

pletely conceals the secondary image. I have no doubt that if I should look at Mars through an instrument powerful enough to show the single black lines, I should rediscover the twin line of each, that is, if I used the polarizing eye.

I presume others have noticed this power in themselves, or discovered it in other persons, but I have not happened to come across such. One can easily test his own eyes, by making a fine black dot on a piece of white paper and examining it with one eye at a time. If he possesses this power, he will see two dots pretty close together, one much darker than the other. Then let him revolve the paper; the paper will go around, but the dots will retain their relative position. If, for example, the secondary dot is to the right of the other, it will stay to the right, however much the paper is turned. It may be necessary to move the paper nearer to or farther from the eye, but if the double-refractive power is there, it will soon be found. C. B. WARRING.

Park Lupin, Aug. 29.

The Aurora of July 16.

THE various accounts of this aurora which have come to my notice contain no mention of a band or curtain formation. They all agree in describing the aurora as simply an arc of light, with well-marked streamers of more or less brilliant coloring. I append a description of an appearance, not already noted, which was observed by me in Mechanicsburg, Pennsylvania.

The day had been cool and fair, and after sunset only a few clouds could be seen in the north. About nine o'clock a faint auroral arc was visible, and later a brilliant white ray shot out from the north-west and extended beyond the zenith. Nothing more of note occurred for an hour. By this time the clouds had disappeared, with the exception of two small stratified bands, which hung low in the north. They were parallel with a narrow opening in line with the horizon. At 10.15 this space became brilliantly lighted, the color changing between green and pink. Then from the eastern edge of the space a brighter and intensely green light spread rapidly westward, and apparently descended from between the clouds, assuming the shape of a band in folds or waves like a banner in a breeze, as those who have seen this appearance in more northerly latitudes describe it. When the band became well defined, it grew stationary and the green light increased in intensity; and then occurred a magnificent electrical display. From the upper edge a bright pink light suffused downwards until it almost overspread the curtain, when it paused; and for a few seconds there was presented a pink banner, edged with a regular but narrow border of bright green, in stationary folds or waves. Yet there was no progressive wave-motion observed, as seems common to this phenomenon. The formation was repeated after a time, but very indistinctly. As nearly as could be estimated, the entire occurrence could not have lasted more than ten seconds.

W. M. STINE.

Athens, Ohio.

The Ancient Libyan Alphabet.

IN *Science*, Aug. 19, Dr. Brinton treats my equation of *Finagh* with *Phœnician* as "fanciful," and traverses my assertion that the stress falls on the root *fin*. The equation may be fanciful, but the assertion, stigmatized as "utterly incorrect," is absolutely true. Dr. Brinton says that the stress "falls on the last syllable, and not on the penult (see Hanoteau, 'Grammaire Tamachek,' p. 5)." From this the reader might suppose that the French scholar was on Dr. Brinton's side, and accented the word on the last syllable. Such is not the case. Hanoteau does not accent the word at all, makes no remark on its accentuation, and in his grammar nowhere refers to the question of accent. It is Barth, a supreme authority on a point of this nature, who always accents the word on the penult, as already stated by me. What Dr. Brinton appears to have mistaken for an accent in Hanoteau (p. 5) is not an accent, but a diacritical mark used by him to distinguish the "r grasseyé" answering to the Arabic *ghain* from the soft *r* (*r'* and *r*), and in the same way to distinguish the deep guttural *k* (*q*) answering to the Arabic *qof* from the ordinary *k* (*k'* and *k*). Hence he writes *tifinar'*, the mark falling, not on the final vowel *a*, but on the final consonant *r*, which he means to be pronounced

as with the Northumbrian *burr*, or like the Arabic *ghain* (tiffinagh, as Barth always writes it, and always accenting the *i* of *fin*, thus, tiffinagh).

It is strange that Dr. Brinton should have at all ventured to take up my reference to Hanoteau, for on the main issue Hanoteau is dead against him, writing that "le système d'écriture des Imouchar' [Sahara Berbers] est analogue à celui des Arabes et des Hébreux" (p. 1). In other words, it is Semitic. But doubtless the passage has escaped Dr. Brinton's notice. As to Dr. Collignon's cock-sure assertion that it is "antérieure à Carthage" and that "it is time to discard" the theory of its Punic origin, it will suffice to say that, if it comes to the *ipse dixit* argument, the name of Mommsen alone will outweigh fifty thousand Collignons.

Lastly, touching the squares and the rounds, otherwise a point of secondary importance, unless you have a theory to serve, my reference should rather have been to Hanoteau's "Grammaire Kabyle" than to his "Grammaire Tamachek." It is in the former work (p. 360) that is given the full table of the three variant Berber alphabets, with the following results: I. Five curves; six rectangular forms; two acute angles. II. Seven curves; five rectangles; two acutes. III. Six curves; five rectangles; three acutes.

And here the matter may rest, as Professor Newman needs no rehabilitation from me, and in any case cannot be held responsible for the incapacity of "French scholars" to assimilate his "phonetic system."

A. H. KEANE.

79 Broadhurst Gardens, South Hamstead, N.W., Sept. 7.

BOOK-REVIEWS.

Life Histories of North American Birds, with Special Reference to Their Breeding Habits and Eggs. By CHARLES BENDIRE. Washington, Government. 554 p. 4°. III.

The Humming Birds. By ROBERT RIDGWAY. Washington, Government. 131 p. 8°. III.

THE publications of the Smithsonian Institution and of its offspring, the U. S. National Museum and the Bureau of Ethnology, are becoming almost too numerous to be kept track of by any but the professional librarian. Ordinary readers have long since despaired of the task, and consider it as a matter of course that they will seldom or never hear of them all, to say nothing of the pleasure of seeing them. True, many of these publications are of such technical character that only specialists care for them, and these are supposed to be cognizant of the publications pertaining to their study. On the other hand, there are many papers published by the Institution of great general interest, and it frequently happens that these are largely inaccessible to the general public. Any retrospective view of the work of the Smithsonian from its inception deals almost exclusively with its publications. These beginning with meagre annual reports, containing administrative and financial statements, have increased so in numbers and variety that it requires a good-sized volume to catalogue them. It is the intention here to refer to them in only the most general way.

At the present time they may be grouped under three heads: 1. Those of the Smithsonian proper; 2. those of the U. S. National Museum; and 3, those of the Bureau of Ethnology. Under the first of these we have (a) annual reports; (b) miscellaneous collections; (c) contributions to knowledge. Under the second we have (a) annual reports; (b) proceedings; (c) bulletins; and (d) special bulletins. Under the third come (a) annual reports; (b) contributions to North American ethnology.

To still further complicate matters and bewilder the enquirer, we find that frequently there are several editions of these volumes, one always appearing in the guise of a congressional document, and another in the form designed for general distribution. Besides this, it has of late become the habit, perhaps from the necessities of the case, to issue, under a separate cover, papers which may appear in various annual reports or proceedings.

The first few annual reports of the Board of Regents of the Smithsonian contain few or no papers of any great general interest. It was not many years, however, before these began to appear in an appendix to the administrative report. During the latter part of Professor Baird's administration a special feature

was made of general summaries of the progress of science. Within the past few years these have been discontinued, and there is a return to the old plan of placing in an appendix papers having special value. Further, since the National Museum has fairly begun its work, the annual report has been swelled far beyond the compass of one, and so is now issued in two volumes. One of these is devoted to the Smithsonian, and the other to the Museum. The annual reports and other publications of the Bureau of Ethnology will not be considered here.

The second series of publications of the Smithsonian is the "Miscellaneous Collections." In this are given papers which are the results of original investigation, and which are too long to be included in the annual reports. The volumes are in octavo form, and some of them, like Gray's "Synoptical Flora of North America," contain from 900 to 1,000 pages. There are now about 35 volumes in this series. The third series, "Contributions to Knowledge," is in quarto form, and includes many elaborate and finely illustrated monographs. Among them are Squier and Davis's "Ancient Monuments of the Mississippi Valley," Wood's "Fresh-Water Algæ," etc. There are about 25 volumes in this series.

Of the publications relating to the work of the U. S. National Museum, the annual reports have already been referred to. Papers in these admit of considerable elaboration, but are not considered extensive enough to be published in separate form except as excerpts, which is the case with the second of the books given in our title. When it became apparent that the results of the work of the curators of the Museum would be too long delayed if issued in the annual reports, the "Proceedings" of the Museum was established. This contains advance notices of work, with preliminary descriptions and short notes, which could find no place in other series of the Institution. It is now in its fifteenth volume, but it is published in so small an edition that it is only rarely seen outside of public libraries. Excerpts from it, however, are frequently distributed to specialists. In 1875, previous to the establishment of the "Proceedings," there began to appear a series under the name of "Bulletins." These are octavo in form, and consist of long and elaborate monographs of various orders, or catalogues of birds, beasts, or plants. There are now some 39 of these Bulletins.

Finally, a new series of "Special Bulletins" in quarto form has been begun. Of this series, the volume which forms the first portion of our title is No. 1. The author, Capt. Bendire, is the curator of oölogy in the museum, and he gives in the volume descriptions of the breeding habits of gallinaceous birds, (partridges, grouse, etc.), pigeons, doves, and birds of prey. The nomenclature followed is that of the American Ornithologists' Union Check-list. There is no attempt at synonymy, only the original and the latest name being given. The geographical range for each is also given. In the text there is no description of the bird itself, but the breeding habits, food, nest, and eggs are all fully described. This information has been derived from original notes, from private correspondence, and from published statements. Many interesting facts are given, and a few extracts will serve to show the rich store it contains. The following account of the dance of the prairie sharp-tailed grouse of Manitoba is quoted from the unpublished notes of Mr. E. E. Thompson:—

"After the disappearance of the snow, and the coming of warm weather, the chickens meet every morning at gray dawn, in companies of from six to twenty, on some selected hillock or knoll, and indulge in what is called a 'dance.' This performance I have often watched, and it presents the most amusing spectacle I have yet witnessed in bird life. At first the birds may be seen standing about in ordinary attitudes, when suddenly one of them lowers its head, spreads out its wings nearly horizontally and its tail perpendicularly, distends its air-sacs, and erects its feathers, then rushes across the 'floor,' taking the shortest of steps, but stamping its feet so hard and rapidly that the sound is like that of a kettle-drum; at the same time it utters a sort of bubbling crow, which seems to come from the air-sacs, beats the air with its wings and vibrates its tail, so that it produces a loud, rustling noise, and thus contrives at once to make as extraordinary a spectacle of itself as possible. As soon as one commences, all join in, rattling, stamp-

ing, drumming, crowing, and dancing together furiously; louder and louder the noise, faster and faster the dance becomes, until at last, as they madly whirl about, the birds leap over each other in their excitement. After a brief spell the energy of the dancers begins to abate, and shortly afterward they cease, and stand or move about very quietly, until they are again started by one of their number leading off. . . . The space occupied by the dancers is from 50 to 100 feet across, and, as it is returned to year after year, the grass is usually worn off, and the ground trampled down hard and smooth. The 'dancing' is indulged in at any time of the morning or evening in May, but it is usually at its height before sunrise. . . . When the birds are disturbed on the hill, they immediately take wing and scatter, uttering as they rise their ordinary alarm note, a peculiar vibrating 'cack, cack, cack.' This is almost always uttered simultaneously with the beating of the wings, and so rarely, except under these circumstances, that at first I supposed it was caused by the wings alone, but since then I have heard the sound both when the birds were sailing and when they were on the ground, besides seeing them fly off silently."

One of the dangers of egg-hunting in the western wilds is given in an account of the zone-tailed hawk. One day, while riding up Rillitto Creek, in Arizona, Capt. Bendire observed one of these birds fly from its nest, and he determined to examine it. "Climbing to the nest," he says, "I found another egg, and at the same instant saw from my elevated position something else which could not have been observed from the ground, namely, several Apache Indians crouched down on the side of a little cañon which opened into a creek bed about eighty yards further up. They were evidently watching me, their heads being raised just to a level with the top of the cañon. In those days (1872) Apache Indians were not the most desirable neighbors, especially when one was up a tree and unarmed. I therefore descended as leisurely as possible, knowing that if I showed any especial haste in getting down they would suspect me of having seen them; the egg I had placed in my mouth as the quickest and safest way that I could think of disposing of it,—and rather an uncomfortably large mouthful it was, too,—nevertheless, I reached the ground safely, and, with my horse and shot-gun, lost no time in getting to high and open ground. . . . I found it no easy matter to remove the egg from my mouth without injury, but I finally succeeded, though my jaws ached for some time afterward."

The author puts in a number of good words for the much-abused owls, considering that, as a rule, they are more useful to the farmer and poultry-raiser than harmful. This is especially the case with the barn owl, barred owl, screech owl, and burrowing owl. The great horned owl, on the contrary, is destructive, and merits the condemnation generally accorded it. Domestic fowls and game birds are killed by it in quantities, besides which it feeds upon various mammals, such as rabbits, squirrels, skunks, muskrats, etc. The account given of the burrowing owl disposes of the story that the bird lives in harmony with the prairie-dog and the rattlesnake, and the following extracts are thought to be of interest sufficient to quote:—

"A good deal of nonsense has found its way into print about the life-history of this owl; and the sentimental story of its living in perfect harmony with prairie-dogs and rattlesnakes, both of which inhabit a considerable portion of the range occupied by these owls, was for years accepted as true, and furnished the ground-work for many an interesting tale. . . . From an extended acquaintance with the habits of the burrowing owl, lasting through a number of years' service in the West, I can most positively assert, from personal experience and investigation, that there is no foundation based on actual facts for these stories, and that no such happy families exist in reality. I am fully convinced that the burrowing owl, small as it is, is more than a match for the average prairie-dog, and the rattlesnake as well; it is by no means the peaceful and spiritless bird that it is generally believed to be, and it subsists, to some extent, at least, on the young dogs, if not also on the old ones."

"In Washington, Idaho, and Oregon they appear to migrate about the beginning of November, and sometimes earlier, returning to their summer homes in the early part of March. At any

rate, without actually examining their burrows during the winter months to ascertain their presence, I never saw one of these birds, as far as I can remember, sitting in front of these at such times, and I have lived where they were very common, and would certainly have noticed one occasionally if actually about. . . . These birds are diurnal in their habits, and may be seen sitting in front of their burrows at any hour of the day. When not unduly molested, they are not at all shy, and usually allow one to approach them near enough to observe their curious antics. Their long slender legs give them rather a comical look, a sort of top-heavy appearance, and they are proverbially polite, being sure to bow to you as you pass by. Should you circle around them, they will keep you constantly in view, and, if this is kept up, it sometimes seems as if they were in danger of twisting their heads off in attempting to keep you in sight. If you venture too close, they will rise and fly a short distance, and generally settle down near the mouth of another burrow close by, uttering at the same time a chattering sort of note, and repeat the bowing performance. Occasionally, when disturbed, they alight on a small sage bush, probably to get a better view of the surroundings.

"They hunt their prey mostly in the early evening and throughout the night, more rarely during the day-time. As soon as the sun goes down they become exceedingly active, and especially so during the breeding season. At such times they are always busy hunting food, and go and come constantly, and they may often be seen hovering suspended in the air, like the sparrow-hawk, locating their prey, or darting down noiselessly and swiftly, and grasping it with their talons without arresting their flight an instant. The actual amount of food a pair of these birds require to bring up their numerous family, generally averaging eight or nine, is something enormous. Each owl will eat fully its own weight in twenty-four hours, if it can get it. . . . As nearly all the food used by them consists of noxious vermin, it readily appears what an immensely beneficial bird the burrowing owl is, considered from an economic point of view, and deserving of the fullest protection.

"In southern California the burrowing owl commences laying about the beginning of April; in Oregon, Washington, and Idaho, rarely before the fifteenth of the month, and usually about the latter part of it; in Kansas and northern Texas, it begins about the same time; in Utah, fresh eggs have been found as late as June 15, and at Fort Collins, Colorado, on July 1.

"Although incubation does not appear to begin until the clutch is nearly completed, I have always found one of the parents at home, even if there was but a single egg in the nest. The old bird is courageous in the defence of its domicile, and, as a rule, will not leave it, although the way may be left clear for it to do so. Backing up to the extreme end of its burrow, it will strike with beak and claws in defence of its nest. Frequently, when within a foot or two of the nest proper, and before it was yet visible, the occupant made a rattling noise, produced by the rapid movement of its mandibles, which sounded very much like the warning of the rattlesnake when disturbed; this would easily impose on the average investigator, and, proceeding out of the burrow somewhat muffled and subdued, it is very similar indeed to the rattle of the latter."

There are 146 species described in the volume. Illustrations of the eggs of 94 of these are given on 12 beautifully colored lithographic plates. In looking over them, it is noticeable that, while the eggs of game birds and birds of prey are variously speckled and mottled, those of doves, pigeons, and owls are uniformly white. The last generally nest in holes in trees or similar places and are not conspicuous by reason of this color. The eggs of doves and pigeons, while placed in open nests, are screened by the parent birds, which are protectively colored. Grouse and other game birds generally lay their eggs on the ground, where their mottling prevents their being conspicuous; white birds of prey have similarly marked eggs, which may be considered as protectively colored also. The book contains a great mass of interesting information which will be welcomed both by ornithologists and the ordinary lover of birds. One cannot but regret that the index

Publications Received at Editor's Office.

- CANADIAN GEOLOGICAL SURVEY. Annual Report for 1888-89. Ottawa: S. E. Dawson. 8°. Paper.
 COMMISSIONER OF FISH AND FISHERIES. Report on the Establishment of Fish-cultural Stations. Washington: Government. 4°. Paper. 88 p. Ill.
 HAY, O. P. On the Breeding Habits, Eggs and Young of Certain Snakes. Washington: Government. 8°. Paper. 13 p.
 — On the Ejection of Blood from the Eyes of Horned Toads. Washington: Government. 8°. Paper. 9 p.
 HOWARD, L. O. Insects of the Sub family Eneyninae with Branched Antennae. Washington: Government. 8°. Paper. 9 p.
 STEJNEGER, LEONHARD. Two Additions to the Japanese Avifauna. Washington: Government. 8°. Paper. 3 p.
 TORREY, BRADFORD. The Foot-Path Way. Boston: Houghton, Mifflin & Co. 12°. 245 p. \$1.25.
 U. S. NAVAL OBSERVATORY. Meteorological Observations and Results, 1888. Washington: Government. 4°. Paper. 60 p.
 — Magnetic Observations, 1891. Washington: Government. 4°. Paper. 100 p.

Reading Matter Notices.

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INDEXES

TO

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is so defective. The authorities quoted from or referred to are frequently mentioned, but there are innumerable cases where they are not. It thus becomes an impossibility to ascertain from the index whose work has been and whose has not been referred to.

The second title mentioned in our heading pertains to a paper of quite a different character from the foregoing. The first is a bulletin in itself, the second is an excerpt from the annual report of the U. S. National Museum for 1890: the one treats of special features in the life of birds, the other discusses in general and particular the characters of a small group. In this monograph on humming birds the author, Mr. Robert Ridgway, gives an interesting account of these wonderful little creatures. Among the many subjects discussed, we find an account of the early history of the literature of the group; remarks on the geographical distribution of the species; mention of their habits, manner of flight, migrations, intelligence, nests and eggs, food, variations, etc. The last 70 pages are devoted to descriptions of the species occurring in the United States, seventeen in all, of which illustrations are given of all but five. There are many other figures, some of which are original and others copied from Gould's "Monograph of the Trochilidae."

The family is essentially one of the New World, not a single species being known outside of its bounds. Their diminutive size and brilliant coloration have made them favorites with ornithologists, and, as in the case of every other well-studied group, innumerable genera and species have been made. Dr. Coues refers to this fact, and notices that it was carried to such length that it finally reached "the farcical and scandalous extreme of some 350 genera for few more than 400 known species." In size the species vary from about $8\frac{1}{2}$ inches long to only $2\frac{1}{2}$ inches. Notwithstanding their smallness, they are capable of the most rapid flight, and some perform journeys of 2,000 miles in their semi-annual migrations. On the west coast the highest latitude attained is in Alaska, about 61° , by the rufous-backed hummer, which is found

in winter in Mexico, more than 2,000 miles to the southward of its summer station. In the eastern United States the common ruby-throat ranges in summer as far north as 57° , and in winter is not known to occur north of southern Florida (latitude 29°), while its most southern limit is on the Isthmus of Panama, only 8° north of the equator. Species are most numerous in mountainous countries where there is great diversity of soil and productions within small areas. The State of Ecuador has 100 species within its borders, more than one-half not occurring elsewhere. Mr. Ridgway says regarding their geographical distribution: "Their centre of abundance is among the northern Andes, between the parallels of 10° north and south of the equator, from which region they gradually diminish in numbers both to the northward and southward, but much more rapidly toward the extensive lowlands of the eastern portion of the continent. The northern limit of their abundance may be approximately given as the Tropic of Cancer, beyond which but few of the fifty Mexican species extend, while only eighteen of them have been detected across the boundary line in the equally mountainous portions of the south-western United States, including the semi-tropical Rio Grande Valley. Small as this number may appear, the south-western portion of the Union may be considered richly endowed compared with the vast valley of the Mississippi and the Atlantic water-shed, a region of unsurpassed fertility and luxuriant vegetation, yet which throughout its whole extent, even including the peninsula of Florida, possesses only a single species of humming bird!"

The usefulness of this monograph would be greatly increased by the addition of a table of contents and an index. Neither of these is present in the excerpt, a though they are probably provided for in the report from which it is taken. One must turn page after page to find remarks upon any special subject. Notwithstanding this, however, readers must be grateful to Mr. Ridgway for the work he has done.

JOSEPH F. JAMES.

Washington, D.C., Sept. 16.

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