affirms, and in our judgment quite justly, the soundness of the position taken up by Kant in the "Critique of Pure Reason". He endeavours to extend Kant's theses. Kant asserted that space and time, which enclose within them all phenomena, are 'forms' which our mind imposes on phenomena, and Uexküll not only reasserts this, but also adds to it that colour tone and odour are equally mental constructs, as are concepts of motion, including wave motion, and what the 'thing-in-itself' would be like when stripped of these mental accretions no human being can conceive. He scourges with just contempt the assertions of mechanistic biologists that mind is a name for the physical and chemical actions of matter, since all the qualities which make matter anything else than 'pure being' are conferred on it by mind.

Space is a general synopsis of our earliest fundamental experiences. Vision alone will not give us space, for the field of vision is spread out before the baby like a flat picture; it is only gained when to this experience are added the efforts of the eye-muscles and of the arms in reaching after objects. This space which thus summarises our muscular experience is always three-dimensional Euclidean space,