

OUR ASTRONOMICAL COLUMN

BARNARD'S COMET.—The following ephemeris of this comet for Greenwich midnight is deduced from the elliptical elements of Dr. Berberich, of Strasburg, which assign a revolution of $5\frac{1}{2}$ years:—

1884	R.A.			N.P.D.			Log. distance from Earth Sun			
	h.	m.	s.							
Nov. 6 ...	22	5	32 ...	101	27	8 ...	0	0041 ...	0	1985
8 ...	—	10	28 ...	100	50	3 ...	0	0147		
10 ...	—	15	20 ...	100	13	3 ...	0	0253 ...	0	2054
12 ...	—	20	8 ...	99	36	8 ...	0	0358		
14 ...	—	24	51 ...	99	0	7 ...	0	0463 ...	0	2122
16 ...	—	29	30 ...	98	25	2 ...	0	0567		
18 ...	—	34	6 ...	97	50	1 ...	0	0670 ...	0	2191
20 ...	—	38	38 ...	97	15	5 ...	0	0772		
22 ...	22	43	7 ...	96	41	4 ...	0	0874 ...	0	2259

The theoretical intensity of light on November 6 is $0\cdot39$, and on November 22, $0\cdot24$. As previously remarked, it is very desirable that observations of this comet for position should be continued as long as practicable, that its mean motion may be determined with sufficient precision to enable a trustworthy estimate of past planetary perturbations to be obtained. The general resemblance of the elements to those of the short-period comet of De Vico in 1844 will render such an investigation one of much interest.

THE NOVEMBER METEORS.—The earth arrives at the descending node of the first comet of 1866 on the afternoon of Thursday, November 13, and a watch may be favourably instituted on the night of that day for meteors of the stream which appears to lie in the comet's track. Oppölzer's definitive elements give for the radiant point, R.A. $150^{\circ}2$, N.P.D. $67^{\circ}2$ (equinox of 1866).

THE LICK OBSERVATORY, CALIFORNIA.—The following is an extract of a letter from Prof. Edward S. Holden, Director of the Washburn Observatory, University of Wisconsin, dated October 17:—"I have just returned from the Lick Observatory, where I have mounted a beautiful meridian-circle by Repsold of 6 (French) inches aperture. It has north and south collimators of the same aperture, and its axis is a telescope of 2.5 inches aperture, which is viewed by an east (or west) collimator for controlling the azimuth, &c. There are two circles, each divided to 2', one fixed, the other movable by a wheel and pinion, so that it is not essential to determine the division errors of any lines except those for each 1°, and those 2' lines belonging to 4 degrees, 90° apart. The room is double throughout, a wooden building 40 X 40 feet inside of a structure in louvre-work, which gives a continuous air space all around; and this air space is connected with a tall ventilating tower which enables the free circulation of air to be maintained. It appears to me to be in all respects satisfactory. The Lick Observatory now needs only its 36-inch refractor to be complete, and they hope for this within three years."

It will be remembered that this Observatory is situate on the top of Mount Hamilton.

VARIABLE STAR IN THE ORION-NEBULA.—The late Prof. Schmidt found that the star which he distinguishes as J' (Bond 822 = Liapunov γ), which follows θ Orionis $34\cdot3s$, and $5\cdot5''$ to the south of it, disappeared at minimum in his 5-foot refractor, and at maximum reached $9\cdot5m$. On April 3, 1878, it was estimated $12\cdot8$, equal to Bond 784, but before the end of the month it rose to $9\cdot7$. The star may deserve frequent observation.

GEOGRAPHICAL NOTES

THE Rev. Francis A. Allen has issued a reprint of the paper read by him at the late Congress of Americanists in Copenhagen on Polynesian antiquities. The stupendous Cyclopean monuments, platforms, terraces, walls, colossal statues, scattered over the South Sea Islands are graphically described, and regarded as forming a connecting link between the ancient civilisations of Asia and America. The theory is that America was mainly peopled by two streams of migration from Asia—a nomad Mongolic, proceeding directly by the Straits of Behring, and now represented by the Apaches, Utes, Comanches, and other wild tribes of California, Oregon, Colorado, &c.; and a semi-civilised, proceeding from Further India and China across the islands of the Pacific Ocean to Mexico, Central America,

and Peru. On their way across the archipelagoes these peoples left traces of their presence in Micronesia, Hawaii, Tahiti, and especially Easter Island, the last-named distant only some 2600 miles from the mainland of South America. The resemblances between these monuments and those of Peru and Mexico are dwelt upon, and they are further compared with those of Java (Boro-Boro), Cambodia (Angkor-Vaht), and others in Southern Asia. The theory, which is not altogether novel, is supported by other arguments based on considerations of traditions, usages, religions, languages, and the like, brought together from various sources not always of a trustworthy character. It is suggested that the Chinese tradition of the discovery of Fusang by the monk Hoën-Shin may not be altogether an idle tale. Allusion is made to Schoolcraft's exploded legend of Hiawatha; and some more than doubtful authorities are referred to in proof of the affinities between the American languages and those of Japan, North-East Siberia, and Indo-China. Nevertheless, if not always critical, the paper is learned and lucid, and worth reprinting, if only for the great number of data here brought together as bearing directly or indirectly on the point at issue.

HERR VON HAARDT contributes an instructive memoir to the last number of the *Proceedings* of the Vienna Geographical Society on the services rendered to the progress of the geographical sciences by the Austrian navy. A brief historical survey is given of the famous *Novara* Expedition round the world (1857-59); of the survey of the Adriatic coastlands by Capt. T. Ritter (1871); the simultaneous determination of the magnetic relations in the same waters by Lieut. J. Schellander; the expedition of the *Friedrich* and *Donau* to the East Asiatic seaboard (1868); the second voyage of the *Donau* to Asia and South America (1874-76); the circumnavigation of Borneo by Capt. T. F. von Oesterreicher; the circumnavigation of Africa by the *Helgoland* and *Friedrich* (1874-75); the voyages of the *Pola* to Jan Mayen and the Arctic Ocean (1882-83); Weyprecht's discovery of Franz-Josef Land, &c. The memoir concludes with a brief reference to the expeditions now in progress or promised in the near future, such as that of the *Saida* to Australasia (1884-86); of the *Aurora* to South America (1884-85); of the *Helgoland* to the West African seaboard, and of the *Fruntsberg* to the Indian Ocean.

THE same periodical contains the first part of what promises to be a very valuable contribution to the physiography of Caucasia. Much useful information is here brought together from the latest sources regarding the orography, river systems, administrative divisions, and statistics of that region. The present area of the northern section (Cis-Caucasia) is given at 4037 German geographical square miles, of the southern (Trans-Caucasia), 4400; total, 8437, or 2740 more than that of the British Isles.

To this journal F. Blumentritt also sends an account of the little-known Negrito tribes of the district of Principe in the Island of Luzon, Philippine Archipelago. These aborigines, collectively known as Atas (Aetas), and showing distinct physical resemblances to the non-Malay wild tribes of Malacca, are being gradually evangelised by the Spanish missionaries stationed at Baler. Hemmed in between the semi-civilised Tagalans and the fierce Ilongotes, both of mixed Malay stock and speech, they have already been largely affected by Malay influences. But although their language contains numerous Tagala words, expressions, and even grammatical forms, its fundamentally distinct character has been clearly determined. For the purpose of comparison useful vocabularies of about 150 words are appended in five languages: Spanish, Tagala, Negrito of Mariveles (Bataan), Negrito of Zambales, and Negrito of Baler (Principe).

At the opening meeting of the Royal Geographical Society on Monday, Mr. Joseph Thomson gave an eloquent and highly interesting account of his recent explorations in the country of the Masai. Both the country and the people are of the greatest interest to science, and, as was shown last week, Mr. Thomson's botanical collections are decidedly novel. One or two zoological novelties he has also obtained, and we shall be glad to have the detailed account of his discoveries, which will appear in his forthcoming work.

It appears from the *Anglo-New Zealand and Australian Times* that Mr. H. O. Forbes, F.R.G.S., is organising a scientific expedition with the view of exploring the botany and zoology of the Mount Owen Stanley Mountains, the great cen-

tral range of the eastern peninsula of New Guinea. Mr. Forbes has been allowed 400*l.* by the British Association and 250*l.* by the Royal Geographical Society towards the expense of the expedition. The party will start early in December, though it is not expected to get into active working before May next, in consequence of the necessity for procuring trusty carriers from the Moluccas. Mr. Forbes will break his journey at Batavia, in order to proceed to Amboyna, where he hopes to find his men. He will then return to Batavia, and sail for Thursday Island, proceeding thence to Port Moresby. He proposes to ascend the course of one of the rivers which flow from the mountains to Redscar Bay. Should the natives prove friendly and the food-supplies sufficient, Mr. Forbes does not despair of reaching the other coast of the peninsula; but in any case the exploration of the Mount Owen Stanley Range would be of itself a satisfactory achievement. The mountain travelling is declared to be dangerous to any but very experienced travellers.

NEWS has reached St. Petersburg from Col. Prjevalsky, the indefatigable explorer in Thibet, whose expedition appears to be distinguishing itself in feats of arms as well as discoveries of science. A telegram *via* Kiatcha, dated August 20, says:—"The difficult task of the expedition has been successfully accomplished. During the three summer months we traversed 1000 versts of North-Eastern Thibet. We first descended from Zaidam, 400 versts south, over the sources of the Yellow River to the Blue River, which it was found impossible to cross, and then we explored the large lakes in the upper course of the Yellow River. One lake was named 'Russian,' another 'Expedition' Lake. Their height was 13,500 feet, the surrounding country being a mountain plateau 1000 feet higher. Along the Blue River lies a mountainous, but woodless and Alpine country. The climate of the localities passed through was terrible. The whole of the summer was cold, with rain and snow; at the end of May there was sharp frost, in July we had snowstorms like those of winter, while the amount of alluvium deposited by south-western monsoons from the Indian Ocean is so great that in summer Northern Thibet is converted into an almost continuous marsh. Wild animals and fish are abundant, the birds and flora poor, but original. The Tanguts live on the Blue River, and near the lakes of the Yellow River. Here we were twice attacked by about 300 mounted marauders, and the heroic conduct of my companions, armed with Berdan rifles, saved the expedition. We soon repulsed the first attack on July 25, and subsequently destroyed the Tangut camp. A week later a fresh party from another Tangut tribe attacked us. For two hours on the banks of the Yellow River we repelled the mounted brigands with repeated volleys from our rifles; and when we took the offensive the Tanguts retreated behind the knolls, and in turn began volley-firing. We were most fortunate, all coming off safe and sound, only two of our horses being wounded, while forty of the brigands were killed and wounded in the two encounters. We now go to Western Zaidam. We shall establish a depot at Hast, and during the winter explore the surrounding localities."

DR. GERHARD ROHLFS leaves for the West Coast of Africa by one of the German war-ships under Admiral Knorr, and has been intrusted with a special mission by the German Government.

CAPT. BECKER and some other Belgian officers are about to proceed to Zanzibar, thence to start for Lake Tanganyika. They intend to cross this lake, and to found a station on its western shore. Thus the line of stations across Africa, which the International African Society has planned, will be completed. On the eastern side of Lake Tanganyika, between this and the sea-coast, there are four stations: Kondoa, in Usagara; Tabora, in Unyamwebe; Kakoma, in Uganda; and Karema, on the shore of the lake. On the western side there are over fifty stations between the lake and the Atlantic.

THE subject of trade-routes into South-Western China is now engaging attention in France, and has caused much discussion in the periodical press. The various methods of reaching Szechuan and Yunnan which have from time to time been suggested by explorers are dismissed in their turn as impracticable. From the side of India we have the Brahmaputra, which is navigable almost to the Chinese frontier, and the Irrawaddy *via* Bahmo. These are described as useless on account of the obstacles offered by lofty and almost impassable ranges of mountains; the Meinam from Bangkok would only land us in the Shan States; and the Meikong, through Cambodia, was tried by Lagrèe, but was found quite unfit for navigation on account of its numerous rapids and

cataracts. In China we have the Sikiang—which offers an almost straight line from Canton into Southern China, and was followed by Mr. Colquhoun in his recent attempt to cross through the Shan States into British Burmah—and the Yang-tze-kiang, but both of these routes, according to French writers, are closed to trade by Chinese hostility. Thus every possible route has been tried and found wanting, with one exception, viz. that by the Songkoi or Red River of Tonquin. By means of this new possession of France the trade of the two great provinces of South-Western China, say the French writers, can be tapped, and in no other way. Their wealth, it is said, will be poured down the valley of the Red River into the hands of the French traders at Hanoi and Haiphong. With regard to routes mentioned only to be dismissed as impossible, nothing need be said here. Their merits and defects may be found described in a score of English works by explorers on the spot; but so far as the Red River is concerned, no proposition either way can be laid down with safety. Beyond Hanoi it is but little known, and its upper waters above Honghoa are almost wholly unknown to Europeans. But one Frenchman has ever ascended or descended the river, and when M. Dupuis made his courageous journeys more than ten years ago, he did so under circumstances which rendered geographical observation impossible. All that M. Dupuis can say (and European knowledge is confined to his information) is that with an escort, and with Chinese passports, he was able to come down the river in a small junk, and to ascend it again with several junks laden with arms and ammunition. Even at the present moment the whole river from Honghoa to Laokai on the Chinese frontier is in the hands of the Black Flags. Moreover it has been stated that after leaving the Red River the route would have to cross a lofty mountain range, and pass through the most desolate region in Yunnan. The river may offer an excellent trade route; but in the present state of our geographical knowledge of Upper Tonquin all that can be said with certainty is that nobody knows whether it is so or not. Happily the French lose no time in thoroughly studying the countries which they occupy, and as soon as a state of peace has been reached in Indo-China we shall be in a position to decide the question; until then anything written about the navigation of the Red River above Honghoa is mere speculation, and valueless for practical purposes.

THE last number of the *Izvestia* of the Russian Geographical Society contains three interesting papers by M. D. Ivanoff on the Pamir, embodying the results of the last year's expedition, and giving a lively summary of our present knowledge as to this very interesting region. A. E. Regel contributes to the same number a note on his journey to the Shugnan; A. Wysheslavtseff describes the burial customs of the Tchuvashes; and P. A. Putyatyn contributes a note on the pottery of the Stone Age. The same issue contains, moreover, accounts of the geodetical and cartographical work done in 1883 by the military topographers and by the Hydrographical Department, and several notes.

NATURAL SCIENCE IN SCHOOLS¹

HOWEVER fully it may be admitted by the few that it is important, nay essential, that all members of the community, whatever their station or occupation, should during their school career receive some instruction in the elements of natural science, the general public have not as yet had brought home to them with sufficient clearness that, just as a knowledge of foreign languages is essential to all who are brought into intercourse with foreigners, so in like manner is a correct knowledge of the elements of natural science of direct practical value to all in their daily intercourse with Nature, apart from the pleasure which such knowledge affords. In fact, judged from a purely utilitarian standpoint, the advantages to be derived from even the most elementary acquaintance with what may be termed the science of daily life are so manifold that, if once understood by the public, the claims of science to a place in the ordinary school course must meet with universal recognition. To quote Huxley²:

¹ "On the Teaching of Natural Science as a Part of the Ordinary School Course, and on the Method of Teaching Chemistry in the Introductory Course in Science Classes, Schools and Colleges." Paper read at the Educational Conference of the International Health Exhibition by Henry E. Armstrong, Ph.D., F.R.S., Sec.C.S., Professor of Chemistry in the Finsbury Technical College.

² This writer's "Introductory" to Macmillan's Science Primers, and his "Physiography: an Introduction to the Study of Nature," should be studied by all who wish to know what science is and how it should be taught.