

reservoir sites and the use of the microscope and photomicrography. The latter portion of the book, containing descriptions of various groups of water-organisms, has also been revised, and the plates showing the commoner organisms of water have been printed in colours, making identification easier.

The book is one which should find a place in every bacteriological and public health laboratory and in the office of the water-engineer.

R. T. HEWLETT.

LETTERS TO THE EDITOR.

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Micromillimetres and Micromicrons.

It is very desirable that men of science should adhere to the conventions which have been established with regard to the use of the terms employed for units in the metric system. It has been generally agreed that the prefixes mega- and micro- should indicate the multiplication and division respectively by a million of the unit expressed by the term they precede. In this way a micrometre usually shortened to *micron*, means a millionth part of a metre, or, in other words, a thousandth of a millimetre; and a *micromillimetre* signifies a millionth part of a millimetre, or, what is the same thing, a thousandth part of a micron. It is, therefore, to be regretted that in the translation, published in Geneva, by L. Duparc and Vera de Dervies, of Nikitin's excellent account of Fedorov's "universal" method of microscopical mineral research we find the term *micromicron* employed in place of micromillimetre. The former term should mean a millionth part of a micron—that is to say, a metre $\times 10^{-12}$, a unit that might be usefully employed in expressing intermolecular or interatomic distances in crystals, which we are now at last in a position to determine in many cases.

JOHN W. EVANS.

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September 3.

Origin of Species.

In Darwin's great work on this subject he claims that Dean Herbert, in 1822 and 1837, held that "single species of each genus were created in an originally highly plastic condition, and that these have produced, chiefly by intercrossing, but likewise by variation, all our existing species."

Years of study along this line have assured me that he was right. I am now especially interested as I have a few trees on hand which seem to prove this position. They are a cross between *Quercus* and *Juglans*, which bears walnut-like nuts on a tree which bears oak-like leaves: at least a new species and perhaps a new genus. If this tree had been found in the forest it would have caused no remarks, but originating in the garden it has become the wonder of the world. Here is an oak tree in appearance which bears perfect walnuts, all originated in one year and fairly productive and fixed.

This tree gives me further evidence of the fact that all sexual life known to us, both animal and vegetable, has sprung from hybrids.

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LECTURES ON THE ANIMAL KINGDOM BY LINNÆUS.¹

IT is probable that most modern zoologists, when unfamiliar with the Scandinavian tongues, know little of the zoological writings of Linnæus beyond the "Systema Naturæ," and that from this restricted evidence they draw the natural but entirely erroneous conclusion that, considered as a zoologist, Linnæus was little more than a methodical compiler, classifier, and name-giver. If, moreover, the modern zoologist is not so well acquainted with the history of his science as he should be, he is apt to seize rather on the defects, or even absurdities, in the "Systema" as compared with his own knowledge, and to ignore the real advances made by the great Swede over the attempts of his predecessors. There are, as we have hinted, many writings by Linnæus that prove the falsity of such opinions, and now another has just been issued by the University of Uppsala which enables one to read between the lines of the "Systema," and to realise the wide zoological knowledge and still more the philosophy and humanity on which it is based. The volume consists of a complete course of lectures on the animal kingdom, delivered by Linnæus between 1748 and 1752, and collected from the notes made by various pupils, of which more than forty manuscripts are preserved in the university library. The collation of these manuscripts was begun by the late Dr. M. B. Swederus, and has been completed by Dr. Einar Lönnberg, with the help of Miss Greta Ekelöf. The lectures are followed by a detailed commentary and by short accounts of 123 authors quoted by Linnæus; these two parts are by Dr. Lönnberg, who has availed himself of the help of various colleagues, living and dead.

And now of Linnæus as a lecturer, what may we think? Approaching him at second-hand, and without the magic of his enthusiastic presence, we yet see how he infused a living and practical interest into what might so easily have been a dry catalogue of species. An undergraduate's notebook omits much that the writer does not consider essential, the humorous asides, the occasional divagations, the purple patches; but the students of Uppsala realised that they listened to no ordinary man, and it is clear that much has been taken down verbatim. Certainly, that must be the case with the stately Prolegomena, which we should like to have translated in full, but must at least make some attempt to abstract:—

Generation after generation of earthly creatures comes into being only to pass into nothingness. And yet, though fashioned only for vanity, each creature struggles to preserve its life; one preys upon another so that nature is a *bellum omnium perpetuum in omnes*, and of all creatures man is most inhuman. And yet man, with his works of wisdom, his castles and towers, comes only to dust. What is the object of so vain a contrivance? The answer is given by natural history.

¹ Linnés Föreläsningar öfver Djurriket, med understöd af Svenska Staten för Uppsala Universitet utgifna och försedda med förklarande anmärkningar af Einar Lönnberg. (Uppsala, 1913.)

Particles of stone build up the mountains, and these, again, break down into stones and sand. But on this live the plants, each springing from a tiny seed, and growing from mould, with a little water and air, to such a wonder-work as all the artists of the world cannot rival. They bloom and seed and perish, but meanwhile they shelter and give food to all kinds of animals. And the animals, they too spring each from a little seed; and earth, air, and water are compounded to form that masterpiece which every animal is. Yet the animals feed, not on mould, but on the plants; and all animals in their turn serve the needs, the nourishment, or the pleasure of mankind. And so comes the conclusion: all is fashioned for the sake of man. Earth, herb, beast, and man; further the metamorphosis cannot go. But why is this great world created for man? Is not he, too, a thing of naught? What mighty attributes has he? This, this is his peculiar property: that not only can he see, hear, smell, taste, feel things, but that he can also contemplate the marvellous construction of all natural bodies, fathom their peculiar qualities, and reason therefrom to their high and skilful Master.

Love of life forces every creature to seek the necessaries of life. Man goes out with the rest, and so he must note and admire the work of the Creator. Some rich men, indeed, with all needs ready supplied, are little better than savages who sit in the sun and let fruit drop into their mouths; but the poor, who must earn food with toil and sweat, learn better to thank God therefor.

The true inquirer into nature's works must observe with accurate attention, seek out origins, follow generation and growth, unravel use and harm, and finally note change and decay. He looks not on the rowan-berry with the eyes of the raven, tastes not the herbs with the tongue of an ox, nor sports with doves after the manner of the hawk. Not hastily, not upon one or even upon many journeys, but ceaselessly and diligently must the inquirer mark and ponder on the natures and causes of things, on their relations both to themselves and to their surroundings, seeing that no natural thing lives or dies to itself alone.

Some object that natural history is but a heap of useless names. True, to know a heap of names and nothing more is no learning. But it were as easy to become a scholar without the alphabet, as a naturalist without names. Describe me a thing precisely as you will, I can make no use of it without a name; only by names can such knowledge be passed on, since the object cannot always accompany the description. Names are the alphabet of natural knowledge; and that is a true science, one that should be taught in all schools for the sake of its practical service to our country. . . .

Throughout the course the points here emphasised find abundant illustration, and often throw a curious light on the customs, the rural economy, the medicine, and the philosophy of the

day. It would have been easy to pick out some delicious plums, but it seemed better to give, so far as might be in the words of Linnæus himself, the principles that guided him, and may still inspire us, in the illimitable study of nature.

F. A. B.

NOTES.

A GIFT of 20,000*l.* has been promised to London Hospital by Mrs. E. S. Paterson for cardiac research work.

ONCE again the Arctic claims its toll. The *Times* correspondent at Petrograd (St. Petersburg) reports that Lieut. Sedoff, the leader of a Russian attempt on the north pole, was taken ill at Hooker Island, Franz Josef Land, in September, 1913. The party was in dire straits in winter quarters, as the coal was all burnt and even parts of the ship were used for fuel. During February, 1914, a dash was made polewards; but, in March, Lieut. Sedoff, who had not recovered from his illness, died between Franz Josef Land and Rudolf Island. He had set out accompanied by two sailors and twenty-four dogs. The sailors buried the body, abandoned the dogs, and returned. The *Foka*, Sedoff's ship, had previously, in August, 1913, been useful in the rescue of two members of the Brousiloff Expedition. M. Brousiloff, with half the expedition, is reported still in his ship, the *St. Anna*, hoping that the current will carry the ship north of Spitsbergen, so that he can break through southwards. In consequence of the privations they had endured on the voyage from the Kara Sea, eleven members of the expedition left the ship; of these all perished but the two rescued by the *Foka*.

THE Board of Agriculture and Fisheries has received the following from the Agricultural Consultative Committee:—Milk-sellers or others who have a surplus of milk to dispose of are strongly urged to take steps to have it converted into cheese either in their own dairies or cooperatively. This method of dealing with surplus milk beyond what is required for immediate consumption will not only be found more remunerative than separating the milk and making the cream into butter, but will also be a useful means of contributing to the conservation of the food supply of the nation. The types of cheeses most suitable for manufacture in the circumstances are Cheddar, Cheshire, Derby, Leicester, and Gloucester, or such other varieties as do not deteriorate under reasonably prolonged storage.

IN the medical papers and in the *Times* the value of, and necessity for, anti-typhoid vaccination for all branches of the Army have been urged by Sir William Osler, Sir Lauder Brunton, and Sir William Leishman. Figures quoted by Sir William Leishman are eloquent as to the efficiency of the vaccination for the prevention of typhoid fever: in India, where formerly this disease among the British garrison cost us from 300-600 deaths annually, was last year responsible for fewer than twenty deaths, 93 per cent. of the men now being inoculated. Large supplies of the vaccine have been prepared at the Royal Army Medical College, while the department for therapeutic inoculation, St. Mary's Hospital, Paddington, has furnished nearly