wit, curlew, "piping the wild notes, to which the Greenlander listened in June, now to the *gaucho* herdsman on the green plains of La Plata, then to the wild Indian in his remote village, and soon, further south, to the houseless *huanaco*-hunter in the gray wilderness of Patagonia." Of the godwit — *Limosa hudsonica* — some go north in March to breed; while later in the season (May) others come from the south to winter on the pampas. The north-flying birds travel thousands of miles to the hundreds traversed by those from the south. It is considered probable that these last have their breeding-places on the as yet undiscovered Antarctic continent, which they have left, after breeding, in time to winter on the pampas.

Another interesting chapter is that upon the Puma. Numerous facts are given to show that this animal, contrary to the habits of all the other wild *Felidæ*, is a friend of man, not only refraining from attacking him, but actually protecting him from the attacks of other animals, like the jaguar for example. One instance of this must suffice. During the course of an extended hunt one of the men fell from his horse, and in falling broke his leg. His companions did not notice his loss until evening, and the next morning he was found where he had fallen. He related that while lying there a puma had prowled about the vicinity but did not attempt to harm him. About midnight he heard the roar of a jaguar, and between that time and morning he several times saw the two animals engaged in fierce fights, the puma preventing the jaguar from attacking the prostrate and helpless man.

In discussing the question of fear in birds, Mr. Hudson discards the idea that it is only found in those which have been persecuted by man, and advances the theory that the older birds teach the young ones to fear their enemies. So strong is the habit of attending to the warning or danger note uttered by many birds, that when a nestling is hammering at its shell and seeking to reach the outer air, uttering meanwhile its feeble "peep," "if the warning note is uttered, even at a considerable distance, the strokes and complaining instantly cease, and the chick will then remain quiescent in the shell for a long time, or until the parent, by a changed note, conveys to it an intimation that the danger is over."

Mr. Hudson is not content to record the observations he has made. He seeks also to explain, sometimes plausibly, sometimes perhaps not so well, many of the facts. For example, we are all familiar with the, to us, absurd cackling of a hen when she has laid her egg. She wants the whole world to know it. Obviously it would in a wild state be a serious objection, and be decidedly injurious to the species as a whole, to have all the egg-feeding snakes and mammals apprised of the fact that a new egg had been laid for them to seek. The author therefore contends that this habit is a perversion of the original instinct, and that while it now serves no purpose or a bad one, originally it was useful. He finds in a certain half-wild fowl of the pampa, a habit of making her nest sometimes 400 or 500 yards away from the feeding-grounds. After the egg is laid the hen flies directly from the nest 40 or 50 yards and then, still silently, runs along to the feeding-ground. Then only does she give vent to a low cackle. The cock, if within hearing, answers her, runs to her, and the cackling ceases. "If," says Mr. Hudson, "we may assume that these fowls, in their long, semi-independent existence in La Plata, have reverted to the original instincts of the wild *Gallus bankiva*, we can see here how advantageous the cackling instinct must be in enabling the hen in dense tropical jungles to rejoin the flock after laying an egg. If there are egg-eating animals in the jungle, intelligent enough to discover the meaning of such a short, subdued, cackling call, they would still be unable to find the nest by going back on the bird's scent, since she flies from the nest in the first place."

In a chapter on spiders mention is made of the many strange and wonderful features known in connection with them. Some spin a wonderfully complex and beautiful web; some live on or in the ground; many simulate inanimate objects or death itself. Of two species belonging to the same genus, one is green, while another is like a withered or dried-up leaf. The first, when disturbed, falls rapidly to the ground like a fresh green leaf broken from a twig; but the second falls slowly like a very light, dried, and withered leaf. Some of the spiders are very large and will chase a man from thirty to forty yards, keeping pace with a slow-trotting horse. An instance is related where one ran up the lash of the author's riding-whip to within three or four inches of his hand, and would have bitten him had he not thrown the whip away. Some rather fanciful speculations are indulged in when considering how a man-like monkey would act were he to have a cord permanently attached to his waist, as the spider may be considered to have his web-making material.

In an interesting chapter on music and dancing in nature, accounts are given of the habit as indulged in by many kinds of birds. Not the least strange of these is that of the spur-winged lapwing. These birds live in pairs, each pair jealously guarding its own chosen ground. But frequently one of a pair will fly off to visit a neighboring couple, leaving its mate to guard the ground. The visitor is graciously received, and the performance gone through with is described as follows: "Advancing to the visitor they place themselves behind it; then all three, keeping step, begin a rapid march, uttering resonant drumming notes in time with their movements; the notes of the pair behind being emitted in a stream like a drum-roll, while the leader utters long single notes at regular intervals. The march ceases; the leader elevates his wings and stands erect and motionless, still uttering loud notes; while the other two, with puffed-out plumage and standing exactly abreast, stoop forward and downward until the tips of their beaks touch the ground, and, sinking their rhythmical voices to a murmur, remain for some time in this posture. The performance is then over, and the visitor goes back to his own ground and mate to receive a visitor himself later on."

We have given here but a bare outline of some of the interesting chapters of the book. The one dealing with the dying-place of the *huanaco* attempts to explain the habit the animals have of returning to a remote place in which to die. It is traced back to a probable origin in ancient times when the animals herded together in winter for protection and warmth, and the idea is advanced that at present the habit is an aberrant and perverted instinct which has descended by inheritance. When the animal feels the pangs of approaching death, its feelings impel it to the spot where long ages ago its ancestors, with their fellows, found refuge and relief. Mr. Hudson thus regards the habit, not as going to a place to die, so much as going to a place to recover health. Other chapters deal with the odoriferous skunk, of which numerous anecdotes are told; with mimicry and warning colors in grasshoppers; the value and importance of the mosquito in the economy of nature and the question why it possesses a blood-sucking apparatus in such perfection, while scarcely one out of many hundreds of thousands ever tastes blood. The humming-birds are treated of in another chapter, while in still another is given a full account of a large family of birds known popularly as "wood-hewers." The biography of the *vizcacha*, the prairie-dog of the pampa, is given in full; while an account of certain birds and animals seen once or twice and then lost, never to be again brought to view, reminds one that disappointment sometimes waits upon the investigator into nature's secrets. The book is an interesting one, and we believe worthy of an extended circulation among lovers of natural objects.

JOSEPH F. JAMES.

Washington, D.C., Aug. 22.

Mineralogy. By FREDERICK H. HATCH. London, Whittaker & Co. 12°. $1.

DR. HATCH has brought together the most essential principles of mineralogy, and embodied them into what is really an abridgment of a larger treatise. He experiences the difficulty felt by earlier authors of making popular conceptions of geometrical figures and relations, and relieves it so far as is possible by stating the principles of their construction and by giving graphic representations of the perfect solids and diagrams illustrative of the crystallographic axes. There is a very wise selection of the more important figures described. Throughout the descriptions of crystalline form, chemical composition, and the various physical properties, including the choice of the minerals described, the author has shown that he knows what selection should be made ir

order that the most essential features shall be presented. He is evidently a master of the whole science, and not an amateur content to explain the familiar portions and to overlook the difficult topics needful to make the sketch symmetrical. Wisdom is also shown in the classification and description of the minerals. The thoroughly scientific arrangement by chemical character, of use to the learned, is laid aside for the following practical scheme: First, the rock-forming minerals, such as are world-wide, and extend through the whole crust; second, the ores; third, the salts and useful minerals supplementary to the ores; and fourth, the gems and precious stones. Under the first head there is presented the important distinction of those that have been formed secondarily in contrast with those that were original. We think the author might wisely have devoted three or four pages, instead of a brief paragraph scarcely exceeding fifty words, to the hydro-carbons. No effort is made to describe the phenomena connected with refraction and polarization, nor to the microscopic structure, nor to petrography.

Notes and Examples in Mechanics. By IRVING P. CHURCH. New York, John Wiley & Sons, 1892.

THIS work, as stated in the preface, is "a companion volume to the writer's 'Mechanics of Engineering,' and contains various notes and many practical examples, both algebraic and numerical, serving to illustrate more fully the application of fundamental principles in mechanics of solids; together with a few paragraphs relating to the mechanics of materials, and an appendix on the "Graphical Statics of Mechanism." A knowledge of the elements of trigonometry and calculus is assumed.

The work is clear and practical. Many problems are first treated analytically, then by assuming numerical values for the several algebraic quantities. English units are used. Engineering data are drawn from well-known and reliable authorities.

Among the structures and machines discussed (after the necessary exposition of general principles) are the bell crank, simple and compound cranes, wedge, roof truss, pendulum, weighted piston with steam, I-beam, box-beam, fly-wheel, locomotive, jack-screw, ore-crusher, etc.

The work is abundantly illustrated with cuts.

Light. By SIR H. TRUEMAN WOOD. London, Whittaker & Co., 1891.

THIS elementary Treatise belongs to Whittaker's "Library of Popular Science." The undulatory theory is presented in clear and non-mathematical language, and the various phenomena of common observation are explained on this theory.

In a very lucid and attractive style, the author discusses such topics as reflection, refraction, color, optical instruments, the chemical action of light (as in photography), polarization, and fluorescence. The cuts are abundant and well drawn.

The appendix contains an annotated list of elementary works on light, color, spectroscope, etc.

Chemical Calculations, with Explanatory Notes, Problems, and Answers. By R. LLOYD WHITELEY. London and New York, Longmans, Green & Co. 1892.

A WIDE range of topics is included in these hundred pages; as metric system, thermometric scales, density and specific gravity, percentage composition of compounds, calculation of empirical formulæ, volume of gases, calculations depending on chemical equations, combination of gases by volume, calculation of the results of quantitative analysis, atomic weight determinations, gas analysis, absorption of gases by liquids, molecular weights, calorific power and calorific intensity.

The problems on molecular weights are not confined to vapor densities; but the more recent methods of freezing points (Raoult) and boiling points (Beckmann and Wiley) are duly explained.

The table of atomic weights is based upon O = 16, and agrees, for the most part, with Ostwald's "Outlines of General Chemistry;" thus H = 1.003, in accordance with the older determina-

Publications Received at Editor's Office.

DAY, DAVID T. Mineral Resources of the United States. Washington, Government. 8°. 678 p.

GARNER, R. L. The Speech of Monkeys. New York, Charles L. Webster & Co. 8°. 233 p.

JACKMAN, WILBUR S. Nature Study for the Common Schools. New York, Henry Holt & Co. 12°. 448 p.

MERRILL, GEORGE P. The Materials of the Earth's Crust. Washington, Government. 8°. Paper. 87 p.

SALTER, WILLIAM M. First Steps in Philosophy. Chicago, Charles H. Kerr & Co. 12°. 155 p. $1.

U. S. DEPARTMENT OF AGRICULTURE. Insect Life. Washington, Government. 8°. Paper. 90 p.

"WATERDALE." Researches on the Dynamic Action and Ponderosity of Matter. London, Chapman & Hall. 12°. 309 p.

WATKINS, J. E. The Log of the Savannah. Washington, Government. 8°. Paper. 30 p.

WELLS, CHARLES R. Manual of the Natural Movement Method in Writing. Syracuse, C. W. Bardeen. Sm. 4°. Paper. 44 p. 25 cts.

WILLIAMS, SAMUEL G. The History of Modern Education. Syracuse, C. W. Bardeen. 12°. 403 p. $1.50.