

the Government of Erivan. Altogether, the mortality is, however, very great, and it is compensated only by a great number of births. As to the density of population, the 224,221 square kilometres occupied by the Northern Caucasus have 10.3 inhabitants per square kilometre, which figure reaches as much as 13.6 in Transcaucasia (248,445 square kilometres), where the density of population is the same as in European Russia. The Governments of Kutais (the valley of the Rion), Erivan, and Tiflis have respectively 33.6, 20.8, and 17.8 inhabitants per square kilometre.

AMONG the recent additions to Chinese scientific literature are translations of Margutti's "Elementary Chemistry" and Fresenius's "Chemical Analysis." These works have been translated into Chinese by M. Billequin, one of the professors of the Jung Wên Kwan, or Foreign College, at Peking.

THE Secretary of State for India in Council has appointed Mr. David Hooper, F.C.S., of Birmingham, to the Nilgiri Government Cinchona Plantations in the Madras Presidency.

THE additions to the Zoological Society's Gardens during the past week include a Ludio Monkey (*Cercopithecus ludio*) from West Africa, presented by Mr. F. W. Robinson; a Macaque Monkey (*Macacus cynomolgus* ♂) from India, presented by Mr. E. Drew; a Vulpine Phalanger (*Phalangista vulpina*) from Australia, presented by Mr. J. C. Martin; a Central American Agouti (*Dasyprocta isthmica*) from Central America, presented by Mr. Hugh Wilson; a Herring Gull (*Larus argentatus*), European, presented by Mr. Thomas Daws; a Common Viper (*Vipera berus*), British, presented by Mr. H. German; a Burchell's Zebra (*Equus burchelli* ♀) from South Africa, three Michie's Tufted Deer (*Elaphodus michianus* ♂ ♀ ♀), four Darwin's Pucras (*Pucrasia darwini* ♂ ♂ ♂ ♀), an Elliot's Pheasant (*Phasianus ellioti* ♂) from China, deposited; three Corn Buntings (*Emberiza miliaria*), British, purchased.

#### OUR ASTRONOMICAL COLUMN

SOUTHERN COMETS.—Dr. Oppenheim of Berlin has published elements of the comet discovered by Mr. Ross of Elsternwick, Victoria, on January 7, founded upon the Melbourne observations in *Astron. Nach.*, No. 2579, though, as he remarks, they were calculated with difficulty, owing to the existence of three oversights in the seven positions there given; hence their connection for an orbit would involve a troublesome tentative process. The position for January 17 is in error nearly two degrees.

Mr. Tebbutt has also computed elements from his own observations at Windsor, New South Wales, on January 19, 23, and 28, which represent closely the observation on February 2, the last he was able to obtain, the comet having become very faint; on January 19 he had considered it just beyond naked-eye vision. He remarks upon the discordance of his elements with those calculated by M. Barachi of the Melbourne Observatory, and observes: "I cannot account for these discrepancies, unless there be some error in the Melbourne data." We subjoin both orbits:—

	Tebbutt Perihelion Passage, 1883, Dec. 25 <sup>h</sup> 3003 <sup>m</sup> 38 ... ..	Oppenheim Dec. 25 <sup>h</sup> 3027 <sup>m</sup>
Longitude of perihelion ... ..	125 44 24 ... ..	125 46 12
" " ascending node ... ..	264 24 0 ... ..	264 25 14
Inclination ... ..	65 0 55 ... ..	65 0 51
Log. perihelion distance ... ..	9.491046 ... ..	9.49094

Motion retrograde.

The time of perihelion passage is for the meridian of Greenwich, and the longitudes are referred to the mean equinox of 1884.0. It will be seen from the close agreement of the two orbits how completely Dr. Oppenheim succeeded in eliminating the Melbourne errors from his work.

In a communication to the *Observatory* of the present month Mr. Tebbutt refers to a notice in the Sydney journals copied from a Tasmanian newspaper, reporting that a bright comet had been seen at New Norfolk at 4 a.m. on December 27, bearing about east, and a few degrees above the horizon; he had searched for

it in the morning sky without success. In the *Sydney Morning Herald* of March 5, Mr. Tebbutt writes:—"Within the past few days I have received, through Commander J. Shortt, R.N., the Meteorological Observer at Hobart Town, communications respecting a fine comet which was seen in Tasmania on December 25 and 27 in the morning sky. It is described as rising above the eastern horizon a few minutes before the sun; and I am strongly inclined to the opinion that this is no other than the comet whose elements I have just communicated" (the comet found by Mr. Ross). There are difficulties, however, in the way of accepting this identification, judging from such information as we have to hand. The great increase of light near perihelion passage is not explained by the elements of the comet of January 7, which by theory would only have possessed five times the intensity of light that it had at the first Melbourne observation on the evening of January 12.

THE OBSERVATORY OF PALERMO.—In *Pubblicazioni del Real Osservatorio di Palermo, anni 1882-83*, Prof. Cacciatori, the director, has collected a large number of interesting observations made chiefly in the year 1882. Prof. Riccò's astro-physical observations of the planet Jupiter extend from December 1881 to June 1883, and his descriptions of the appearance of the disk are accompanied by eighteen well-executed tinted lithographs. An extensive series of observations of the great comet of 1882, also illustrated, follows; it was last perceived with difficulty on April 7, 1883. After the conjunction of the comet with the sun it was again sought for; with a power of 110 on the refractor, and in the best condition of atmosphere, the search was unsuccessful on three evenings in September. There are other cometary and planetary observations and an appendix with the meteorological results obtained at the auxiliary station of Valverde.

#### GEOGRAPHICAL NOTES

THE meetings of the International Polar Conference began in Vienna last week under the presidency of Herr Heinrich Wild, the Director of the Physical Central Observatory of St. Petersburg. In his address the President praised the great merits of Count Wilczek with regard to Polar research, referred to the lamented death, since the last conference, of the Secretary of the Polar Commission, Capt. Hoffmeyer of Copenhagen, and finally gave an outline of the work done since the St. Petersburg meeting by the various expeditions and observing stations. Herr R. Müller, Director of the Hydrographic Office at Pola, was elected secretary in the place of Capt. Hoffmeyer, deceased. The principal subject discussed at the first meeting was the determination of the minimum extent to which each expedition party is bound to work out and publish its own observations at its own expense, and the establishment of a universal form of publication of results for their easier comparison. First of all the meteorological observations were discussed in this regard. The debate turned on the uniform way of noting down the obligatory observations at each station, *i.e.* the observations of temperature, atmospheric pressure, humidity, wind, clouds, hydro-meteors, rainfall, and temperature of the ground, snow and ice. Among those who have arrived at Vienna are the following:—MM. R. Lenz (Professor at the St. Petersburg Technological Institute), H. Mohn (Director of the Christiania Meteorological Institute), R. H. Scott (Director of the London Meteorological Office), Lieut. P. H. Ray of Washington, Lieut. E. von Wohlgemuth (Vienna), Herr Wijkander, Prof. Guido Cora (Turin University), Capt. Dawson (Chief of the Fort Rae Expedition), Dr. Giese of Hamburg (Chief of the German Antarctic Expedition), H. Paulsen of Copenhagen (Chief of the Danish Polar Station at Godthaab), Lieut. Payen (Paris), Dr. Snellen (Director of the Utrecht Meteorological Observatory), Aksel S. Steen (of the Christiania Meteorological Institute), Count Hanns Wilczek (Vienna). The following were expected to arrive shortly:—Prof. G. Neumayer of Hamburg (Director of the German Seewarte), Prof. E. Mascart (Director of the Paris Meteorological Central Bureau), Dr. Börger (of the Kiel Marine Observatory), Prof. Lemström (Helsingfors), E. Riese (Chief of the Finnish Polar Station at Sodankyla).

THE *St. Petersburger Zeitung* contains the following details concerning the expedition which Col. Prjevalsky is now leading in Thibet. The points of departure of the expedition were Kiakhta and Ourga. From thence it was to go to Tsaidam by Alashan and Koko-Nor. In Tsaidam, at the foot of Burkhan Buda, it

was the intention to establish a camp, and leave behind a section of the party and of the escort. Col. Prjevalsky, with his companions, will push forward to the sources of the Yellow River, and even to the towns of Chambo and Batanou. If the circumstances are propitious, the expedition will devote the spring and summer of 1884 to the exploration of the region of Sifanei, between Koko-Nor and Batanou, where it will surely find abundant natural riches to explore. In autumn the expedition will return to its encampment. A part of the baggage will be sent to Gast, in Tsaidam, where they will establish a second camp. From Gast the expedition will traverse Northern Thibet in the direction of Lhassa, and will try to penetrate as far as the Lake Tenegri-Pora, to reach afterwards, if circumstances permit, either the province of Dsang, or to the Brahmaputra. If not successful, however, the expedition will return part of the way and then go northwards to Ladak and to Lake Daigro-Jum-Tcho. From thence it will return to Gast, and try afterwards to go across the plateau of Thibet in another direction. From Gast, which they expect to reach in the spring of 1885, a part of the expedition will go towards Lob-Nor, and the other part towards Keria, that they also may reach Lob-Nor by way of Tcherkin. The two sections of the expedition will afterwards go together to Karakorum, and along the Khoton, and then return by Alsa to Asiatic Russia, near the Lake Issak-kul. Col. Prjevalsky left St. Petersburg on August 3, 1883, accompanied by Sub-Lieutenant Roborovsky, his assistant, and a volunteer, Kozloff. At Ourga they were joined by twenty soldiers for an escort, and on November 8 they left Ourga to cross the Desert of Gobi. The telegram just received from Alashan (dated January 20) tells of the safe arrival there of the expedition.

GEOGRAPHERS will be glad to find in the last volume of the *Izvestia* of the Caucasus Geographical Society a number of astronomical determinations of positions of places in the Transcaspian region, by M. Gladysheff. We find in the list a number of points in the oases of Akhal-tekke and Merv, and in Khorassan, and notice that the exact position of Sarakhs (western corner of the citadel) is  $36^{\circ} 32' 14'' \cdot 5$  N. lat. and  $61^{\circ} 10' 10''$  E. long., 860 feet above the sea; that of Merv (garden at Kaushut-khan-kala)  $37^{\circ} 35' 18'' \cdot 3$  N. lat. and  $60^{\circ} 47' 16''$  E. long., 900 feet above the sea; and that of Meshed (cupola of Imam Riza)  $36^{\circ} 17' 25'' \cdot 6$  N. lat. and  $59^{\circ} 37' 27''$  E. long. The same volume contains a great number of heights measured in Asia Minor by Russian officers.

THE last issue of the *Izvestia* of the Russian Geographical Society contains a preliminary report of a journey made by MM. Adrianoff and Klementz in the still little-known islands to the south-west of Minusinsk; a note by MM. Hedroitz and Lessar, being a reply to M. Konshin's paper on the Kara-kum sands and the former bed of the Amu; a note, by M. Malakhoff on the remains of prehistoric man on the Nyeman, close by Druskeniki; the necrology of Admiral Putyatin, by Baron Osten-Sacken; and a note by M. Piltchikoff, on a magnetic anomaly between Kursk and Kharkoff.

#### ON THE PROGRESS OF GEOLOGY<sup>1</sup>

IN addressing you to-night at the opening of the session 1883 of Canterbury College, may I be allowed to appeal first to your kind indulgence? On an occasion like this you have a right to expect that only the best and most refined English should reach your ear; and if this to-night is not the case, you will, I trust, be lenient with me, as only very few foreigners have ever been able to master the beautiful and expressive English language so thoroughly that they would not now and then offend the ear of an educated audience.

When I look round me in this fine hall, and see before me such a large audience, of which a number consists of graduates of Canterbury College, it appears almost like a dream and not a reality—a reality of which we have every reason to be proud.

It is about sixteen years ago that a few earnest men, having the intellectual advancement of Canterbury at heart, met and proposed to found a university in Christchurch; but they were told by a not inconsiderable number of our citizens, some in high positions, that we were about a hundred years in advance of the wants of the colony. However, we persevered, and at

<sup>1</sup> An opening address delivered to the students of Canterbury College on March 28, 1883, by Julius von Haast, Ph.D., F.R.S., Professor of Geology and Palæontology in Canterbury College (N.Z. University).

last succeeded; and the best proof of the correctness of our views is the number of the graduates of the New Zealand University, of whom there are now twenty-one Masters of Arts and forty-nine Bachelors of Arts, together seventy; of whom Canterbury College can claim twenty-nine of its own, many of whom would be an ornament to any university of the home country.

And although the greater portion of our graduates mostly apply the knowledge gained to the education of others, they continue their studies for their further intellectual progress long after they have gained their well-earned degrees.

To my mind no more ennobling or higher sphere can be selected by anybody than that of the teacher. What mental energy, what moral devotion are required in the teacher, who can only be successful if he has his whole heart in the work, so that the chain of human sympathy, the most powerful tie in mankind, unites him with his pupil. In a young country, where wealth is generally considered to give power, position, and influence, and the "*auri sacra fames*" is much developed, only a refined mind can gladly and willingly turn away from those pursuits by which wealth is more easily obtained, in order to devote himself entirely to the education of the young.

Moreover, nothing shows us more clearly than teaching that we have only put our foot on the first step of the ladder leading to knowledge. We remain students our whole life; and I trust that none of our graduates will ever overrate the step gained, but that they will consider that the degree obtained has only given them an insight into the dominion of Knowledge, and has shown them how much they have still to learn; and that in fact they have become masters of the art how to learn to the advantage of themselves as well as of others.

Before entering into the subject I have chosen for to-night's address, I wish to make only a few remarks upon the development the University of New Zealand ought to take, so as to satisfy the present and future wants of our population. It was only to be expected that in the beginning its founders should have been guided by the curriculum of the great centres of learning in Great Britain, although even then some of the newer improvements were not adopted; but I may point out that under the different circumstances in which we live in a colony, we ought to have more cosmopolitan views, and profit by the experience of those States and communities which our conditions resemble most. In fact, the University of New Zealand ought to be eclectic, and to select for assimilation in its constitution the best as to manner and matter of teaching from all parts of the world.

According to my views it ought not to be at present the highest aim of a university course to offer a mass of knowledge of a chaotic character in a number of subjects, but to make the student acquainted with the general principles of the stock of knowledge possessed by the world and its application to life; to know in what direction that general stock is most deficient, and in what manner it can be augmented and made more useful both intellectually and practically.

The study of philosophy, in the highest and most general acceptance of the term, is one of the greatest wants for any university that intends to educate thinkers, men and women who not only wish to use their acquired knowledge for earning their daily bread, but to advance the human understanding.

Advancing to the subject upon which I wish to address you to-night, I have thought that some remarks on the progress geology has made and is daily making would not be inappropriate. I should also like to show, though owing to the short time assigned to me this can only be done in a fragmentary manner, how from an empirical science it has gradually been raised to an inductive science fully deserving, as far as actual observations go, to claim the position of an exact science.

If we consult "*The Cyclopædia, or an Universal Dictionary of Arts and Sciences*," by E. Chambers, F.R.S., London, four large folio volumes, of which the first appeared in 1779 and the fourth in 1783, an excellent work, for which some of the most eminent men of the last century wrote, we find that the word geology, or geognosy, did not exist at that time, the principal information upon the formation and constitution of our earth being contained in the articles on basaltes, earth, fossils, geography, lithology, marine remains, mineralogy, mountain, rocks, stone, and volcano.

The explanation of the formation of "stones" is in many instances exceedingly erroneous, and appears ludicrous to us; whilst the explanation of the nature and occurrence of fossils is given quite correctly, although the theory of Tournefort, pro-