

article on each canal and a digest of the report of the Canal Commission; it is illustrated by about forty views and diagrams. In the ordinary number is a short summary of the matter to be found in the supplement, and a full-page illustration showing the two canals in plan.

THE *National Geographic Magazine* publishes, as a supplement to its January number, the official map of the Philippines prepared by the United States Signal Officer under the direction of General Greely. The map is in two sheets, on a scale of 1:900,000, and shows telegraph lines and cables, telephone lines, open ports, lighthouses and post offices. The spelling of names is that adopted by the U.S. Board on Geographic Names. A remarkable feature is the large amount of country, in the island of Mindoro especially, which remains blank on the map, awaiting exploration.

DR. MARTIN KNUDSEN contributes a paper on the oceanography of the straits connecting the Baltic and the North Sea to the January number of *La Geographie*, in which he gives a short account of the work of the Danish Commission during the past ten years, and brings it into relation with the researches of Pettersson and Ekman. The seasonal variations of the inflowing and outflowing streams are fully described; a section is devoted to the discussion of the distribution of temperature in the Kattegat and the western Baltic, and another to the relative volumes of the Baltic current and the inflowing current of salter water, as deduced from the salinity observations. With regard to the Baltic current, the remarkable result has been arrived at that its volume is four to six times greater than can be accounted for by the supply of fresh water by rainfall in the Baltic basin alone, and that this cause is largely assisted by the winds and by the variations of atmospheric pressure on the surface of the sea itself.

A CATALOGUE of the types and figured fossils in the geological department of the American Museum of Natural History, New York, has been published as the eleventh volume of the *Bulletin* of the Museum. It is needless to say that such catalogues are of great service to palæontologists. The Museum contains the James Hall collection, which includes a large number of type and figured Palæozoic fossils; it also contains other interesting and important collections from strata of various ages in North America, including the fruits and seeds from the Eocene beds of Brandon, Vermont, described by Lesquereux, Pliocene and post-Pliocene fossils from South Carolina, &c. There are also Cretaceous fossils from Syria, Jamaica, &c. The term "type" is employed to embrace not only the specimens actually used by an author in the original description of a species, but those specimens which have been used by the same author in the further elucidation of the species in subsequent publications. This valuable record, for which we are indebted to Mr. R. P. Whitfield, the curator, and his associate, Mr. E. O. Hovey, enumerates 8345 type and figured specimens, representing 2721 species and 190 varieties.

AMONG the forthcoming publications of the Clarendon Press is an authorised translation of Schimper's "Geography of Plants," by Profs. Percy Groom and W. R. Fisher.

THE third volume of Lord Rayleigh's collected papers, containing papers published from 1887 to 1892, has been published by the Cambridge University Press. The next volume will bring the collection down to nearly the present time, and will, it is hoped, be ready in about a year. The complete work will then be reviewed in these columns.

MESSRS. F. VIEWEG AND SON, Brunswick, announce that the preparation of a biography of the late Prof. Helmholtz has been undertaken by Prof. Leo Königsberger, and will be published by them. The work will contain the letters which passed

between Helmholtz and his father, and correspondence with personal and scientific friends. Many men of science will look forward with pleasure to the publication of the biography of one who contributed so much to the progress of natural knowledge.

MR. H. K. LEWIS, of Gower Street, W.C., is extending his circulating library of medical and scientific books. New books and new editions are added to the library immediately on publication, so that it is possible for students with limited incomes to keep themselves in close touch with all important additions to scientific literature. The library provides a useful means for obtaining standard works for study, or for examination with a view to purchase. The lists of scientific books and periodicals circulated by Mr. Lewis are worth attention.

IN the Siebenbürgen salt district (Transylvania) are some warm salt lakes which have recently been examined by A. V. Kalecsinsky, chemist to the Hungarian Geological Survey. They are remarkable for having a layer of warm or even hot salt water between two colder bodies of water, the surface being fresh water while the rest is highly saline. In the Medoc See, for example, when the surface was in summer at a temperature of 21° C., at a depth of 1·3 metres the temperature was 56° C. and the specific gravity 1·17, thence declining gradually to the bottom to 19° C. with a specific gravity of 1·19, corresponding to 25 per cent. of salt in solution. The warm layer in summer has been found to reach 70° to 71° C., but during winter months it cools until the minimum in May is only 26° C. The author concludes that the lakes are not fed by hot springs nor warmed by chemical agency, but derive their heat from the sun. As the specific heat of brine is below that of water, the saline water is more readily warmed, and the fresh surface water prevents any rapid loss of heat by radiation. Some future useful application may, he thinks, be made of these natural heat-accumulators.

THE additions to the Zoological Society's Gardens during the past week include two Vulpine Phalangers (*Trichosurus vulpecula*), two Laughing Kingfishers (*Dacelo gigantea*) from Australia, a Weka Rail (*Ocydromus australis*) from New Zealand, presented by H.R.H. the Prince of Wales, K.G.; a Malayan Paradoxure (*Paradoxurus hemaphrodilus*) from Burmah, presented by Capt. Burnett; a Red-bellied Spider Monkey (*Ateles rufiventris*) from Colombia, a Long-haired Spider Monkey (*Ateles vellerosus*) from Central America, a Bungoma River Turtle (*Emyda granosa*), seven Roofed Terrapins (*Kachuga tectum*), five Hamilton's Terrapins (*Damonia hamiltoni*) from India, two Bichenov's Finches (*Estrellda bichenovii*) from Australia, deposited; a Sykes's Monkey (*Cercopithecus albigularis*) from East Africa, purchased; three Red River Hogs (*Potamochoerus penicillatus*) born in the Gardens.

OUR ASTRONOMICAL COLUMN.

EARLY OBSERVATIONS OF ALGOL STARS.—In the *Harvard College Observatory Circular*, No. 64, Prof. E. C. Pickering furnishes particulars of additional observations of recently discovered variables, which have been obtained from examination of the photographs taken with the 8-inch Draper telescope. 78 (1901) Cygni.—R.A. = 20h. 18m. 4s. 0; Decl. = +42° 46' 4 (1855).

This star was announced as variable by Mr. Williams. On referring to the Harvard collection the star has been found on 177 plates, the first being on 1885 September 19 ten of the photographs showing the star to be fainter than the normal brightness. Determinations with the 12-inch meridian photometer give the maximum magnitude as 10·47, and taking this value, a light curve has been determined from observations with the 15-inch equatorial. The magnitude appears to decrease to about 13·05 at minimum. With an adopted period of 3d. 10h. 49m. 12s. a table of residuals is formed from the old and new measures, and more accurate results will probably

be obtained when the photographic light curve is better known, and also by correcting for aberration.

93 (1901) Sagittæ.—R.A. = 19h. 14m. 26s.; Decl. = +19° 25'·4 (1900).

The variability of this star was announced by Dr. Schwab, and subsequent inspection of the Harvard plates showed that there were 155 records of nearly normal brightness, the magnitude at this stage being 6·50, and 13 where the star was near minimum. A photograph obtained on 1895 August 22 shows a sudden change during the exposure from 9th to 8th magnitude. The range in light appears to be greater than that of any other Algol star. The suggested period of seventeen days does not appear to satisfy the observations, and observers in other situations are asked to forward any determinations as soon as possible.

UNITED STATES NAVAL OBSERVATORY REPORT.—The report of work accomplished at this observatory during the year ending June 30, 1901, has recently been distributed, and is here summarised.

26-inch Equatorial.—This instrument has been in charge of Prof. See, who has been engaged in determinations of the diameters of the planets and satellites of the solar system, observations of Eros for parallax, double star observations, &c. These, so far as reduced, have been published from time to time in the *Astronomische Nachrichten*.

12-inch Equatorial.—During the greater part of the year this has been dismantled for repairs. Since its readjustment it has been used for the observation of zone stars, double stars, &c., and also for the entertainment of visitors to the observatory, 765 admission cards having been issued during the year.

9-inch Transit Circle.—The regular sun, moon and planet work has been continued, and in addition a revision of the *Astronomische Gesellschaft* zones and the zone of zodiacal stars undertaken for the Paris Astronomical Conference of 1896. The instrument is in need of thorough repair, as an examination of the pivots reveals considerable inequalities, and the present method of oblique illumination is to be replaced by an axial arrangement.

6-inch Transit Circle.—Observations have been continued on comparison stars for planets, special stars for Eros reductions, and determinations of personal equation. A serious difficulty, however, has been the persistence of the large diurnal change of azimuth with temperature. Numerous experiments have been made, but the error is only partially remedied.

Clock Vault.—A considerable amount of time has been spent in an attempt to bring the timekeepers under more constant conditions. A vault eight feet square and seven feet high has been made in the basement of the observer's room near the 6-inch transit circle. In this a 9-inch brick wall encloses a wooden hut, with an intervening air space of one foot containing hot water pipes. The roof is covered over with boards enclosing a 6-inch layer of asbestos wool. The room is entered by triple doors, and it is hoped that by these precautions constant temperature conditions will be attained. The whole is on the summit of a hill to avoid drainage difficulties.

Prime Vertical Transit and 5-inch Altazimuth.—These instruments have been used in conjunction for the determination of latitude variation, the two distinct types of observation constituting a valuable check on the accuracy of results obtained.

40-foot Photoheliograph.—During the year photographs of the sun were obtained on 116 days. Of these, sunspots were recorded on 24 days. The photographs show many faculæ and fine detail in the granulation of the solar surface.

Nautical Almanac.—This is now under the direction of Prof. W. S. Harshman. Special effort is to be made to ensure the publication three years in advance. Investigations are being made to provide tables for Jupiter's satellites and the inner satellite of Uranus, and a new catalogue of zodiacal stars for computing occultations will be used in the preparation of the volume for 1905.

For a considerable time an important section of the staff was absent on the eclipse expedition to Sumatra. Although most of the parties were unfortunate in having bad weather, the observers at Fort de Kock obtained excellent photographs of the phenomenon.

Meteorological observations have been continued as in former years, but all the magnetic determinations have been discontinued owing to the interference of currents from the various electric systems in the neighbourhood.

THE DISCOVERY OF THE FUTURE.¹

IT will lead into my subject most conveniently to contrast and separate two divergent types of mind, types which are to be distinguished chiefly by their attitude towards time and more particularly by the relative importance they attach and the relative amount of thought they give to the future of things.

The first of these two types of mind, and it is, I think, the predominant type, the type of the majority of living people, is that which seems scarcely to think of the future at all, which regards it as a sort of black non-existence upon which the advancing present will presently write events. The second type, which is, I think, a more modern and much less abundant type of mind, thinks constantly and by preference of things to come, and of present things mainly in relation to the results that must arise from them. The former type of mind, when one gets it in its purity, is retrospective in habit, and it interprets the things of the present, and gives value to this and denies it to that, entirely with relation to the past. The latter type of mind is constructive in habit, it interprets the things of the present and gives value to this or that, entirely in relation to things designed or foreseen. While from that former point of view our life is simply to reap the consequences of the past, from this our life is to prepare the future. The former type one might speak of as the legal or submissive type of mind, because the business, the practice and the training of a lawyer dispose him towards it; he of all men must most constantly refer to the law made, the right established, the precedent set, and most consistently ignore or condemn the thing that is only seeking to establish itself. The latter type of mind I might for contrast call the legislative, creative, organising or masterful type, because it is perpetually attacking and altering the established order of things, perpetually falling away from respect for what the past has given us. It sees the world as one great workshop, and the present is no more than material for the future, for the thing that is yet destined to be. It is in the active mood of thought while the former is in the passive; it is the mind of youth, it is the mind more manifest among the western nations while the former is the mind of age, the mind of the oriental.

Things have been, says the legal mind, and so we are here. And the creative mind says, we are here, because things have yet to be.

Now I do not wish to suggest that the great mass of people belong to either of these two types. Indeed, I speak of them as two distinct and distinguishable types mainly for convenience and in order to accentuate their distinction. There are probably very few people who brood constantly upon the past without any thought of the future at all, and there are probably scarcely any who live and think consistently in relation to the future. The great mass of people occupy an intermediate position between these extremes, they pass daily and hourly from the passive mood to the active, they see this thing in relation to its associations and that thing in relation to its consequences, and they do not even suspect that they are using two distinct methods in their minds.

But for all that they are distinct methods, the method of reference to the past and the method of reference to the future, and their mingling in many of our minds no more abolishes their difference than the existence of piebald horses proves that white is black.

I believe that it is not sufficiently recognised just how different in their consequences these two methods are, and just where their difference and where the failure to appreciate their difference takes one. This present time is a period of quite extraordinary uncertainty and indecision upon endless questions—moral questions, æsthetic questions, religious and political questions—upon which we should all of us be happier to feel assured and settled, and a very large amount of this floating uncertainty about these important matters is due to the fact that with most of us these two insufficiently distinguished ways of looking at things are not only present together, but in actual conflict in our minds, in unsuspected conflict; we pass from one to the other heedlessly without any clear recognition of the fundamental difference in conclusions that exists between the two, and we do this with disastrous results to our confidence and to our consistency in dealing with all sorts of things.

But before pointing out how divergent these two types or habits of mind really are, it is necessary to meet a possible objection to what has been said. I may put that objection in this

¹ A discourse delivered at the Royal Institution on Friday, January 24, by Mr. H. G. Wells.