

Animal Heroes: Being the Histories of a Cat, a Dog, a Pigeon, a Lynx, two Wolves, and a Reindeer. By Ernest Thompson Seton. Fourth impression. Pp. 363. (London: Constable and Co., Ltd., 1920.) Price 8s. 6d. net.

This lively and generously illustrated book begins with the story of four of the lives of a "Royal Analostan" cat—we were a little afraid that there were to be nine—which, in virtue of considerable worldly wisdom, got on well against heavy odds. "But in spite of her prosperity, her social position, her royal name and fake pedigree, the greatest pleasure in her life is to slip out and go a-slumming in the gloaming, for now, as in her previous lives, she is at heart, and likely to be, nothing but a dirty little Slum Cat." The second story tells of the ability of a homing pigeon and of its successful education. "The hardest of all work is over the sea, for there is no chance of aid from landmarks; and the hardest of all times at sea is in fog, for then even the sun is blotted out and there is nothing whatever for guidance. With memory, sight, and hearing unavailable, the Homer has one thing left, and herein is his great strength, the inborn sense of direction. There is only one thing that can destroy this, and that is fear, hence the necessity of a stout little heart between these noble wings." This is a fair sample of the more reflective passages in the book, and it is too easy-going. There is a stronger note in the two descriptive studies of wolves, for Mr. Thompson Seton excels in proportion to the wildness of the scenery and of the *dramatis personae*. The other subjects are "The Boy and the Lynx," "The History of a Jack-Rabbit," "The Story of a Bull-Terrier," and "The White Reindeer." The author is an artist in reading the man into the beast—a great art, but a dangerous one; and we are afraid that some of the book is in the danger zone. But those who recoil from "apsychie" biology will probably agree that Mr. Thompson Seton's anthropomorphic faults lean to virtue's side.

The Year-book of the Scientific and Learned Societies of Great Britain and Ireland. Thirty-sixth Annual Issue. Pp. viii + 336. (London: C. Griffin and Co., Ltd., 1919.) Price 12s. 6d. net.

As is well known, this invaluable year-book gives official particulars and records of work not only of scientific societies in the British Isles, but also of such institutions as the Imperial Institute, Meteorological Office, National Physical Laboratory, Rothamsted Experimental Station, etc. Titles are given of papers read during the session 1918-19, and twenty-six new societies have been added to the comprehensive list of those surveyed in this volume. The work is one which we continually consult, and it is an essential volume for the reference library of every newspaper, institution, college, or club which desires to provide its staff or members with accurate particulars of the officers and activities of scientific organisations throughout the kingdom.

NO. 2645, VOL. 105]

Letters to the Editor.

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Weather Forecasts and Meteorology.

THE experience gained during the last few years in aerial navigation has shown, among other things, that weather forecasts, in these latitudes at any rate, are trustworthy only for a few hours in advance, and not always that.

If weather forecasting were at all accurate for a day or two ahead, it would be possible to make a correct weather-chart for to-morrow from the information received to-day. This has never yet been done, and it seems unlikely that it ever can be done, for the simple reason that in latitudes higher than 30° or thereabouts the conditions of the flow of the air are those of the permanent instability which characterises a stream exposed to the influence of surface friction at a velocity greater than that compatible with lamellar flow.

The unstable motion referred to consists of eddying motion superposed on a general drift, the eddies themselves being of all sizes and in all stages of growth and decay—some showing actual rotation, others being merely distinguishable by differences of velocity and direction. Eddies, when formed, have a certain individual life, generally of not many hours' duration, though in some cases there may be maintaining causes which will prolong their existence for days. The deviations of their courses (*i.e.* the path of their centres) from the average direction of the stream depend chiefly on the state and intensity of the other eddies in the neighbourhood, and, within wide limits, must be treated as a matter of pure chance.

Let anyone watch the motes of dust in the air illuminated by a beam of sunlight passing through a slit. They may all, on the whole, be drifting in some one direction, but combined with the general drift there will be irregular eddying motions, some quick, some slow, but deviating largely from the average for the whole. Much the same sort of thing on a large scale takes place in the atmosphere, and a weather forecast professes to determine from the motion over a certain area and at a certain time, together with the then existing variations, what the future motions will be.

For a time so short that the eddying motions preserve their respective characters this can be done, but not for longer periods, the causes which alter existing eddies and develop new ones being incalculable.

If the weather prophet makes no observations whatever, but is content to say that "to-morrow will be like to-day," he will be right rather more than sixty times out of a hundred. With all the information which can be obtained, by telegraph or otherwise, he may add 10 or 15 per cent. to his correct predictions for twenty-four hours ahead.

The Meteorological Office, I believe, claims rather a better average than this, but its forecasts are often so vague (*e.g.* "Wind moderate, strong to a gale at times in places. Fair, but with some cloud and rain. Temperature moderate") that almost any sort of weather might be said to fulfil the prediction.

The proper test of the value of forecasts for a day in advance would be to prepare a chart for that day and to publish it side by side with one formed from