

On chucks and mandrils our author has much to say, and useful advice is given on how to centre work for the lathe, the book concluding with a chapter on screw-cutting of a rudimentary nature, sufficient, however, to give the amateur a good start in this somewhat difficult subject.

Taken as a whole, the little book will be of much use to the young apprentice and amateur. It flavours more of the workshop than of the technical school, which is very much in its favour.

*Principles of Plant Culture.* By Prof. E. S. Goff. Second Edition. Pp. 287. (Wisconsin: Madison. Published by the Author, 1899.)

MANY of our county councils have now instituted training colleges for teachers, and laboratories for the instruction of pupils in the elements of agriculture and horticulture. In such establishments Mr. Goff's little treatise, which is now in a second edition, will be most useful. The phenomena of the life of plants are clearly explained, and the details of internal structure sufficiently set forth. The application of these facts to the practical details of cultivation is shown, and stress laid upon the conditions that are propitious, as well as on those that are adverse, to plants. Numerous illustrations are given and, as an appendix, is provided a syllabus of laboratory work containing directions whereby the pupil may be assisted in realising for himself the teachings of the text.

It is a book suitable not only for those who have the advantage of access to a laboratory, but also for those who have to acquire a knowledge of plant-life without the assistance of a teacher

*Photography in Colours.* (Photography Bookshelf, No. 5.) By R. Child Bayley. Pp. 74. (London: Iliffe, Sons and Sturmev, Ltd., 1900.)

THERE are probably many people who wish to obtain a general survey of the different attempts that have been made to solve the fascinating problem of "photography in colours" without necessarily entering deeply, or at all, into the practice of any one or more methods. Every one who practises photography should, however, have an intelligent idea of the various processes in use, even if such knowledge amounts to a mere outline of the principles involved. Until now there has been no book devoted to such a summary, so the one before us is very welcome for filling such a gap in our literature.

The author has naturally avoided all technicalities, and confined himself strictly to the explanation of the fundamental principles on which each method is based. The book, it may be mentioned, originated from the editorial articles written by the author for *Photography*, which have been revised and published in this handy form.

*The Romance of the Earth.* By A. W. Bickerton. Pp. 181. (London: Swan Sonnenschein & Co., Ltd., 1900.) Price 2s. 6d.

THIS is an attempt to trace, in a popular manner, the history of the earth from the time it had a separate existence to the present, together with that of its fauna and flora. As giving an idea of the subjects touched upon it may be mentioned that among the titles of the various chapters are "The Beginning of the Earth," "Earth-Sculpturing," "Ice-Ages," "Evolution," "Embryology" and "Organic Ascent." In order to make the story a connected one, the author admits that where facts have not been available he has permitted himself "to speculate, to make deductions from the accepted laws of nature." To this there could be no objection had some clear indication been given whereby the reader might distinguish the generally accepted ideas from the personal views of the author. Still, the book is well written and appropriately illustrated, and provides an interesting first course of reading on some of the greater problems of science.

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## LETTERS TO THE EDITOR.

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### Directions of Spirals in Horns.

THE direction of the spiral in the horns of Bovide is, I think, a less simple matter than might be inferred from Mr. G. Wherry's interesting note in NATURE for January 10, p. 252; at all events so far as sheep and goats are concerned.

The only wild goat with truly spiral horns is the markhor, *Capra falconeri*, in all varieties of which the spiral is, as Mr. Wherry states, "crossed" (right horn twisting to left, left horn to right), but in the great majority of tame goats the reverse is the case, the horns being "homonymous." This was pointed out to me many years ago by the late Edward Blyth, and I have been able to confirm his observations repeatedly in countries where tame goats abound, both in India and in North-East Africa. The rule is not without exceptions, a few tame goats having horns coiled like the wild markhor. I have already called attention to these facts in the "Fauna of British India, Mammalia," p. 508. The "homonymous" spiral in tame goats is the more interesting because it is probable that most of them are derived from the wild *Capra aegagrus*, which has horns curving backwards, not spiral.

As regards sheep, the horns in all the *Ovis ammon* group, including *O. poli*, are "homonymous," as Mr. Wherry says. But the bharal, *Ovis nahura*, has its horns arranged on the reversed or "crossed" system. It is true that the bharal is in some other respects intermediate between sheep and goats.

W. T. BLANFORD.

### The "Usefulness" of Science.

IN your interesting article on "The New Century" in the January 3 number of NATURE, I notice that you endorse M. Lévy's account of the usefulness of "useless" studies and even proceed to suggest that "all our progress has come from the study of what was useless at the time it was studied." Now while fully agreeing with your main argument, it seems to me that this goes too far. Certainly M. Lévy's illustrations do not prove it. For it so happens that the early astronomical observations, to which he appeals, so far from being useless in the eyes of those who made them, were believed to be of the utmost practical importance. In fact, it may be doubted whether the study of astronomy has ever again been prosecuted in so directly utilitarian a spirit as in its infancy. For, quite apart from the practical need of determining the succession of the seasons, which M. Lévy seems to have strangely overlooked, it was generally believed that the observation of the heavenly bodies was "useful" as a method of forecasting terrestrial events. Astronomy was the offspring of astrology, and assiduously practised because no distinction had yet been made between those heavenly bodies which made great practical differences to human affairs, like the sun and the moon, and those whose influence was inappreciable. Furthermore, it must be remembered that these same bodies were regarded as literally deities of the highest order, so that their observation was a religious rather than a scientific act. This veneration of the heavenly bodies, moreover, persists throughout Greek science, and even Aristotle regards them as composed of a purer and diviner material than anything "sublunary." So that, when he advocates the "useless" *theoria* of astronomy and mathematics as the highest exercise of human faculty, he does *not* mean "seek knowledge for its own sake," but rather "raise yourself to the contemplation of what is nobler and diviner than anything earthly." For the eternal and immutable truths of mathematics also were regarded as being of more than human validity. Hence it seems a mistake to call these primitive researches useless because we do not happen to believe in the use they were supposed to have.

And this suggests a further scruple. Does not the doctrine that the "useful" discoveries arise out of the study of the "useless" come perilously near to a psychological paradox? For how can any one rationally pursue the study of what he at the time conceives to be useless? It must at least be useful to him, *i.e.* satisfy his desires in some way or other. In the last resort, what can the useful be but that which satisfies some human desire, subserves