

table: A measuring instrument to remedy the defects associated with the use of the ordinary apparatus is described by Messrs. Miller and Kenrick in the *Journal of Physical Chemistry* (vol. iv. p. 599). Provided with a dial two feet in diameter, and "dead-beat" in its action, the instrument is so arranged that ohms, mhos, volts and amperes can be read off directly, and it can be changed from any one use to any other without delay. A series of fifteen quantitative experiments, chosen so as to illustrate the various principles of electro-chemistry, and which can be shown to a large class by means of the instrument, are described by the authors.

THE additions to the Zoological Society's Gardens during the past week include a Stanley Crane (*Anthropoides paradisea*) from South Africa, presented by Mr. J. E. Matcham; a White Pelican (*Pelecanus onocrotalus*), a Lesser Black-backed Gull (*Larus fuscus*), European; a Yellow Hangnest (*Cassicus persicus*), a Common Boa (*Boa constrictor*) from South America, two Japanese Greenfinches (*Ligurinus sinicus*) from Japan, a Yellow-winged Sugar-bird (*Coereba cyanea*) from South America, a Three-striped Boa (*Lichanura trivigata*), a Chained Snake (*Coluber catenifer*), a Snake (*Zamenis taeniatus*), a Snake (*Rhinocheilus leconteii*) from North America, deposited; an Axis Deer (*Cervus axis*), born in the Gardens.

OUR ASTRONOMICAL COLUMN.

NEW VARIABLE STARS.—Two more variables are announced in the *Astronomical Journal*, vol. xxi. No. 487, as having been detected by Mr. R. T. A. Innes, at the Cape Observatory.

24. 1900. *Aræ*. This star is C.P.D. - 49° 10361, and has the position

$$\left. \begin{array}{l} \text{h. m. s.} \\ \text{R.A.} = 17\ 49\ 32 \\ \text{Decl.} = -49^{\circ}\ 24'\ 9'' \end{array} \right\} (1875).$$

The range in magnitude is from 8.9 to 9.75, and the period very short—about 7h 28m. 36s.

25. 1900. *Octantis*. This star is No. 9192 in Gillis's Polar Zones, and has the position

$$\left. \begin{array}{l} \text{h. m. s.} \\ \text{R.A.} = 13\ 9\ 32 \\ \text{Decl.} = -83^{\circ}\ 34'\ 1'' \end{array} \right\}$$

The variation in magnitude is from 7.7 to 10.3.

THE ALMUCANTAR.—The Case Observatory, Cleveland, Ohio, has recently been equipped with one of the new type of instruments invented by Dr. S. C. Chandler in 1879, and in the *Astronomical Journal*, vol. xxi. No. 488, Mr. C. S. Howe gives a description of its construction and working, illustrated by photographs of the instrument in position. It is adaptable for all determinations usually made with the transit circle, as time, latitude, right ascensions and declinations, &c., but has several advantages. As the name implies, the instrument is inclined at a fixed elevation, generally equal to the latitude of the station, and being free to move in a horizontal plane, the times of passage over the parallel of altitude are observed in exactly similar manner to meridian transits; in general both transits may be observed, east and west. The advantages claimed are (1) elimination of flexure; (2) elimination of refraction errors depending on zenith distance, leaving only those produced by variations of pressure and temperature; (3) greater precision of fundamental plane of instrument; (4) greater extent of sky available.

The Case almucantar has an object-glass of 6 inches aperture and 60 inches focus, by Brashear, and instead of the telescope being inclined, the light is reflected from a mirror inclined at the proper angle, outside the object-glass.

The whole of this optical apparatus rests on a massive hollow iron ring 57 inches in diameter, which floats in mercury, means being provided for preventing lateral movement. The float, telescope tube and frame weigh about 1800 pounds, and additional weights are provided for adjusting the position of the centre of gravity. Preliminary experiments show that although the instrument weighs about 2300 pounds, the oscillations after

it has been moved die out in slightly over one minute, so that stars can be observed at intervals of three minutes. Another of these instruments, of about the same size as the above, has been erected at the Durham Observatory, and is described by Prof. R. A. Sampson in *Monthly Notices*, vol. ix. pp. 572-579.

THE ETHNOLOGY OF ANCIENT HISTORY DEDUCED FROM RECORDS, MONUMENTS AND COINS.

SERIOUS students of ancient history are fully aware that the narratives which have been preserved by professional historians are usually so eclectic and so meagre in many important details that they require to be largely supplemented by other data before the full significance of the events can be appreciated. The spade of the archæologist has provided innumerable documents of the greatest historical importance which serve to supplement the imperfection of the written record, and the observations and measurements of the physical anthropologist have to be called into evidence as well as the comparative studies of the ethnologist. The historian who ignores archæology, physical anthropology and ethnology deprives himself of the most voluminous of historical documents which lead, when carefully studied, to accurate conclusions. Thus alone can written records be established.

As in the distribution of animals, so in that of man, it is impossible to draw a line of demarcation between Europe and Asia. The pure Northern European type is as distinct as possible from the true Mongol, but there is such a chain of links between these two primary human races that they pass insensibly into one another.

It is now generally admitted that the fair dolichocephalic European race (*Homo Europæus*, the Northern or Nordic race of some authors, the Aryan of others), stretched in Neolithic times far away into Asia, where they mixed to a variable extent with the Mongols, more so to the eastward, less so to the westward. To portions of this hybrid population have been applied such terms as Allophylian, Turanian, Finno-Turki, Ural-Altaic, Ugro-Altaic, Turko-Tatar, Mongolo-Turkic, Tatar, Turki. Part of this spectrum of mixed peoples was spoken of by ancient historians under the collective name of Scythians, those in Europe being "Aryans," those in the extreme east being largely Mongolised.

A short, dark, brachycephalic race (*Homo Alpinus*, Alpine or Slavo-Celtic race) which wandered into Central France in Neolithic times still persists in a central zone across Europe and into Asia, and there can be little doubt that this element also entered into the population of Western Asia in very early times. But at whatever period they arrived, their descendants can be found amongst the Tadjiks, who are brown brachycephals and quite different from the brachycephals of the yellow race whose point of origin appears to have been towards Tibet, whereas Lapouge and Ujfalvy believe the former to have followed the dolichocephals either from Asia Minor or from Europe.

A third race, of medium stature and dark complexion, is the dolichocephalic Mediterranean group (*Homo Mediterraneanensis*). This was located in Neolithic times in Western and Southern Europe, Northern Africa, South-Western and Southern Asia. The Dravidian peoples of India do not now concern us, and attention need be drawn only to the Semitic branch of the Mediterranean race, with its various offshoots. It is possible that the rise of Babylonian culture was due, as Keane points out, to the influence of Semites on the indigenous Akkado-Sumerians, who were almost certainly of Finno-Turki origin.

The typical Mongols (*Homo Mongolicus*) are a short, brachycephalic people with a yellowish skin, high cheekbones, very characteristic eyes, lank, black hair on the head, and sparse hair on the face. This race is as purely Asiatic as the negro is African.

The easterly drifting of tall, fair, long headed peoples speaking dialects of the Aryan group of languages took place, perhaps, about 2000 B.C. The migrants to India had scarcely attained the agricultural phase of culture, and it was not until the conquests of Alexander in 327 B.C. that a true civilisation flourished in the Panjab. The Persian branch advanced much more rapidly, owing to their proximity to the ancient civilisations of Mesopotamia.

Few portions of the world have had so complex a history as the region between the Caspian Sea, the Persian Gulf and the

Himalayas. Streams of migrations have passed through this district, to be caught up into ethnological eddies of which written history is incompetent, by itself, to unravel their intricate movements and blendings.

There is insufficient evidence concerning the physical type or types of the ancient inhabitants of Persia, but one predominant primitive Persian type resembled that of the ancient Ilindus, that is, both were long-headed (dolichocephalic), narrow-faced (leptoprosop), with long, thin noses (leptorhine). They also had skulls of but slight height, which were flattened above. In all these respects these Persians of the time of the Achæmenian dynasty resembled the Macedonians of the time of Alexander the Great, and these traits are also represented on Greek coins of the archaic style.

Nearly two hundred years later we again meet with this ancient form of skull, but with slight modifications. On the very beautiful sarcophagus from Sidon is represented a battle (? of Arbele) between Macedonians led by Alexander and Persians under Mazaios, one of the bravest of the generals of Darius. The main differences between the physical characters of these two nations consist in the head of the Persians being higher and the forehead broader and more vertical than that of the Macedonians. The latter were still characterised by a rather low, flat head, by a rather retreating forehead, and often with prominent supra-ciliary ridges and a well-marked nasal notch. The nose of the Persian is very delicate, but inclined to be arched. Their beautiful eyes are more sunken, but less widely open than those of the Greeks. This superb monument has the inestimable advantage of retaining some of its original coloration, and all the Persians, like the Macedonians, had fair or red hair.



FIG. 1.—Coin of Kadphises II., King of the Kushans; circ. 55 A.D.

On the road from Nineveh to Ecbatana is a most interesting bas-relief, carved on the face of a rock by Darius to commemorate his victories over ten kings and princes, whose portraits are carved, and we have portraits of Semites, Persians, a Mede, Magian, Armenian and Scian. Behind Darius are represented two Achæmenian Persians, who have a gently-curved cranial vault, a high forehead and a curved nose with a slightly flattened tip. The Magian, who is also a Western Persian, is broad-headed. Dolichocephalism is predominant among the Iranians of this period, and more so among the Eastern Iranians.

A gradual transformation of the Persian type was accomplished in the interval between the downfall of the dynasty of the Achæmenids and the accession of that of the Sassanids (i.e. from 328 B.C. to 240 A.D.). The heightening and shortening of the head, amongst other characters that affected the old Iranian type, was due either to the slow substitution by a very brachycephalic pre-existing population or to infiltration from neighbouring countries. Ujfalvy points out that the first of these hypotheses is without any historical foundation, although one would expect to find representatives of the alpine race in Iran at that period, so for the present we must rely on the second alternative. We know, from de Sarzec's excavations, that in Babylon in very remote times there was a mixture of races in which a "Turanian" (Ujfalvy) element was present. This transformation of the Iranian type was helped by the arrival of the Arsacian Parthians, who brought heterogeneous peoples in their train.

A study of the coins of the Parthian kings of the dynasty of the Arsaces also reveals an interesting series of changes. The aryanised tatar type of the first three Arsaces was transformed in the fifth Arsace (Mithridates I., 174-136 B.C.) by a mixture of races of which we have historical evidence, and the skull became elongated and flattened; but we find Mithridates III. (Arsace XI.), 60-56 B.C., with a very short and excessively high skull, which was retained till the end of the dynasty in 227 A.D. Nevertheless, all through the series the face was practically unchanged. The Chinese annalist, Ma-touan-lin, says of the A-si (Parthians), "they marry their elder and younger sisters and even their mothers in the same manner as animals," and Lucian uses an identical phrase.

Other alterations of the physiognomy of the Persians were shown in the very aquiline nose, widely open, sunken and almond-shaped eyes. One very typical characteristic of some of the Sassanid warriors is the great height of the chin, which is still to be seen among the Hadjemis of Persia.

Among the living Tadjiks and Sarts of Central Asia, as among some stocks of Afghanistan and Western Himalaya, we meet, after some 2000 years, with individuals in whom the facial characteristics, and in some cases their crania, remind one of the portrait heads of the Grecian kings of Bactria and India. The low height of the head among the Afghans, of the natives of Kafiristan and of the Dards, the noble profile of the Pandits of Kashmir, are all heirlooms from a remote time. Also the long, well-formed nose of the Tadjiks, their wavy beard and crafty expression of face recall the typical coins of Persian satraps. These latter, as well as the Arsaces and Sassanids, appear to have been leptoprosopic brachycephals, as the unmixed survivors of the old Persians in India are to this day, for, after twelve centuries of exile, the Parsis of Bombay retain these ancestral traits.

When the portrait coins of the Greek kings of Bactria and India are compared, there is no difficulty in seeing a racial resemblance. In the first Bactrian princes the head is low like that of the typical Macedonians, in the later kings it is higher till eventually the head was almost high. The prominent brow ridge of the Macedonians was very persistent, but it, too, was diminished in the last Bactrian kings; the same held good for the marked notch between the forehead and the nose. The prominent, delicate nose of the early Greco-Bactrian kings became short and thick; these princes were almost exclusively leptorhine, and only, last of all, became mesorhine, but were never platyrhine. The chin of the Greco-Bactrian princes was round and full, but less prominent than in the Macedonians or Syrians. There is a fairly regular gradation among the Greco-Bactrian kings when placed in chronological order, not only in the increase of the height of the head, but also in the decrease of the head-length. The face, too, had a tendency to broaden and shorten, for while leptoprosopy was the rule, chamæprosopy was sporadic and was found in only a few of the later Greco-Bactrian kings. Thus it is evident that the purity of the royal family had been impaired by marriages with women of a different stock.

Allusion has been made to Scythians. Certain Asiatic so-called Scythian nations have played an important part in Western Asia, and we must now see what light monuments and coins can throw on the relationships of these much-discussed peoples. The three Scythian groups known as the Sacæ, Kushans and Ephthalites constitute an instructive series.

At the time of the Achæmenian kings, the Sacians (Sakas) occupied all the regions between the lower course of the Silis (Iaxartes) and Lake Balkash. "They," says Herodotus, "were in truth Amyrgian Scythians, but the Persians called them Sacæ, since that is the name which they give to all the Scythians." They were renowned for their bravery and wealth and were recognised tributaries of Persia, and formed the advance guard of the empire against the east, as they were settled in the plains of Turkestan almost at the confines of China.

It would appear that even at this time the Sacæ were a mixed race, as, according to the *Chinese Annals*, the Ssé or Sek (who are identified with the Sacæ) originally inhabited Southern China, but they occupied Sogdiana and Transoxiana at the establishment of the Greco-Bactrian monarchy. Towards 165 B.C. they were dislodged from Sogdiana by the Yué-tchi, who themselves were flying before the Hiung-nu. The Ssé thus dispersed invaded Bactriana, chased in their turn from Bactriana by the Yué-tchi in 120 B.C., the Sacians passed over the Paropamisus (Hindu Kush) and directed their steps towards Southern Afghanistan, occupying Sakastan (Seistan to Arachosia); but a century later they were again harassed by

the Yué-tchi, and a part of them, under Maues, founded a kingdom in the Panjab, where they quickly appropriated Hellenic culture.

The Sakas appear to have been mesaticephalic; the height of the head was rather low, they had straight eyes, a well-formed nose, straight, projecting chin. Ujfalvy remarks that they were not true Scythians, as the Aryan element was outweighed in them by another strain. They are nearer to the typical Parthians, but they are not Tatars.

For two thousand years they have persisted, and in the Balti of to-day Ujfalvy recognises the direct descendants of the Sacæ who, about 90 B.C., invaded India from the north over the Karakoram passes, since, in their physical features, the Balti strikingly resemble the effigies on the rock carvings or on the coins of the kings of the Sacæ. The Pamir countries of the Chugnan and Sirikol still retain Sacian linguistic traces.

The Chinese annalists inform us that the Yué-tchi were located in eastern Turkestan, south of the Celestial Mountains, but being invaded by the Hsiung-nu in 201 and 165 B.C., they fled to the west and spread over Sogdiana and Bactria, and dispossessed the Ta-hia (Tadjiks). The annalist thus speaks of the inhabitants of Sogdiana: "Sunken eyes, prominent nose and bushy beard, they excel in trade," just like the living Tadjiks. The primitively nomadic Yué-tchi became sedentary and prosperous in this fertile country. In B.C. 25 Kieu-tsieu, or Kudschula, whom the Greeks called Kadphises, the prince of the Kuei-schuang (Kushan), one of the five tribes of the Yué-tchi, conquered the four other tribes, and, crossing the Hindu Kush, invaded

eventually invaded Transoxiana (425 A.D.) and founded a great empire as far as North-west India. The invasion of Europe by Attila (430 A.D.) and that of the Caucasus by the Kidarite Huns were the result of the same pressure of the Yuan-Yuan.

The Hoa sovereigns had the family name of Ye-ta-i-li-to (Ephthalites) which became the name of the dynasty; this was abridged to Ye-tha. Unlike the Yué-tchi they remained nomads, and, as the Chinese annalists inform us, they practised polyandry. Their empire lasted till 557 A.D., when the Tu-kiu (Turks), profiting by the troubles that had fallen on the Hoa or Huna, seized the government. After their defeat, the Ephthalites did not disappear from Turkestan but retired to the east, while another portion mixed with Kushans south of the Oxus.

The Chinese annalists give various interesting accounts of this people. The Hoa migrated with their flocks and did not live in towns. The women took a good standing; brothers took a wife in common, and the women wore a horn on their headdress for each husband that they had. The people were cruel, valiant and bellicose, and had strict laws.

According to the coins the three kings of the Hūnas (the White Huns or Ephthalites of India) were absolutely hairless, the face has a savage expression, the eyes appear somewhat oblique, the nose is large, jaw powerful, neck fleshy, ears immense and in two of the kings recall the legendary pointed ears of Attila. The occipital region of the head is deficient, the vertex being produced into a truncated cone; this remarkable shape must have been the result of artificial deformation, which greatly exaggerated the natural brachycephaly. They are still Tatars, but approach the Mongolian type.

Polyandry was one of the most characteristic traits of the Hoa, and it still persists in the regions which formerly belonged to their empire. The employment of the horned headdress, which was formerly associated with polyandric practices, still exists among the inhabitants of Kafiristan.

There are still many problems awaiting solution among the intricacies of Asiatic ethnology, and it may be that some of the foregoing conclusions will require emendation, but there can be little doubt that the brilliant researches of C. de Ujfalvy have paved the way to a clearer comprehension of the ethnic affinities of various ancient historical peoples, and his papers in *l'Anthropologie*, Tomes ix. (1898) and xi. (1900), and in the *Archiv für Anthropologie*, Bd. xxvi. (1899), are full of references to the labours of his distinguished fellow-workers, Drouin, Percy Gardner, de Lapouge, Maspero, Rapson, Specht, Stein and others.

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FIG. 2.—Coin of Jayatu Mihirakula (Mo-hi-lo-kiu-lo of the *Chinese Annals*), last King of the Hūnas; 515-544 A.D.

Kopen (Ki-pin of the *Chinese Annals*), the country of the Asacides, and took possession of Kabul. His son Kadaphes conquered most of Northern India, and this empire lasted till towards the commencement of the fifth century of our era. The *Chinese Annals* tell us that Ki-to-lo (Kidara of the coins) chief of the Great Kushans, yielded before the incursions of the Ephthalites, crossed the Paropamisus and settled at Gandhara, in the Valley of Kabul. Towards 475 A.D. the Ephthalites, or White Huns, conquered Gandhara, forcing the Kushans to retire in the Chitral and up to Kashmir. After the defeat of Mihirakula, the last Huna king, the Kushans preserved their power in these regions till the ninth century of our era.

The Kushans appear to have been a brachycephalic folk with a normal head, high forehead, straight eyes, powerful Semitic nose, full mouth, with a somewhat Semitic cast of countenance, but not in the least Mongolian; there was a full beard. These, according to Ujfalvy, are Tatars and not Mongols, the true Scythians of Hippocrates; with Keane ("Man, Past and Present," p. 322) we may call them a Turki people.

They were a gifted and powerful people, and, in consequence of their high political endowments and their adaptability, they played a predominant part alike in Bactria and North-west India, and to a large extent contributed to the formation of the present racial type north and south of the Hindu Kush, and especially so among the Dards of the Himalayan Valleys.

The Hoa or Ye-tha, originally a small people located to the north of the Great Wall of China, were hunted from their territory by the Yuan-Yuan (or Avars?) and fled to the west, and

THE CURRENTS IN THE GULF OF ST. LAWRENCE.

THE result of investigation of the currents in the Gulf of St. Lawrence, by the Survey of Tides and Currents, has been issued recently in the form of a pamphlet by the Department of Marine and Fisheries, Canada. These investigations were carried on by Mr. W. Bell Dawson, in charge of this Survey, and were made during the summer months of 1894, 1895 and 1896; and they are supplemented by information collected personally by him from captains of vessels, fishermen and others having a long experience in the Gulf. The examination of the currents was made chiefly along the lines of the leading steamship routes which traverse the Gulf. It thus comprises the more open area of the Gulf rather than the estuaries and straits in which stronger tidal streams occur locally.

In the investigations a steamer was employed. It was anchored in positions carefully selected for the purpose in view. These were in all depths, up to 250 fathoms. The steamer thus served as a fixed point from which to observe the behaviour of the current. The observations of the current and of the force and direction of the wind were continuous day and night. Both the surface current and under-currents were investigated, current-meters, registering electrically, being chiefly used for the purpose. Temperatures and densities were also obtained at all depths, to 200 fathoms; and these indications were found of much assistance in tracing the movement of the water. For fuller descriptions of the methods and appliances employed, some of which were specially adapted to the conditions in the Gulf, the reports of progress issued from year to year by this survey must be referred to.

With regard to the general circulation in the Gulf area, the investigations point to its being, broadly speaking, a movement