

logical side of geology that most fascinated him. And what a mass of observations he accumulated in that department of the science! Every grade of the animal kingdom had an interest for him. He was passionately devoted to living animals, and he made use of his knowledge of them and their ways in interpreting the remains of their remote ancestors imbedded in the geological formations. He would take endless trouble to satisfy himself as to the habits of some living animal, in the hope of thereby throwing light on the history of extinct forms. Witness, for example, his rapid journey to the Pentland Hills in Midlothian, for the purpose of examining the drained bed of a large reservoir, where he expected to find materials for elucidating the history of old lacustrine limestones.

In those days geology had not become a science of detail. There were new fields to be cultivated on every side, and Buckland was the first to enter some of these. His researches in caves opened up a fresh chapter in geological history. And his chivalrous support of Agassiz, in the face of much ridicule, when he announced the former existence of glaciers in Britain, must be recognised by all glacialists as one of the first steps which led to the recognition and cultivation of glacial geology in this country.

There was ever in Buckland's science a strong vein of practical common sense. He was imaginative beyond most of his compeers, and sometimes, perhaps, allowed his imagination too free a rein, but he never lost sight of the fact that geology has a very definite practical side, and may be turned to useful account in many of the affairs of daily life. He was an active farmer, in order that he might try various methods for the improvement of crops. To him we owe the introduction of coprolites, so valuable a source of artificial manures. He never lost an opportunity of preaching the true principles of drainage, and he insisted on the value of geological knowledge in all questions of water-supply. These are familiar enough applications of the science now, but it was largely through Buckland's influence that they were recognised.

Of the man himself as he lived and moved, Mrs. Gordon's volume gives a pleasing though hardly adequate picture. His boundless energy and enthusiasm were infectious, and led many a man and woman captive into the geological fold. His industry enabled him to carry on a busy scientific life, while at the same time he had on hand enough of other work to fill up fully the time of most men. His wide sympathies and large range of knowledge broadened his grasp of his own special science, and led him to see where he could find the most useful collateral information. His eloquence as a speaker and writer commanded the attention of his audiences, and did much to make his subject popular. His unwearied hospitality and his generous large-handedness opened a way for him into the hearts of men, while his overflowing vivacity, his brilliant wit, and his racy talk made him the central figure in any company where he might happen to be. Truly there were giants in the land in those days, and no one of them deserves to be more warmly remembered for all that he did, and all that he was, than William Buckland.

NO. 1324, VOL. 51]

OUR BOOK SHELF.

The Birds of Eastern Pennsylvania and New Jersey.
Edited by Witmer Stone. Pp. 185. (Philadelphia :
Delaware Valley Ornithological Club, 1894.)

THE Delaware Valley Ornithological Club has only been established about five years, but steps were taken shortly after its organisation to compile a list of the birds observed by the members in the vicinity of Philadelphia. In this volume the important results of the club's ornithological investigations are brought together in a compact form by the committee of three—Messrs. Morris, Rhoads, and Stone—appointed to prepare the work. A list of the birds to be found in the Delaware Valley and along the New Jersey sea-coast has naturally a limited sphere of usefulness, even though it may furnish a work of reference for ornithologists in general. But this volume contains not only an annotated list of the birds of the district to which it refers, and a bibliography of ornithological literature relating to Pennsylvania and New Jersey; it comprises, in addition, outlines of the knowledge of the geographical distribution and migration of birds, thus giving it increased value. These chapters

April 1891.

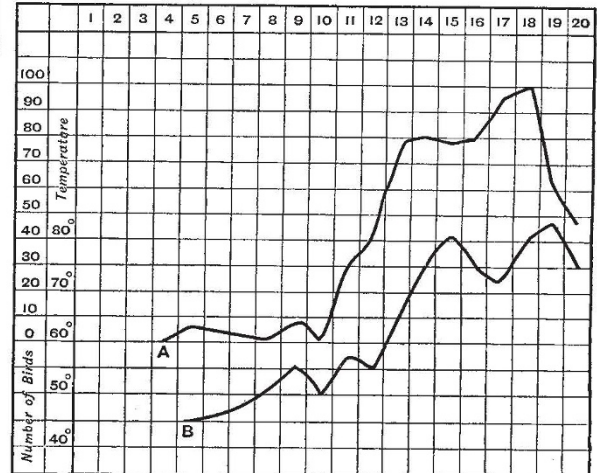


FIG. 1.—A, Migration Curve; B, Temperature Curve.

will lead beginners in the study of birds to understand the importance of simple observations.

The influence of meteorological conditions upon the migration of birds is an important point, and one which requires careful investigation. The records of the club's observers furnish some valuable facts for the study of migratory waves or rushes, and their relation to meteorology. It is pointed out that, during migrations, the flight of birds is not uniform, but is made up of a series of waves or rushes and rests or lulls. The relation of these rushes to temperature is well shown in the accompanying diagram, reproduced from the volume. The curve A represents graphically the fluctuation of the April migration of 1891, based upon observations of the Flicker, Chipping Sparrow, and Brown Thrasher; the curve B shows the temperature variation during the month of observation, based upon the daily maximum temperature. The connection between the two curves is very distinct, and it is especially interesting to observe that the "bird waves" occurred a day or two after a decided increase of temperature.

In conclusion, we think the Delaware Valley Ornithological Club is to be congratulated upon its activity, and Mr. Stone for this admirable addition to the literature on the birds of Eastern Pennsylvania.