Methods of Surveying. A Manual for Students, Estate Agents, and Planters. By N. F. Mackenzie. Pp. ix+143; illustrated. (London: Bradbury, Agnew and Co., Ltd., 1908.)

WRITTEN by a practical surveyor and teacher, this manual is just what is required by the beginner, be he student or practitioner, in surveying. It contains just what is necessary and little that is superfluous; each step is so clearly indicated, and the little practical hints given are so apt, that a novice could go straight on with his work with only the manual to guide him; but a knowledge of plane geometry, trigonometry, and drawing is assumed. The book is only intended for teaching the methods employed in making large scale plans of comparatively small areas, therefore the methods of the trigonometrical survey and geodetic work are not given. The author deals in turn with chain surveying, prismatic compass surveys, theodolite traverses, levelling, plane table operations, and the determination and plotting of contours. Interspersed are chapters describing the various instruments, each of which is carefully explained in detail with the help of numerous photographs and diagrams. Problems are set and solved, and practical methods of overcoming incidental difficulties in the field are dealt with. As an example of the thoroughness with which each essential point is treated, one might take p. 21, where all the conventional signs employed to denote various objects shown on the finished plan are not only explained, but are also reproduced, and this is but one example among the many that this excellent manual contains. For teachers who have the desire, and are in a position, to teach real, practical geography, the book is the best we have yet seen. W. E. R.

A Guide to the Domesticated Animals (other than Horses) exhibited in the Central and North Halls of the British Museum (Natural History). Pp. vi+54; illustrated by 24 figures. (London: Printed by Order of the Trustees of the British Museum, 1908.) Price 6d.

DR. R. BOWDLER SHARPE states in a preface that this very attractive guide has been written by Mr. R. Lydekker, F.R.S., which is guarantee enough of its accuracy and completeness. The interest of the collection here dealt with to breeders, fanciers, and the public generally is self-apparent. Accompanied by such a guide as this little book provides, any intelligent person will be able to understand the principles exemplified by the specimens described. The excellent plates will make the book useful also to students unable to visit the museum.

LETTERS TO THE EDITOR.

[The Editor does not hold himself responsible for opinions expressed by his correspondents. Neither can he undertake to return, or to correspond with the writers of, rejected manuscripts intended for this or any other part of NATURE. No notice is taken of anonymous communications.]

The Isothermal Layer of the Atmosphere.

IN NATURE of March 12, p. 437, I made some remarks under the above heading on temperature observations in the upper atmosphere, and suggested that it was desirable to have simultaneous records from thermographs of the different types in use in this country and abroad. From "Heft 2, Jahrgang 1907, of the Beob. . . . mit . . . Ballons . . ." recently published under the editorship of Prof. H. Hergesell, I find that the desirability of such comparisons had already been recognised on the Continent. There are only two or three examples of such comparisons in the volume, but they illustrate in a remarkable fashion the uncertainties which I was led to anticipate from general considerations. The thermographs compared were of two

types—A (that of Monsieur Teisserenc de Bort), B (that of Prof. Hergesell).

Taking first Strassburg, we have data for the ascents only, on February 7 and 8, 1907. On February 8 the differences between A and B varied from 0.0 C. to 2.1 C. in a total range of 52° C. In this case A gave, with one exception, the higher temperature, so the difference may have been partly due to "zero error" in one or both of the instruments. On February 7, as the balloon rose, the temperature recorded by A fell from -3.4 C. at 140 metres to -60.2 at 9280 metres. B, originally in agreement with A, gradually began to read lower, the difference amounting to 1.8 when A recorded -34.2. The difference then diminished, being only 1° C. when A recorded -60.2. There then followed a thin isothermal layer, followed, as usual, by an inversion of temperature (a phenomenon not uncommon at comparatively low levels), but while A's temperature rose from -60.2 to -58.3 (or 1.9 C.), B's only rose from -61.2 to -60.7 (or 0.5 C.). The instruments then differed by 2.4 C., and shortly after, when the ascent stopped—the temperature then being -53.1 C.—by 2.5 C.

When A, with falling temperature at 9140 metres, showed -58.8, B read only 1.2 lower, but when, after the inversion of temperature, A showed -58.3 at 8690 metres, B read 2.4 lower. There is thus in this case something quite different from mere zero or scale error. The cause must have been in the type or construction, or in the exposure of the instruments.

A still more instructive case is presented by the results obtained at Uccle on February 7, 1907, with the same two types of instruments; in this instance the observations are recorded during both ascent and descent. During the ascent the differences between A and B varied only from -0.6 to +1.1 C. As temperature fell to -42°, B usually read lower by a few tenths of a degree; at greater heights B read higher by from 0.2 to 1.1. During the descent, however, a marked difference of a systematic kind appeared, B reading higher than A. The maximum difference 2.9 C. appeared when A recorded -46.5, in spite of the fact that when A recorded -46.3 during the ascent, B differed by only 0.2. As the descent continued, the difference between A and B diminished and changed sign, until when A showed -8.9, B read 1.6 lower. Between the heights of 6000 and 1150 metres, when the extreme differences between A and B occurred, we have a range of 37.6 from A as against 33.1 from B, a difference of 4.5 C., or about 12 per cent. On this occasion there was a marked inversion of temperature near the highest level attained, but the conclusions one would draw as to the nature or even as to the existence of an isothermal layer of finite thickness would depend a good deal on whether one took the ascending or descending readings, and in the latter event on whether A or B was accepted as correct. Thus, while A during the descent gave the same reading (-62.5) at 9000 as at 10,090 metres, B read higher by 2.2 at the lower level. Both at Strassburg and Uccle the differences between A and B became accentuated when temperature inversion occurred. So decided was the instrumental influence that in the short abstract accompanying the Uccle figures the writer speaks of "isothermie au T. de B."

In making these and previous comments, my object is not to criticise directly or indirectly any particular type of instrument, or any one observer or class of observers, but solely to secure the adequate and timely recognition of an idea, that idea being that no reasonable precaution should be omitted to ascertain how different types of meteorographs stand to one another, and how their records may best be interpreted. C. CHREE.

July 18, 1908.

The Nature of the γ and X-Rays.

THE arguments contained in Dr. Barkla's letter to NATURE of May 7 do not directly affect the position which I have taken in respect to the nature of the γ and X-rays. I have shown that all the striking phenomena of the secondary kathode radiations are simply and completely explained on a neutral pair theory, but not on the older theory of ether pulses. Dr. Barkla refuses to consider this large body of evidence on the ground that it is well to