Irrawadi there could be no question. Such a rainfall seemed in itself quite sufficient to account for the large volume of water that was drained off by the lower portions of the Irrawadi; and anybody who knew what Tibet was, General Strachey stated, must be aware that, even with a course of several hundred miles, the river would pick up but a small quantity of water in comparison with the enormous volumes which were collected from the rain which fell in Upper Burmah. General Strachey had roughly calculated that a monthly fall of rain of 18 inches over a square degree would mean 65,000 cubic feet per second for the whole month.

THE latest news from Dr. Bunge, chief of the Russian Polar Station at the mouth of the Lena, is encouraging. Telegraphing from Orkinga, a telegraph-station on the road to Yakutsk, Dr. Bunge informs the Academy of Sciences at St. Petersburg that his expedition has had a successful issue. They passed the summer in two islands of the New Siberia Archipelago; Bunge on Great Liakovsky, and Toll on Kotelnoy Island. During spring all the five islands of the group were explored, New Siberia especially by Toll. The mainland was reached at the end of October. The scientific results are very considerable, and, as we know so little about these islands, are likely to be novel.

MM. POTANIN, SKASSY, AND BÉRÉSOFSKY have lately returned from their expedition to China and Mongolia, bringing numerous collections in anthropology, zoology, and botany, besides maps of the country which they have traversed during their three years' journey (1884-86). The Russian Geographical Society has nominated a committee, consisting of MM. Stebnitsky, Tillo, Mushketoff, and Schmidt, to make inquiries as to the desiccation of Siberian lakes. It is expected that an expedition will be despatched to investigate the subject on the spot.

WE learn that the geographical results achieved by the Survey officers on the Afghan Frontier Commission extend over 100,000 square miles of country. The Indian Survey officers have been very busy in Upper Burmah. Captain Hobson's map, prepared from all available sources, in 14 sheets, is all published already. A reduction therefrom, on the scale of 16 miles to an inch, has been prepared in the Surveyer-General's Office, Calcutta, and published also. The Survey party, which has lately completed the Andaman Islands survey, left Calcutta on November 19, under the charge of Major G. Strahan, R.E., to undertake the survey of the Nicobar Islands.

THE ESKIMO

SPECIAL interest attaches to a paper on "The East Greenlanders in their relations to the other Eskimo Tribes," contributed by Dr. H. Rink to the current number of the *Deutsche Geographische Blätter* (Bremen, 1886). Hitherto these hyperboreans have been studied by independent observers, chiefly in Alaska at the eastern, and in Greenland and Labrador at the western extremity of their domain, while through lack of sufficient materials the intermediate branches thinly scattered round the Arctic shores from the Mackenzie to Baffin Bay have been mostly neglected. Here, however, we have for the first time a comprehensive ethnological survey of the whole field by perhaps the greatest living authority on the subject, based on the rich collections recently brought to Europe by Capt. Holm from East Greenland, by the brothers Krause and A. Jakobsen from Alaska, and by F. Boas from the central region of Baffin Land.

With these materials before him, and keeping in view the facts already determined by previous students, Dr. Rink is able to throw much light, if not on the origin, at least on the general line of dispersion, and still more on the social evolution and art history, of the Eskimo race. He makes it sufficiently evident that their primæval home must be placed in the extreme north-west, on the Alaskan shores of the Bering Sea, where they probably acquired a knowledge of some of the useful industries connected with navigation, fishing, and hunting from the neighbouring Indian tribes of Athabascan stock. From this point the migratory movement appears to have been partly across the neck of the Alaskan Peninsula to the Copper River, where their further progress in this direction was arrested by the Thlinkit Indians on the coast and by the Athabascans in the interior. But their wanderings were chiefly directed towards the north and east, that is, along "the line of least resistance" around the unoccupied Arctic seaboard down to Baffin Bay, which seems to have formed a fresh point of dispersion, southwards to Labrador and eastwards to East and West Greenland. Dr. Rink is inclined to accept the view of Capt. Holm, that the Angmagsaliks, or East Greenlanders, found their way round the unexplored north coast of Greenland to their present homes, and that the West Greenlanders passed from Baffin Bay directly southwards, while a mixed race, most probably including old Norse elements, was developed at the southern extremity of the peninsula. In the extreme west there has also been a slight intermingling, with Thlinkits about the Copper River, and with Athabascans, back of Kotzebue Sound; but elsewhere the Innuit and Karalik (Western and Eastern Eskimo) have kept entirely aloof, nowhere amalgamating with the Red Man, and keeping mainly to the seaboard throughout the whole extent of their domain, which, between the Copper River and Cape Farewell, Greenland, cannot be estimated at less than 7000 miles in extent, although scarcely anywhere exceeding 150 miles inland from the coast. This explains the curious fact that the social organisation of the Indian tribes in families, gentes, phratries, confederacies, and nations can nowhere be detected amongst the Eskimo, unless to it is to be attributed a certain restriction in the choice of a wife, and an obligation to lend each other mutual aid, universally recognised amongst all branches of the race. Even the general distribution into tribes, assumed by most writers, appears to be quite groundless, and the final syllable, *mût*, *miût*, of the so-called tribal names, meaning "dweller," "inhabitant of," shows that they are purely *topographical* terms without any ethnical significance whatsoever. Thus, Angmagsalingmiût, Mahlemiût, Aglemiût = inhabitants of the *Angmagsalik*, *Mahle*, *Agle* districts, and so on; so much so, that a family migrating from one of these districts to another changes its name accordingly. Hence Dr. Rink considers it sufficient for all practical purposes to class the whole race into the following seven *geographical* groups:—(1) South Alaskan; (2) North Alaskan; (3) Mackenzie; (4) Central (Baffin Land, &c.); (5) Labrador; (6 and 7) West and East Greenland. Between these various groups there certainly exist differences, by which they may often be readily distinguished; but these are mainly of a social and linguistic, and to a less extent of a physical character; and such is the great uniformity even in the structure of the Eskimo tongue, that an East Greenlander and an Alaskan, if fortuitously thrown together, would soon begin to understand one another. It is noteworthy that in Greenland, where the language has been most carefully studied, greater differences are observed between the eastern and western than between the northern and southern dialects—a circumstance doubtless due to the different routes followed by the two streams of immigration from the central region. Compared with the West Greenland dialect, taken as the written standard, the Labrador is found to contain 15, the Central 20, the Mackenzie 31, and the Alaskan 53 per cent. of different root-words—relations which correspond remarkably well with the conclusions arrived at, on other grounds, regarding the general migratory movement from Alaska, the assumed cradle of the race.

But here an important exception is formed by the Aleutian Islanders, who are treated by Dr. Rink as a branch of the Eskimo family, but whose language diverges profoundly from, or rather shows no perceptible affinity at all to, the Eskimo. The old question respecting the ethnical affinities of the Aleutians is thus again raised, but not further discussed by our author. To say that they must be regarded as "ein abnormer Seitenzweig," merely avoids the difficulty, while perhaps obscuring or misstating the true relations altogether. For these islanders should possibly be regarded, not as "an abnormal offshoot," but as the original stock from which the Eskimos themselves have diverged. It is remarkable that in his new work on "Alaska and the Seal Islands" Henry W. Elliott discovers a striking resemblance between the Aleutians and the Japanese. They constantly remind him of "Japanese faces and forms in another costume," so much so that in his opinion they form "a perfect link of gradation," not between the Eskimo and Red Man, nor between the Eskimo and Asiatic hyperboreans, but "between the Japanese and Eskimo" (p. 173). Mr. Elliott may have here unconsciously hit upon the solution of a very interesting ethnological problem, for in his "Classification of the Varieties of the Human Species" (*Journal* of the Anthropological Institute, May 1885), Prof. Flower also connects the Eskimo with the Japanese:—"Every special characteristic which distinguishes a Japanese from the average of mankind is seen in

the Eskimo in an exaggerated degree, so that there can be no doubt about their being derived from the same stock. It has also been shown that these special characteristics gradually increase from west to east, and are seen in their greatest perfection in the inhabitants of Greenland, at all events in those where no crossings with the Danes have taken place."

The Aleutians would thus help to bridge over the somewhat abrupt gap still undoubtedly separating the Eskimo and Japanese groups. At the same time this view suggests a primæval line of migration from Japan through the Kurile Islands and Kamchatka to the Aleutian chain and Alaska, which again presents other difficulties of a somewhat formidable character. In the first place, the Japanese appear to be themselves only comparatively recent intruders in Niphon, whose primitive inhabitants were the Ainos, a people of totally different physical type. Hence it is not easy to understand how they could have thrown off an easterly branch, which has had time to develop into the Eskimo, probably the most specialised of all existing races. In the second place, in his "Tales and Traditions of the Eskimo," Dr. Rink himself advances some solid reasons for bringing the Eskimo, not from Asia at all, or at least not in the first instance, but from the interior of the North American continent. He holds in fact, with some other ethnologists, that they were originally inlanders, who, under pressure from the American Indians, gradually advanced along the course of the Yukon, Mackenzie, and other great rivers, to their present homes on the Bering Sea and Frozen Ocean. But a discussion of these contradictory theories, for which a solution may yet be found, must be deferred to another occasion. Meantime enough has probably been said to show the highly suggestive character of the paper under review.

A. H. KEANE

SCIENTIFIC SERIALS

L'Astronomie: Revue mensuelle d'Astronomie populaire, de Météorologie, et de Physique du Globe, January 1887.—We have received the January number of the above periodical, edited by Camille Flammarion. M. Flammarion has done a great work in popularising astronomy in France, and the success which has attended this review—for it is entering on its sixth year—proves how widespread an interest is now taken in the science in that country. The present number contains an "Annuaire astronomique pour 1887," by the editor, a series of descriptive notes of a general character on the principal objects of astronomical observation for the current year, the sun, moon, eclipses, occultations, and the planets. M. Daubrée follows with a paper on some recent meteorites. M. Flammarion gives an account of the storms of October 16 and December 8, and of the general principles of weather prophecy. The notes chiefly relate to the two comets of the season, those of Barnard and Finlay, three diagrams being given of the first, showing the position and character of the two tails, and one of the second. A sort of general observing ephemeris for the month January 15 to February 15, of a popular rather than of a scientific character, concludes the number. M. Flammarion and his co-workers frequently affect a somewhat magniloquent and sensational style, and deal principally with the more popular, easy, and interesting aspects of astronomy; the wonders of our own globe, earthquakes, volcanoes, &c., receive much attention, so that the field embraced is not confined to pure astronomy alone. But after every allowance is made and every drawback admitted, *L'Astronomie* has done much good in circulating astronomical information and in arousing and fostering scientific tastes, and it must be confessed that for an astronomical journal containing forty well-printed imperial octavo pages and, as in this case, more than thirty illustrations, to command a remunerative circulation at the price of a franc a number is highly creditable alike to editor, to publishers, and to the public which supports it. It may well be doubted whether such an enterprise would meet with the same success either here or in America.

Bulletin de l'Académie des Sciences de St. Pétersbourg, tome xxx., No. 4.—The appearance of Encke's comet in 1885 compared with its previous appearances, by O. Backlund. The paper is the first of a series, and contains, besides the numerical data of the observations made in 1885, an inquiry into the disturbances due to the attraction of the earth. The summer parallax of the earth is taken to be 8″·80, and the elements of the comet are determined accordingly.—On the formation of buds among the Phanerogams, by A. Famintzin.—The period of the rotation of the sun, according to the magnetic disturbances, as observed at Pawlowsk, by P. A. Müller. The average value of 25·66 is deduced from observations made from August 1, 1882, to August 31, 1883.—Photography applied to astronomy; abstract of a lecture by Otto Struve.—On several new Trilobites and kindred forms from East Siberia, by Fr. Schmidt. The following species (nearly all new) are described, with plates:—From the Cambrian, on the Vilui River, *Anomocare pawlowskii* and *Liostracus* (?) *maydeli*; from the Cambrian on the Olenek, *Agnostus czekanowskii*; from the Lower Silurian of the Middle Tunguska, *Phacops lopatini* and *P. sibiricus*; from the Devonian limestone at Krasnoyarsk, *Proëtus slatkowskii*, *Cyphaspis sibirica*; *Eurypterus* (?) *czekanowskii*, and *E. punctatus* from the Devonian on the Angara at Padun.—A new form of *Opalina* (*spiculata*), by Warpachowsky.—On a new *Otomela* (*bogdanowi*), by V. Bianchi.—Remarkable hail at Bobruisk, by H. Wild (with plates). On November 28, 1885, with an absolutely clear sky, not a cloud being visible, hail fell for five minutes. The fall was quite local, and did not extend farther than five miles from Bobruisk. Many pieces were like broken pieces of ice, others apple-shaped, with conical depressions at the poles.—On the electromotory difference and the polarisation of electrodes on telegraphic lines, by P. Müller.

SOCIETIES AND ACADEMIES

LONDON

Royal Society, January 13.—"On the Crimson Line of Phosphorescent Alumina." By William Crookes, F.R.S., V.P.C.S

In a paper which I had the honour of communicating to the Royal Society in March 1879 (Phil. Trans., Part 2, 1879, pp. 660, 661), I described the phosphorescence of alumina and its various forms when under the influence of the electrical discharge *in vacuo*, in the following words:—"Next to the diamond, alumina in the form of ruby is perhaps the most strikingly phosphorescent stone I have examined. It glows with a rich full red; and a remarkable feature is that it is of little consequence what degree of colour the earth or stone possesses naturally, the colour of the phosphorescence is nearly the same in all cases; chemically precipitated amorphous alumina, rubies of a pale reddish yellow, and gems of the prized 'pigeon's blood' colour, glowing alike in the vacuum, thus corroborating E. Becquerel's (*Annales de Chimie et de Physique*, vol. lvii. 1859, p. 50) results on the action of light on alumina and its compounds in the phosphoroscope. . . . The appearance of the alumina glow in the spectroscope is remarkable. There is a faint continuous spectrum ending in the red somewhere near the line B; then a black space, and next an intensely brilliant and sharp red line to which nearly the whole of the intensity of the coloured glow is due. . . . This line coincides with the one described by E. Becquerel as being the most brilliant of the lines in the spectrum of the light of alumina, in its various forms, when glowing in the phosphoroscope."

In the *Comptes rendus* for December 6 last (vol. cii. p. 1107) appears a brief note by M. de Boisbaudran, in which he announces, "to that date, that alumina, calcined and submitted to the electrical discharge in a vacuum, has not given him a trace of red fluorescence." This fluorescence, as well as its special spectrum, shows itself brilliantly when the alumina contains 1/100 and even 1/1100 of Cr_2O_3. With the 1/10,000 part of Cr_2O_3 we still obtain very visible rose colour. . . . From these observations the presence of chromium appears to be indispensable to the production of the red fluorescence of alumina."

This statement being opposed to all my experience, I immediately instituted experiments with a view, if possible, to clear up the mystery. I started with aluminium sulphate which I knew to be tolerably pure, and in which ordinary tests failed to detect chromium. On ignition and testing in the usual manner in a radiant-matter tube the alumina line was brightly visible in the spectrum of the emitted light. Different portions of this aluminium sulphate were now purified by various processes for the separation of chromium. All gave as a result the absence of this impurity. The most trustworthy process being that devised by Wöhler ("Select Methods in Chemical Analysis," second edition, p. 124), I used it to purify the bulk. The salt was dissolved in water, and excess of caustic potash added till the precipitate first formed re-dissolved. Chlorine was now passed through till no