

A pyramid is being raised on the summit of the mountain, which it is hoped will dissipate the superstition among the natives below that no one can ever reach the top.

CAPTAIN TRIVIER, a French naval officer, has left France to undertake an expedition across Africa. One of his chief objects will be the exploration of the Lualaba and its tributaries, and more especially the Lukuga, the outlet of Lake Tanganyika, about the real nature of which there has been so much controversy. Captain Trivier will follow the Lukuga to the lake, and make a careful report on its actual condition. Captain Hore, who has been more than ten years on the lake, has just returned home. He states that during the whole period of his stay on the lake it has steadily decreased in size; its level has fallen quite 15 feet, but the Lukuga still flows out with a rapid current. This it will continue to do until its muddy bed is worn down to the rock, when it will cease to be an outlet of Tanganyika. Captain Hore seems to think the lake will go on decreasing in size. Captain Trivier will cross to Ujiji and endeavour to make his way to the east coast at Bagamoyo.

THE first number is to hand of the *National Geographic Magazine*, the organ of the recently founded "National Geographic Society" of the United States. The work of the Society, of which all the leading officers of the U.S. Survey are members, promises to be of much higher scientific value than that of the American Geographical Society of New York. The Society has 200 members. Among the articles in this number are "Geographic Methods in Geologic Investigations," by Mr. W. M. Davis; "Classification of Geographic Terms by Genesis," by Mr. W. J. McGee; "The Survey of the Coast," by Mr. H. G. Ogden; and the "Survey and Map of Massachusetts," by Mr. Henry Gannett.

CAPTAIN WAHAB reports as follows regarding the survey work accomplished by himself and one sub-surveyor while with the Hazara field force:—"Up to the end of the Ahazai country we have a complete survey extending a good way west of the Indus, and a certain amount of reconnaissance work in the Chagarzai country up to about Judbai. North-east of the Black Mountains we have surveyed from Nandihar (the limit of this survey in the 1868 expedition), north to the range beyond Allahi, and west to the hills overlooking the Indus. We have fixed the course of the river up to say 15 miles north of Thakot, and I have sketched, on the $\frac{1}{4}$ -inch scale, as much as possible of the country between the Indus and the Swat Valleys, what I could see from the Chel Mountain and the Ghorapher Pass. I have made three stations, and fixed a number of points in the lower ranges between the snowy peaks fixed by the Great Trigonometrical Survey and our frontier, which I hope may be useful on future occasions. While I was triangulating on the top of Chel, Imam Sharif went down the hill to Polkal, for the day, and got in most of the Allahi Valley. There is a gap in the survey of the Indus Valley from the bend west of Thakot down to Judbai, which cannot be seen without going into the Chagarzai country, but even if we do not go, I have got the course of the river practically fixed within about half a mile one way or the other."

ELECTRICAL NOTES.

F. KOHLRAUSCH has just made a fresh determination of the ohm. He makes it equal to 106.32 centimetres of mercury 1 square millimetre in section.

PROF. ROWLAND has made preparations to repeat his classical Berlin experiment by which he demonstrated the fact that a static electrical charge in motion acted like a current. He is going to use higher speeds and higher electrification, and it is therefore hoped that he will get accurate quantitative determinations.

AT Paisley, an electric discharge, which seriously damaged a chimney and its defective lightning-conductor, also killed a quantity of fish that were in a pond close by in which the conductor was earthed. When will people take the precaution to examine their lightning protectors?

DUBS (*Centralblatt für Electrotechnik*, 1888, No. 28) has shown that a strong blowpipe or oxyhydrogen flame from one carbon to another sets up an E.M.F. which would fully account for the opposing E.M.F. of the arc.

A NEW mode of regulating dynamos for constant current and constant potential has been devised by the Waterhouse Com-

pany in the United States by means of a *third brush* slightly in advance of the positive brush, and an external variable shunt circuit which can be adjusted automatically or by hand. The desire to evade patents has at least one merit—it exercises the faculty of invention and stimulates design. The *Electrical Engineer* of New York (December 1888) has an excellent paper by Mr. Caldwell on this third brush.

IT is sometimes asserted that the unit of work—the *erg*—is too small to be of any use, but Prof. Langley has shown that the perception of the colour crimson is produced by an expenditure of energy upon the retina, which can be represented by 10^{-13} horse-power, or 0.001 of an erg; while the sensation of green is due to 0.00000001 of an erg.

HELMHOLTZ has shown that if an invisible jet of steam be electrified or heated it becomes visible with bright tints of different colours according to the potential or the temperature.

DR. GORE, F.R.S., has submitted to the Royal Society a new instrument of research, which he thus describes:—"Take two small glass cups containing known volumes of distilled water. Form two voltaic cells of them by means of strips of stout wires of unamalgamated zinc cut from the same piece, and two small sheets of platinum, also cut from the same piece. Connect them together in series to a sufficiently sensitive galvanometer, so that the currents from the two cells oppose each other, and produce no visible deflection of the needles. This arrangement constitutes a 'voltaic balance,' and is extremely sensitive to change of chemical composition of the liquid in one of the vessels. Make an aqueous solution of known strength of the substance, and add it in sufficiently small quantities at a time to the water in one of the cups until the needle of the galvanometer visibly commences to move, and note the proportion of the substance and of water then contained in that vessel. As the amount of energy required to move the needle is the same in all cases, the different numbers thus obtained with different substances represent the relative amounts of voltaic energy of those substances. And as each substance and mixture of substances gives a different number, it is possible by this method to detect substances, to ascertain the degrees of strength or concentration of liquids, to ascertain whether a substance contains a soluble impurity, &c. The method also is in many cases an extremely sensitive one."

PROF. J. J. THOMSON (R.S., January 17, 1889) has examined the screening influence of conducting plates upon alternating currents of great frequency, and has deduced thereby the resistance of electrolytes and of graphite. He shows that the screening effect depends on the conductivity and thickness of the plate and upon the frequency of the alternations. The secondary induced currents are confined to the skin of the plate next to the primary, the thickness of this skin varying inversely with the conductivity of the plate and the frequency of the currents. Thus a thin plate of badly conducting material will be efficient with currents of great frequency, such as those of the rate 10^8 per second; while a thick plate of the best conducting material will not be sufficient to screen off currents of low frequency, such as those with a rate below 10^2 per second. Thus to measure the resistance of electrolytes it is necessary to have vibrating electrical systems such as those examined by Hertz, whose frequency is of the former class; and if two different plates produce the same screening effect, their thickness must be proportional to their specific resistances. He supports Maxwell's theory that the rate of propagation of electrostatic potential is practically infinite, a point called in question by Hertz; and he agrees with Hertz that the rate of propagation of electro-dynamic action is finite and measurable. He shows that the rate of propagation of an electro-magnetic disturbance through a metallic conductor and through the surrounding dielectric is the same, and this differs from one of Hertz's conclusions. But he also shows that this is not so when the conductor is a dilute electrolyte or a rarefied gas. In such a case there would be interferences and standing vibrations. Hence the striae in so-called vacuum-tubes. He also concludes that the relative resistance of electrolytes is the same when the current is reversed a hundred million times a second as for steady currents.

SOMEONE in the United States has proposed to call static electricity "amberism." It is a good analogue to "galvanism" and to "magnetism." It would be well to introduce some term to relieve the word "electricity" from the dreadful abuse to which it is now subjected. The Board of Trade in their draft Provisional Orders are using it in three distinct and different

senses: (1) for electrical energy, which is measured in *watts*; (2) for electric currents, which are measured in *amperes*; and (3) for electrical quantity, which is measured in *coulombs*.

Loé has discovered that the resistance of cobalt in a magnetic field is *increased* in the direction of lines of force, and *diminished* in directions at right angles to them.

STAR NAMES AMONGST THE ANCIENT CHINESE.

IN two recent numbers of the *Chinese Review* (vol. xvi. Nos. 5-6) the well-known scholar, Dr. Joseph Edkins, writes on the subject of star naming amongst the ancient Chinese. He says that there are two great periods of star naming in ancient China, the first being about B.C. 2300, and the second during the Chow dynasty from B.C. 1120 to B.C. 220. The real beginning of Chinese astronomy is, in Dr. Edkins's opinion, to be found in the period preceding B.C. 2300, about which date, by command of the Emperor Yan, the observation of the meridian stars was made. Amongst primitive Chinese observers our Scorpion was a dragon, Aquarius a serpent or tortoise, Taurus a tiger, and Leo a bird. These figures were, however, larger than our zodiacal signs; for instance, the chief portion of Virgo, Leo, and Cancer would form the Red Bird. At that remote period we find that Chinese astronomers divided the heavens into four large sections, and twenty-eight small groups or constellations. The former, the large ones, are all animals, and are arranged from east to west, while the constellations are arranged from west to east. There were seven eastern constellations forming the Green Dragon—which comprised the stars in Libra, Scorpio, and Sagittarius; seven southern constellations, the Red Bird, or *Feng-hwang*—comprising Cancer, Leo, and Virgo; seven western constellations, the White Tiger—made up of Aries, Taurus, and Gemini; and the seven northern constellations, the Dark Warriors—or the Serpent or Tortoise. Each group, whether large or small, had its Chinese name. The Red Bird or Pheasant is the constellation of summer or the south; the Dragon, of spring or the east; the Tiger, of autumn or the west; and the Serpent or Tortoise, of winter or the north. Since the Great Bear points to Spica Virginis, the Chinese astronomers made the group led by Spica the group of spring. Another reason for thus making Spica the gate of the year is, perhaps, to be found in the fact that the Babylonians, from whom the Chinese probably got their astronomy, for a long time regarded Scorpio as the first of the signs. This is, of course, a mere guess, for we cannot, after this lapse of time, tell how much of the astronomical knowledge of the Chinese is derived from external sources. On the probable Babylonish origin of some of the astronomical knowledge of the Chinese, Dr. Edkins says:—"The contests of the early Buddhists with the worshippers of fire show that the Persian religion was propagated in India during and after the sixth century before Christ, and the eagerness with which the Hindus adopted the Greek astronomy after Alexander's invasion of India, as well as our knowledge of the fondness of the Buddhists for astrology, make it probable that Babylonian ideas on the stars were familiarly known in ancient India, during the period when they became popular in China. The resemblance of the cosmogony of the laws of Manu to that of the Babylonians seems to support strongly the correctness of the statement that Babylonian astrology was accepted at the same time in ancient India and in ancient China." With regard to the names of the four zodiacal signs, they are, as we have seen, those of animals, and it is peculiar that they are all Chinese animals but the Dragon, and it is not known that any species of dragon ever existed in China. In the naming of the constellations a wider field is included. Thus, the following are found: parts of the body, as heart, stomach, lips; buildings, a house, a wall, a well, a tower; articles of daily use, a peck measure, a net, a carriage; animals, K'wei K'ien (a humped boar leading a cow to sacrifice); adjectives and numerical groups, &c. From these names it appears that the origin of the appellations was popular rather than Imperial. In B.C. 1144, Wen Wang began to write the treatise called "Yi King." The adoption by Wen Wang of red as the Court colour of the Chow dynasty, and the fact that his son introduced five colours into the sacrifices, show that the Babylonish doctrine of the five colours and the five planets was known in China at that time. There are, however, variations in the colours. Thus,

Mars is red in both China and Babylon; Jupiter, orange in Babylon, blue or purple in China; Venus, yellow in Babylon, white in China; Mercury, blue in Babylon, black in China; Saturn, black in Babylon, yellow in China. The "Yi King" shows that the stars were divided into four groups from the earliest times, for the Dragon and the Tortoise lie at the root of all the divination of that work; and the Tiger and Red Bird are respectively assigned to the west and the south. Shortly after the date of "Yi King" we find the following points mentioned: the cycle of twelve years, dependent on a revolution of Jupiter; the twelve hours into which the horizon is divided by the pointing of the Bear; the cycle of ten days; the cycle of twenty-eight constellations; the four seasons; the sun, moon, and planets. Astrology was, of course, implicitly believed in; in fact, the end and aim of all ancient Chinese astronomy was astrology. The conjunction of the sun and moon controlled the good and bad luck of the Empire, and particular stars foretold the fortunes of the various portions of the Empire, for each province had its presiding star. During the Chow dynasty—that is, after B.C. 1120—many constellations are named. Thus the fifth Emperor ordered a group of stars in Cepheus to be called Tsau-fu, after his favourite charioteer. Wang-liang was also a charioteer about B.C. 470, and his name was given to a number of stars in Cassiopeia. The virtues of a duke of the Tsi kingdom who died in B.C. 488 were so great that a star was called after him. Unlike the old names, all of which seemed to denote a popular origin, those named during the Chow dynasty show their Imperial origin. Thus several stars in Leo were styled Wu-ti-tso—that is, "throne of the five emperors." During the second century before the Christian era, Chinese astronomers pointed out the five emperors. The chief ruler of Heaven is the ancient pole, the star Tai-yi, 22° from our present pole. The seven stars of the Great Bear are the Government—rulers of the sun, moon, and five planets. The palace of the heavenly emperor is bounded by the oval formed of the fifteen stars of Draco, amongst which is Tai-yi. At the back of the bear is the group Wen Ch'ang Kung, "the palace of literature brilliantly spread abroad," the favourite object of the adoration of the *literati*. The abode of the eastern emperor is in Scorpio. The group containing Antares is Ming-t'ang, the council-hall of the emperor, where he give laws to his subjects. The adjoining stars are the sons of the emperor. The palace of the emperor is Arcturus, and the two large stars in Centaur to the south of Sagittarius form the south gate of his dominions. In Cancer and Leo lies the residence of the southern emperor. One group is the palace of the sun, moon, and planets, and surrounding this group is a guard of twelve feudal barons who keep the throne of the five emperors. Between Procyon and Regulus, and between the ecliptic and equator, there is a group in Hydra called the willow-branch, which rules over planets, and forms the beak of the Red Bird. The constellations of the Seven Stars adjoin this, and form the neck of the Red Bird: its crop is the kitchen of the palace; Hydra forms the bird's wings; the constellation Yi is the imperial hotel where visitors at the palace are accommodated; the constellation Corvus finishes the shape of the Red Bird, and is the last in the zodiac. The seven western constellations—that is, those made up of Aries, Taurus, and Gemini—are "the lake of fulness," "the five reservoirs of heaven," "the home of the five emperors." Hyades is "the announcer of invasion on the border." Later on—that is, probably about the second century—the stars are grouped into three principal sections, the first section containing the circum-polar stars, the second stars in Leo and Virgo, the third twenty-two stars in Serpens, Hercules, and Ophiuchus, the latter being said to be feudal rulers paying homage to the Emperor. The whole history, in fact, of Chinese astronomy is full of this comparison of the state of the kingdoms on the earth with the heavenly bodies. Thus, under the Tsin dynasty, the pole star is the abode of the supreme ruler. "The circum-polar stars form his court. Their name as a whole is the 'purple subtle inclosure.' The stars selected to represent the emperors of the five colonies" (*i.e.* blue, red, yellow, white, and black) "were Denebola and four others in Leo. They are surrounded by twelve groups, which have received names of office and rank representing together the court of an earthly emperor. This inclosure is the court, especially, it is said, of the yellow emperor, whose essence is called Han-shu-nieu. The four remaining colours are near him. The blue emperor is Ling-wei-yang. The red or south emperor is Chi-piau-nu. The white emperor of the west is Pe-chan kü, 'the white beckoning mason's rule.' The north or black emperor is