teacher it ought to give admirable results. Each subject is considered from so many points of view that it seems scarcely possible that the pupil could lose interest in the work or fail to see the intimate relation between the great number of natural phenomena and the daily affairs of life. The pupil's attention is held throughout the course of study by interesting him in some aspect of nature especially noticeable during the different seasons. To illustrate, the plan contemplates the following subjects for study during the month of October: In zoology, the migration of animals; in botany, the distribution of seeds; in geography, areas of crops sown in the autumn; in physics, evaporation and condensation; in chemistry, ash, organic matter, fluid and dry solid in common fruits; in meteorology, rainfall and humidity; in astronomy, distribution of sunshine; in geology, erosion and sedimentation, the transporting power of water; in mineralogy, evaporation of water from the soils, and sand and granite.

The notes composing Part Two of the work, though, perhaps, rather too rhetorical in treatment, present to the teacher directions for the construction and use of apparatus, descriptions of experiments and suggestive examples illustrating the tremendous scale upon which the operations of nature are conducted. While in most cases the directions are sufficiently explicit, much is left, and properly, too, to the individual teacher to plan and execute as circumstances may require.

Few teachers realize how much can be made of nature study if properly conducted, and, as Prof. Jackman's plan does not require for its execution that the teacher shall be specially trained in the sciences, it is hoped that it may be widely adopted.

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Papers presented to the World's Congress on Ornithology. Edited by MRS. E. IRENE ROOD, under the direction of DR. ELLIOTT COUES. Chicago. 1896. 8vo. Pp. 208. $5.00.

The 'Congress' at which were presented the twenty-seven papers printed in this volume took place in Chicago in October, 1893. Invitations to it had been widely distributed, signed by a committee of nearly a dozen persons, of whom Dr. Coues is the only one well known as an ornithologist. In the invitation it was announced that the congress was to 'treat of birds from the standpoint of the scientist, the economist and the humanitarian,' and the scientist was warned that the audiences would be characterized by 'æsthetic feelings and humane sympathy rather than intellectual apprehension.' Under these circumstances it is not surprising that the papers show a very wide range of merit, nor that among their writers there are but few ornithologists of much prominence.

Several of the articles are deserving of cordial praise. Mr. D. P. Ingraham, for instance, gives a very interesting account of the American Flamingo, a bird that few other naturalists have seen within the limits of the United States, where to-day it is restricted to the inaccessible, shallow bays of the extreme southern coast of Florida. Another valuable contribution is that on the changes of habits of some birds in Maine, by Manly Hardy, whose many years of exceptionally careful observation have enabled him to narrate a number of instances of adaptation to changed conditions. Somewhat comparable with Mr. Hardy's notes are those of Mr. J. H. Bowles, upon instinct in birds, though of less importance, for the reason that reliable facts of this sort are far more readily attainable than such as Mr. Hardy's, which, from the nature of the case, are seldom afforded save by the life-long experience of a single observer.

The late John S. Cairns contributed a short sketch, giving a good account of the breeding haunts of the Black-throated Blue Warblers on the mountains of western North Carolina. In mentioning the fact that in the spring these birds are already engaged in nest-building at a time when northern-bound individuals of the species are still migrating through the valleys below, he incidentally referred to them as a 'local race.' This calls forth the following editorial foot-note: "As this subspecies does not appear to have been named, it may be called *Dendrœca cœrulescens cairnsi.*—E. C." Readers of the book may be interested to learn

that this has proved to be one of Dr. Coues's happy intuitions, and that his *nomen nudum* only awaits a description to take a secure place in ornithological nomenclature.

Dr. Emil Holub's brilliant description of a winter roosting place of *Hirundo rustica* must not pass unnoticed, nor must Mr. J. A. Allen's article on 'the migration of birds.' The latter is an exposition of the subject excellently suited to the unscientific reader, for whom, doubtless, it was intended, but it contains one or two statements that the field ornithologist of large experience might not assent to. Among the rest of the papers there are some, of which there is nothing especial to be said; others might better never have been written.

C. F. Batchelder.

SCIENTIFIC JOURNALS.

JOURNAL OF GEOLOGY, NOVEMBER–DECEMBER, 1896.

Age of the Auriferous gravels of the Sierra Nevada: By Waldemar Lindgren; with a *Report on the flora of Independence Hill:* By F. H. Knowlton. An attempt is made to definitely fix the age of the auriferous detrital rocks of the Sierra Nevada, resting uncomformably upon the bed rocks at high elevations and covered by volcanic flows. The beds include the deep gravels, the bench gravels, rhyolitic tuffs, gravels of the rhyolitic period, gravels of the inter-volcanic erosion period and andesitic tuffs and tuffaceous breccias. No fossils have been found in the deep gravels. They are older than the bench gravels, and may be as old as the Eocene. At Independence Hill leaves occur in a whitish or bluish clay interbedded with the uppermost gravels of the ante-volcanic period. These plant forms point very clearly to the Miocene age of the deposit. The Ione formation, correlated with the bench gravels, is also shown to be Miocene by the presence of characteristic shells. These gravels are probably Upper Miocene. The gravels of the inter-volcanic period and the andesitic tuffs are probably Lower Pliocene or Upper Miocene. In early Cretaceous the Mariposa and earlier beds were folded and eruptions were continued from the Jurassic. Shortly before the Chico the Sierra Nevada became separated from the Great Basin. In Chico time the sea advanced eastward. In late Chico and Tejon time the Sierra Nevada was being eroded, the greater part of the Chico sandstone being cut away. In early Miocene the sea retreated westward. The Sierra assumed the topography since preserved. The relation of the two eroded surfaces, Cretaceous and Miocene, is clearly discernible from the lower foot hills. In late Miocene (Ione) the sea moved eastward and gravels were formed. The gravel period was closed by rhyolitic and andesitic eruptions with Pliocene elevation. The andesitic flows are supposed to mark the close of the Pliocene. The Pleistocene was a period of erosion, with minor basaltic eruptions in the earlier and middle portions, and glaciation later.

Anorthosites of the Rainy Lake Region: By A. P. Coleman. Lawson has described eruptive masses through the Keewatin of the Rainy Lake region. The basic eruptions were identified as anorthosites, the larger area enclosing the southern arm of Bad Vermilion Lake. The rock presents some differences from typical anorthosites, an analysis showing that it is one of the most basic rocks. Lawson thought the area represented the truncated base of a Keewatin volcano. In this he was probably not correct, as apparently a long interval separated the anorthosite eruption from that of the granite.

Mechanic of Glaciers I: By Harry Fielding Reid. The greatest flow occurs through a section at the névé line, and diminishes as we go up or down the glacier from here; the diminution increasing with the distance from the névé line. In glaciers with beds of uniform slope the velocity and flow increase and decrease together, though not in the same proportion. In a glacier of indefinite length and uniform section the direction of the flow would be parallel to the slope, and the velocity parallel with the axis would not vary along the direction of flow. The velocity of a point under such circumstances would be the normal velocity corresponding to that form and size of cross-section. A glacier of uniform section could not exist if there was any melting; the slope of the glacier being uniform, wherever there is melting, the