members of the club will please send their names and addresses to Dr. F. Boas, 47 Lafayette Place, New York.

— Mr. Montagu Kerr has left for Zanzibar to undertake a journey of some venture across Africa. Mr. Kerr has already done good work in Africa, in the journey which he made, almost single-handed, from the Cape to the Zambesi and Lake Nyassa, partly through new country and among some very troublesome tribes, whom he managed with great tact. In his present expedition, which he undertakes entirely at his own charge, Mr. Kerr means to proceed through Massai-land to the north end of Victoria Nyanza, and thence to Emin Pacha's station at Wadelai. His further course will be to some extent guided by Emin Pacha's advice; but his present intention is to proceed westwards to the Lake Chad region, where he hopes to do some good exploring work, and then, if possible, go on to the Niger and descend that river. Mr. Kerr has a strong letter of recommendation from the Marquis of Salisbury to the British consul at Zanzibar. It is possible that when he reaches Zanzibar Mr. Kerr may meet Mr. Stanley, or at least hear of the results of his mission, and may thus be led somewhat to modify his plans. But whatever course he may take, if he keeps his health, he is pretty sure to do some good work. He has, since his return from his last expedition, done every thing possible to qualify himself for scientific observation, and is quite prepared to pass muster as a Mohammedan in the most fanatical Moslem districts. Mr. Kerr is furnished with a set of instruments by the Royal Geographical Society. All who know him have confidence in his pluck and discretion.

— In the October *Monthly Weather Review*, the long drought of 1887 is discussed. During the six months from May to October inclusive, the rainfall has been largely deficient over the district between Dakota, Michigan, Kentucky, and Kansas. Less than one-half the usual amount of rainfall during these months has fallen in central Ohio. Less than three-fourths of the average amount of rain has fallen during these few months from Michigan, Ohio, and Kentucky westward, to include Missouri and Iowa. Of special interest is a compilation of excessive rainfalls in the month of October for a series of from ten to sixteen years. In a letter to the *Engineering News*, General Greely says, "It is the intention of this office to continue this discussion by months. A systematic effort has been made to make the data for succeeding months more complete and full than for October. In addition, the chief signal-officer has issued instructions to the observers, calling their especial attention to heavy rainfalls." The *Engineering News*, in an editorial, had emphasized the importance of measurements of heavy rainfalls; and in reply to this the chief signal-officer writes, that if the engineers of the country are in earnest about this matter, and will persuade Congress to appropriate twenty-five hundred or three thousand dollars for the purpose of buying self-registering rain-gauges, efforts will be made to spend the money economically, and to distribute the gauges so as to completely cover the country. It is very desirable that the plan should be carried out, as these observations, in connection with the gauge measurements published in the reports of the chief of engineers, would be highly valuable from a scientific as well as from a practical point of view, as the interval between excessive rainfalls and floods and the influence of the character of the rainfall upon that of the flood is of eminent importance for the low parts of the country and for the construction of roads, canals, and other works.

— The first number of *The American Geologist* has just been issued. It is stated in the prospectus that the journal will be devoted to geology in its widest sense, and to allied sciences in all those directions where their special investigations bear directly upon the constitution and history of the globe. A journal of this character will be highly welcomed by all interested in the subject; and, as the amount of geological work done in North America is very great, it will undoubtedly flourish, and become indispensable to students of American geology. The continuous increase in the number of journals devoted to special sciences is highly gratifying, as it is proof of a rapid progress of science, and as it prevents the scattering of investigations in one branch of science through numerous journals. The editors are Prof. S. Calvin, T. W. Claypole, Dr. Persifor Frazer, Dr. L. E. Hicks, E. O. Ulrich, Dr. A. Winchell, and Prof. N. H. Winchell. It is published in Minneapolis. The first number contains interesting communications on the International Congress of Geologists, on geological problems and observations in Minnesota and Iowa, editorial comments, and a review of recent literature.

LETTERS TO THE EDITOR.

*** Correspondents are requested to be as brief as possible. The writer's name is in all cases required as proof of good faith.*

Twenty copies of the number containing his communication will be furnished free to any correspondent on request.

The editor will be glad to publish any queries consonant with the character of the journal.

The Mechanism of the Flight of Birds.

THE subject of the interesting letter by my friend Prof. J. S. Newberry in a late number of *Science* is an extremely important one, which has lately been discussed before the National Academy of Sciences and the Linnæan Society of New York, by Professor Newberry, Professor Trowbridge, and others. Much as I regret my absence on those occasions, I am still more sorry to be obliged to dissent without qualification from the position taken by these gentlemen, which is, to my knowledge, quite untenable. Since the matter has been published, I crave permission to state the facts in the case, and incidentally to present the very curious history of the discovery of the remarkable mechanism of flexion and extension in birds' wings, involving what I would call the 'precession and recession of the radius along the ulna.'

First, With regard to the alleged locking of the primaries: 1. It does not take place; 2. Did it take place, flight would be impossible.

Second, Extension of the carpo-metacarpus upon the antebrachium is automatically effected whenever the antebrachium is extended upon the brachium; and, conversely, flexion of the carpo-metacarpus upon the antebrachium is automatically effected whenever the antebrachium is flexed upon the brachium. In other words, the elbow and wrist of a bird work together, and neither can be bent or straightened to any considerable extent without the other being also bent or straightened. This motion, be it observed, in the cubito-carpal joint, is not flexion and extension in the usual technical sense of those terms, but is the movement commonly called, as in human anatomy, adduction and abduction. Moreover, the peculiar movement of the cubital bones (radius and ulna) which produces pronation and supination (as in man and many other mammals which use their fore-paws as hands) is reduced to a minimum, if not absolutely *nil*, in a bird's wing. It is just these points: (*a*) substitution of adduction and abduction for flexion and extension; (*b*) substitution of the lengthwise sliding back and forth of the radius along the ulna, or recession and procession, for that rolling sidewise of the radius upon the ulna which is pronation and supination; and (*c*) the reciprocal interaction of the elbow and wrist-joint, — it is just these points, I aver, which are the gist of the peculiar mechanism of birds' wings, so far as the bones themselves are concerned.

All these points are fully described, and illustrated by figures, in two of my works; namely, 'Proceedings of the American Association for the Advancement of Science, for 1871' (vol. xx., pub. 1872, pp. 278–284); and 'Key to North American Birds' (2d edition, 1884, pp. 106 seq.).

Third, The history of the case is curious, showing the quadrupled discovery of the precession and recession of the radius by four independent observers: (*a*) Bergmann (1839), (*b*) Wyman (1855), (*c*) Coues (1871), (*d*) Garrod (1875). To take these up in reverse order: —

(*d*) GARROD (A.H.), 'On a Point in the Mechanism of the Bird's Wing,' *Proceedings of the Zoölogical Society*, Feb. 16, 1875, pp. 82–84. [The gist of the paper is the peculiar sliding motion of the radius along the ulna. Garrod writes as an independent discoverer, as no doubt he was, or he would of course have referred to the previous writers.]

(*c*) COUES (E), 'On the Mechanism of Flexion and Extension in Birds' Wings,' *Proceedings of the American Association for the Advancement of Science*, xx. for 1871, pub. 1872, pp. 278–284; abstract in *American Naturalist*, v. 1871, pp. 513, 514; reproduced in substance, *Key to North American Birds*, 1884, pp. 106 seq. [See text above. The writer, like Garrod, was ignorant when he made the discovery that any one had preceded him.]

(*b*) WYMAN (J.) [Remarks on a duck's wing, etc.] *Proceedings Boston Society of Natural History*, v. 1855, p. 169. [As I say in my 'Bibliography,' *Bull. U.S. Geogr. Surv. Terr.*, v. 1880, p. 952, this is a paper "showing mechanism of flexion and extension, contributing to fixity of the limb, independently of muscular action." Wyman evidently discovered it himself, and was ignorant of Bergmann's discovery.]

(*a*) BERGMANN (Dr. C.), 'Ueber die Bewegungen von Radius und Ulna am Vogelflügel,' Müller's *Archiv f. Anat. u. Phys.*, vi. 1839, pp. 296–300. [This is an important, interesting, and so far as I know a novel paper on the peculiar mechanism of the fore-arm of birds, before mentioned in none of the works of Meckel, Cuvier, Tudemann, Wagner, etc. The sum of his paper is, that sliding motion lengthwise of the bones, whereby extension of the fore-arm upon the arm, and flexion of the same, respectively reproduce the same movements at the wrist.]

The last four paragraphs are extracted from my 'Bibliography of Ornithology,' most of which is still unpublished.

It is fortunate that the mechanism of the wing does not permit the primaries to lock in the manner that has been supposed, for, if it did so, birds could not fly.

One point more, and I hasten to conclude remarks that I wish were not necessarily so ungracious. The 'fixing of the wing' of a mortally wounded bird, in the manner described by Professor Newberry, does not bear on the case. It is simply a muscular rigidity, due to nervous shock, and of a part with the convulsive muscular action which, under similar circumstances, results in the well-known 'towering' of hard-hit birds. ELLIOTT COUES.

Smithsonian Institution, Washington, Dec. 21.

THE recent discovery of the power possessed by soaring birds to set their wings when fully expanded, and to remain locked independent of muscular action, explains to my mind a phenomenon that has puzzled me for many years. It has been my custom for many seasons to spend a few days each fall duck-shooting at the lakes bordering the Illinois River in central Illinois. The birds were almost invariably shot in mid-air, while flying rapidly by, and often, when not killed at once, they would set their wings and sail gradually down to the water or ground, which they would reach dead, the distance being from one hundred yards to a quarter of a mile, apparently corresponding to the height of the bird when shot. And it was a maxim with duck-shooters on these lakes, "That bird is killed, for he has set his wings."

Besides the ducks, I have seen this phenomenon illustrated in the wild turkey and prairie-hen. In wing-shooting the wild turkey, if it set its wings, and gradually came to the earth a quarter of a mile or more away, we always marked the spot, well expecting to find the dead body when we reached it. With Mr. J. S. Newberry, I trust that some student of anatomy will take up this subject, and demonstrate it to a certainty. W. S. STRODE, M.D.

Bernadotte, Ill., Dec. 22.

Eskimo and Indian.

CONSIDERING the intimate knowledge of the Eskimo language possessed by the two gentlemen who have passed their criticisms upon my remarks on the subject of the past relations of the Eskimo and the Indian, it would be of little avail for me to enter into any lengthy argument upon the matter, although I still consider that there is room for difference on many of the points raised. On a later occasion, I intend elsewhere to treat the subject, both in its ethnographic and philological aspects, on somewhat broader lines than in the article referred to. The evidence in favor of some relation in the past between the Eskimo and the Iroquois seems to me to be convincing, aside altogether from philological data. Kohlmeister and Kmoch (p. 37) state that there is a legend among the Eskimo that the "*Greenlanders* originally came from *Canada*, and settled on the outermost islands of the coast, but never penetrated into the country before they were driven eastward to Greenland." Dr. Brinton (in his *Myths of the New World*, p. 24, note) says, "It is curious that the traditions of the *Tuscaroras*, who placed their arrival on the Virginian coast at about 1300, spoke of the race they found there (called Tacci or Dogi) as eaters of raw flesh, and ignorant of maize." Dr. Rink (*Tales and Traditions of the Eskimo*, p. 11) has the following interesting passage *in rem*: "In the most remote ages the Eskimo, on their trading expeditions, appear to have overpassed their present southern limits. This may be gathered partly from *pure Eskimo words* being found in the language of more southern tribes, partly from the sagas of the old Scandinavians, who seem to have met travelling Eskimo, even to the south of Newfoundland." With regard to the general subject, M. Petitot ('De la prétendue origine orientale des Algonkins,' *Bull. Soc. d'Anthrop. de Paris*, vii. p. 248) expresses himself thus: "Ce qui est bien certain c'est que les *Inini* ne sont pas sans posséder de nombreux rapports de moeurs, de coutoumes, de physionomie, de traditions, et *même de langue* avec leurs voisins les *Pieds-Noirs* les *Tetes-Plates*, et même *avec les Esquimaux*." Elsewhere the same writer observes, "Il n'ai pu trouver dans l'esquimau du Mackenzie un seul mot qui provînt de l'idiome *dènè-dindjié*. Il aura plus de corrélation grammaticale avec le *cris*, dialecte algonquin . . . si dans cette langue les pronoms ne précédaient aussi la racine verbal comme en *déné*, au lieu de la suivre. La consonnance des mots y est à peu près la même. Dans les deux langues on remarque quantité de mots commençant par une voyelle et terminés en *ak*, *ik*, *ok*, *in*, *it*" (*Vocab. Français-Esquimau*, Introd. p. v.). This, to be sure, may not be strong evidence, but it points in a certain direction. From a comparative study of the Eskimo and Iroquois-Algonquin languages, it is certain there is much to be learned. If I have not succeeded in proving, from philological evidence, relations in the past between these people, I can only wait until others shall have done so. Mr. Murdoch has referred to the lack of phonetic vocabularies, and the errors consequent upon the use of such as are at present available. Surely, all the blame cannot be laid upon investigators, who endeavor to do good work with poor material. A glance at the 'Eskimo Bibliography,' lately compiled by Mr. Pilling, is sufficient to convince one that a very great portion of Eskimo linguistic material (and presumably the most valuable, because the most recent and scientific) is still in manuscript in the Library of the Bureau of Ethnology and other great institutions. When this shall have been published, and so distributed throughout the continent, so as to insure facility of access to students, then, I trust, the evidence of past relations between the Eskimo and Indian will be forthcoming, and the fact of their occurrence be capable of proof on scientific grounds. Elsewhere I have discussed the broad question of the pre-history of the Eskimo race, judging them to have been the dolichocephalic people who formerly extended over a great portion of the North American and perhaps of the South American continent. They have been intruded upon and pushed back by more warlike and aggressive races. Not a little interesting is the remarkable correspondence of the Botocudos and other South American tribes in many respects to the Eskimo; and the same remarks apply to some of the so-called 'fossil-men' of Brazil.

A. F. CHAMBERLAIN.

Toronto, Dec. 17.

Weather-Predictions.

PERHAPS it can hardly be said that there is a science of weather-prediction at the present time; yet interest in the subject is increasing, and there are several persons in this country who are issuing daily scientific forecasts. While the basis upon which forecasts shall be issued admits of little discussion, yet it is far otherwise with their verification, and it would seem that much confusion has arisen on this account. The following comparison of weather-forecasts is given with the hope that others will enter the field outlined, and that a general discussion may clear up some of the misty points. The forecasts were made during October for Boston, Mass., by Mr. Clayton at Blue Hill, and by the writer at Washington, D.C. The predictions were for 'fair,' 'rain,' and halfway between, or 'threatening.'

The verifications were to be by the observations at Boston, made at 7 A.M., 3 and 10 P.M., each day. As there was no specific record of 'threatening,' the amount of clouds was to determine this condition. The prediction was made at Blue Hill at 2 P.M. each day from an examination of the Signal Service observations made over the country at 7 A.M., together with a study of the local conditions at 2 P.M. The Washington prediction was necessarily made from the 7 A.M. observation alone. The interval predicted for was from