10,000 square yards. The hills are about 70 ft. high, and have an area of about 39,000 square feet; these are made in reinforced concrete about 3 in. thick. The lower terraces where the heavier animals are quartered have thicknesses varying from 5 to 7 in. No two square yards of surface are alike. The entire area was divided into squares of approximately 7 ft. side by radial and concentric lines. Contours along each of these lines were drawn, and these, together with a plaster model, enabled the scaffolding and centering to be erected. Timber being out of the question for the centering on account of the irregularity of the surface, a simple and effective substitute was found in wire netting having a fairly small mesh. By mixing the concrete fairly dry, very little escaped through the meshes. The whole is supported on reinforced concrete columns; very wide and shallow beams span the columns in both directions, and are embodied in the thickness of the slabs which form the surface of the terraces and hills. The work was completed in thirteen months.

MESSRS. JOHN BARTHOLOMEW AND CO., of the Geographical Institute, Edinburgh, have published a new and revised edition of their "Route Chart of the World," which is sold at 1s. on paper, and 1s. 6d on cloth.

THE Proceedings of the third International Congress of Tropical Agriculture, held at the Imperial Institute at the end of June last, have been published by Messrs. John Bale, Sons and Danielsson, Ltd., in one volume, at the price of 10s. net. An article describing the meetings of the congress was published in the issue of NATURE for July 9, 1914 (vol. xciii., p. 489). The volume has been edited by the honorary secretaries of the congress. It runs to 407 pages, and includes abstracts of the papers supplied by the authors, reports of the discussions, and the address of the president, Prof. W. R. Dunstan. More than 150 papers, coming from authorities in fifty different countries, were presented to the congress, and the principal problems connected with tropical agriculture were dealt with.

AMONG the forthcoming books of the *Oxford University Press* are the following:—In *Anthropology*:—Aboriginal Siberia: a Study in Social Anthropology, M. A. Czaplicka, illustrated; Contributions to the Ethnology of the Salish Tribes, J. A. Teit; Lower Umpqua Texts, L. J. Frachtenberg. In *Biology*:—Heredity and Environment, E. G. Conklin. In *Geography*:— Historical Geography of South Africa, Sir C. Lucas, part ii., from 1895 to the Present Day; Geography of Eastern Asia, D. Paton; The Voyages of the Norsemen to America, W. Hovgaard (Scandinavian Monographs, vol. i.). In *Medical Science*:—The Evolution of Modern Medicine, Sir W. Osler. In *Miscellaneous* publications:—Scientific Management, C. B. Thompson; Architectural Acoustics, W. C. Sabine.—The *Cambridge University Press* announces for early publication the following volumes in the "University of Chicago Science Series":—The Origin of the Earth, Prof. T. C. Chamberlin; The Isolation and Measurement of the Electron, Prof. R. A. Millikan; Finite Collineation Groups, Prof. H. F. Blichfeldt.—*Henry Holt and Co. (New York)* announce:—The Functions of the Nervous System and the Special Senses, R. P. Angier; General Zoology, Prof. E. G. Conklin; Economic Zoology and Entomology, Prof. V. L. Kellogg and R. W. Doane; Industrial and Commercial Geography for High Schools, Prof. J. R. Smith: College Text-book of Botany, Prof. D. S. Johnson.

OUR ASTRONOMICAL COLUMN.

A NEW COMET, 1915*a* (MELLISH).—A telegram from Prof. Strömgren, Copenhagen, received at the Royal Astronomical Society on February 12, announces the discovery of a small bright comet by Mr. J. E. Mellish, of Madison, Wisconsin, U.S.A., in the position R.A. 17h., declination 3° N., and moving slowly east. A further telegram received on February 16 announces that on February 14 the position was R.A. 17h. 7m., declination 2° 54′ N. The comet is thus in Ophiuchus, and rises about 2 a.m., so that it should be visible in a small telescope between that hour and daybreak.

THE ZODIACAL LIGHT.—Those who are in a position to make observations of the zodiacal light will find some very useful information in the notes on this subject published in the U.S. *Monthly Weather Review* (September, 1914), by Mr. Maxwell Hall. The author describes the chief points which should receive the observer's careful attention, and suggests the best seasons for studying the eastern and western branches. Naturally, low latitudes are best suited for the observation; the fact that no instruments are required, but simply a level terrace and wide expanse of sky should multiply the number of those who observe this interesting and beautiful phenomenon.

ASTRONOMY AND MATHEMATICS.—In an address as vice-president and chairman of Section A (Astronomy and Mathematics) of the American Association for the Advancement of Science, Dr. Frank Schlesinger took as his subject the object of astronomical and mathematical research (*Science*, January 22). The address takes the form of pointing out to the astronomer and mathematician the great need of mutual help, and the tendency of meetings of mathematical and astronomical societies to increase the separation between these two sciences. Dr. Schlesinger directs attention to numerous astronomical problems in the solution of which the help of the mathematician is needed, and takes as an example that which concerns spectroscopic binaries, which offers a rich field.

THE MADRID OBSERVATORY'S ANNUAL FOR 1915.—The Annual for 1915 issued by the Madrid Observatory under the editorship of Prof. Iniguez, is a volume of 703 pages. The first two hundred pages are devoted to tabular statements regarding the ephemerides of the sun and moon, followed by those of planets, satellites, and comets, and facts dealing with eclipses and occultations, together with some numerous useful tables. These are followed by several articles by different authors, among which may be mentioned a long article on time determination, and a preliminary account of the solar eclipse expedition of August last. A *résumé* of the observations of the sun made at the Madrid Observatory during 1913, including spots, faculæ, prominences, etc., is given, concluding with the meteorological observations made during the same year.

WHAT IS GRAVITATION?—"It is scarcely too much to say that the nature of gravitation remains as much

a mystery to-day as when the law was first formulated by Sir Isaac Newton." Thus writes Prof. Eddington in one of those excellent articles on "Some Problems of Astronomy," which appear monthly in the *Observatory* (February, p. 93). The article continues as follows:—"In the meantime, theories of matter, of æther, and of electricity have arisen, have held their vogue, and have been superseded by others; but gravitation stands apart from these changing views. No experiment has as yet shown any relation between it and the other phenomena of nature; the simple law, unconditional and universal, has been all-sufficient hitherto. We have grown accustomed to regarding gravitation as something outside the scope of ordinary physical theories. If a new model of the atom is put forward, we ask if it accounts for the Zeeman effect, for chemical affinity, for the dispersion of light, and a host of incidental phenomena; but it would be considered unfair to suggest that it ought to account for the one fundamental and universal property of matter—gravitation." Prof. Eddington then discusses suggestions that have been made concerning possible mechanisms for gravitation, and finally asks the question, "Does gravitation conform to the principle of relativity?" A decisive result of one of the tests, whether it be positive or negative, would, he states, be of remarkable importance, and "a positive result would mean that gravitation has been pulled down from its pedestal, and ceases to stand aloof from the other interrelated forces of nature."

EUGENICS AND WAR.

THE second Galton Lecture, in memory of Sir Francis Galton, born February 16, 1822, was delivered on Tuesday evening to the Eugenics Education Society by Prof. J. Arthur Thomson, of Aberdeen University, who spoke on eugenics and war. Certainties as to the effect of war on the natural inheritance of the race have not yet been established, but some probable risks are discernible. In ancient times, when fighting was the order of the day, a weaker clan may have been literally extirpated by a stronger, as black rat by brown rat; but nation does not exterminate nation nowadays. In ancient times a battle may have been an effective sifting out of the weaker, less nimble, more cowardly combatants; but it is not so now. For the elimination is either fortuitous or in the wrong direction. The finest bodies of men are chosen for the most hazardous tasks, often involving terrible mortality, and the conspicuously brave are particularly apt to be cut off. In modern warfare the sifting tends to be dysgenic.

In the second place, there is in the making and maintenance of the army, in a nation with voluntary military service, a selection of the more chivalrous, the more virile, the more courageous, the more patriotic, and among these there is a mortality high above that of non-combatants, which means some degree of impoverishment of the race. If the number of combatants was small in comparison with that of the non-combatants, the degree of impoverishment might be slight, but if we have in our British population about 6,250,000 men between eighteen and forty-five, and if we have, as we may well have, a fighting force of three millions, the disproportionate mortality among the combatants is likely to be serious. The eugenic safeguard is in the sound nucleus of "fit" and brave men who remain to keep things going, and in the women (though they again are differentially affected in Belgium and Serbia), but it looks as if this war meant for Britain a disproportionate elimination of those whom we can least afford to lose. Darwin's sentence, in reference to the past, is probably true of the present: "The bravest men, who were always willing to come to the front in war, and who freely risked their lives for others, would on an average perish in larger numbers than other men."

In the third place, there can be little doubt that the economies and retrenchments after a great war tend to handicap most severely the more highly individuated members of the community. The highly skilled, whose work is not absolutely necessary, will be pinched most; and they are the salt of the race. On the whole, the tendency of modern warfare is dysgenic.

The second subject of discussion was the Darwinian concept of the struggle for existence, in regard to which there is widespread misunderstanding. As Darwin said, the term is used "in a large and metaphorical sense," to include all forms of the clash that occurs when organisms assert themselves in any fashion against environing limitations and difficulties. The reactions may be competitive or non-competitive, self-regarding or other-regarding, with teeth and claws, or with wits and kindness. It is not doubted that one way in which animals answer back to their difficulties and limitations is to intensify internecine competition; it is maintained, however, that another way, common among the finer forms of life, is to increase parental care or to experiment in co-operation. An extraordinarily large proportion of the time and energy of living creatures is devoted to activities which are not to the advantage of the individual, and it is an inadequately appreciated part of nature's strategy that the types that survive are not only those that sharpen weapons and thicken armour, but also those in which the individual has been more or less subordinated to the welfare of the race. The improbability of war being the saving grace of human history grows upon us.

The third point in the lecture was that since war, *biologically regarded,* is, in spite of all its nobility, heroism, and skill, a reversion to the most primitive and crude form of the struggle for existence, it involves a serious risk of slipping down the rungs of the ladder of evolution. What sowings of dragons' teeth there must be in the terrible struggle of this war; is it weak to be afraid lest by and by the crop that springs from them may include something worse than armed men?

The discussion then turned to the eugenic position in regard to some practical questions. It is possible that the losses of the war, taken along with the falling birth-rate, may move public sentiment to a stronger disapproval of selfish forms of celibacy and to a stronger encouragement of chivalrous marriages. There is patriotism in dying for our country, perhaps also in marrying for her. In regard to the marriage of recruits, more than eugenic considerations have to be borne in mind, but where adequate provision is secured for the possible widows and children, there seems no reason to place obstacles in the way of the marriage of recruits of suitable age and good record. It is for eugenists to scan critically all proposals hurriedly projected to meet crises of war strain, such as putting children at the disposal of the farmer—a doubly dangerous suggestion. To be resisted also is the natural desire to economise in the higher super-necessaries, such as various forms of art, for this means crippling super-men. One of the results of the war is likely to be a freshened enthusiasm for all-round physical fitness, and it must be granted that all improvements of nurture are eugenic as long as it is clearly recognised that veneering does not make bad wood sound. The British temperament has an inherent dislike of coercion, and schemes of compul-