connected with industrial exhibitions. The establishment starts with a capital of more than 11,500*l.*

ON Sept. 1, an earthquake took place at 4.10 P.M. with slight shocks at Drama, in European Turkey. There was an earthquake at about 9 P.M. on Sept. 6, in Armenia, at Erzeroum, and elsewhere. Several shocks of earthquake were felt on Aug. 21, in the City of Guatemela, but very few houses were damaged.

La Nature records the recent death of M. Godard, senior, the oldest of French aëronauts.

THE additions to the Zoological Society's collection during the past week include a Bosman's Potto (*Perodicticus potto*) from Africa, and a Blue Magpie (*Cyanopolius cyanus*) from China, presented by Rev. A. W. Peter; two Ursine Dasyures (*Dasyurus ursinus*) from Australia, presented by the Acclimatisation Society of Victoria; an Alpine Marmot (*Arctomys marmotta*), an Inconvenient Curassow (*Crax incommoda*) from S. America, a Red-bellied Thrush (*Turdus rufiventris*), a Red Oven-bird (*Furnarius rufus*), and two Yellow Trupials (*Xanthosomus flavus*) from Buenos Ayres; a Hoffmann's Sloth (*Cholopus hoffmanni*) from Panama, purchased; a Sun Bittern (*Eurypyga helias*) from S. America, deposited.

*THE SELECTION AND NOMENCLATURE OF DYNAMICAL AND ELECTRICAL UNITS**

WE consider that the most urgent portion of the task entrusted to us is that which concerns the selection and nomenclature of units of force and energy; and under this head we are prepared to offer a definite recommendation.

A more extensive and difficult part of our duty is the selection and nomenclature of electrical and magnetic units. Under this head we are prepared with a definite recommendation as regards selection, but with only an interim recommendation as regards nomenclature.

Up to the present time it has been necessary for every person who wishes to specify a magnitude in what is called "absolute" measure, to mention the three fundamental units of mass, length, and time, which he has chosen as the basis of his system. This necessity will be obviated, if one definite selection of three fundamental units be made once for all, and accepted by the general consent of scientific men. We are strongly of opinion that such a selection ought at once to be made, and to be so made that there will be no subsequent necessity for amending it.

We think that, in the selection of each kind of derived unit, all arbitrary multiplications and divisions by powers of ten, or other factors, must be rigorously avoided, and the whole system of fundamental units of force, work, electrostatic, and electromagnetic elements, must be fixed at one common level—that level, namely, which is determined by direct derivation from the three fundamental units once for all selected.

The carrying out of this resolution involves the adoption of some units which are excessively large or excessively small in comparison with the magnitudes which occur in practice; but a remedy for this inconvenience is provided by a method of denoting decimal multiples and sub-multiples, which has already been extensively adopted, and which we desire to recommend for general use.

On the initial question of the particular units of mass, length, and time, to be recommended as the basis of the whole system, a protracted discussion has been carried on, the principal point discussed being the claims of the gramme, the *metre* and the second, as against the gramme, the *centimetre*, and the second; the former combination having an advantage as regards the simplicity of the name *metre*, while the latter combination has the advantage of making the unit of mass practically identical with the mass of unit volume of water; in other words of making the value of the density of water practically equal to unity. We are now all but unanimous in regarding this latter element of simplicity as the more important of the two; and in support of this view we desire to quote the authority of Sir W. Thomson, who has for a long time insisted very strongly upon the necessity of employing units which conform to this condition.

We accordingly recommend the general adoption of the centimetre, the gramme, and the second, as the three fundamental units; and until such time as special names shall be appropriated to the units of electrical and magnetic magnitude hence derived, we recommend that they be distinguished from "absolute" units otherwise derived, by the letters "C. G. S." prefixed, these being the initial letters of the names of the three fundamental units.

Special names, if short and suitable, would, in the opinion of most of us, be better than the provisional designations "C. G. S. unit of . . . . . ." Several lists of names have already been suggested; and attentive consideration will be given to any further suggestions which we may receive from persons interested in electrical nomenclature.

The "ohm," as represented by the original standard coil, is approximately 10^9 C. G. S. units of resistance. The "volt" is approximately 10^8 C. G. S. units of electromotive force, and the "farad" is approximately $\frac{1}{10^9}$ of the C. G. S. unit of capacity.

For the expression of high decimal multiples and sub-multiples, we recommend the system introduced by Mr. G. J. Stoney—a system which has already been extensively employed for electrical purposes. It consists in denoting the exponent of the power of 10 which serves as multiplier, by an appended cardinal number if the exponent be positive, and by a prefixed ordinal number if the exponent be negative. Thus:—

10^9 grammes constitute a *gramme-nine*,

$\frac{1}{10^9}$ of a gramme constitutes a *ninth-gramme*.

The earth's circumference is approximately four metre-sevens, or four centimetre-nines.

For multiplication or division by a million, the prefixes *mega* * and *micro* may conveniently be employed, according to the present custom of electricians. Thus the *megohm* is a million ohms, and the *microfarad* is the millionth part of a farad. The prefix *mega* is equivalent to the affix *six*. The prefix *micro* is equivalent to the prefix *sixth*. The prefixes *kilo*, *hecto*, *deca*, *deci*, *centi*, *milli* can also be employed in their usual senses before all new names of units.

As regards the name to be given to the C. G. S. unit of force, we recommend that it be a derivative of the Greek δυναμις. The form *dynamy* appears to be the most satisfactory to etymologists. *Dynam* is equally intelligible, but awkward in sound to English ears. The shorter form *dyne*, though not fashioned according to strict rules of etymology, will probably be generally preferred in this country. Bearing in mind that it is desirable to construct a system with a view to its becoming international, we think that the termination of the word should, for the present, be left an open question. But we earnestly request that, whichever form of the word be employed, its meaning be strictly limited to the unit of force of the C. G. S. system; that is to say the force which, acting upon a gramme of matter for a second, generates a velocity of a centimetre per second.

The work done by this force, working through a centimetre, is the C. G. S. unit of work, and we propose to denote by it some derivative of the Greek ἐργον. The forms *ergon*, *ergal*, and *erg* have been suggested; but the second of these has been used in a different sense by Clausius. In this case also we propose for the present to leave the termination unsettled; and we request that the word *ergon* or *erg* be strictly limited to the C. G. S. unit of work, or what is, for purposes of measurement, equivalent to this, the C. G. S. unit of energy, energy being measured by the amount of work which it represents.

The C. G. S. unit of power is the power of doing work at the rate of one erg per second, and the power of an engine (under given conditions of working) can be specified in ergs per second.

For rough comparison with the vulgar (and variable) units based on terrestrial gravitation, the following statement will be useful:—

The weight of a gramme at any part of the earth's surface is about 980 dynes, or rather less than a kilodyne.

The weight of a kilogramme is rather less than a megadyne, being about 980,000 dynes.

Conversely, the dyne is about 1·02 times the weight of a milli-

* First Report of the British Association Committee on Units.

* Before a vowel, either *meg* or *megal* (as euphony may suggest), may employed instead of *mega*.

gramme at any part of the earth's surface, and the megadyne is about 1·02 times the weight of a kilogramme.

The kilogram-metre is rather less than the erg-eight, being about 98 million ergs.

The gramme-centimetre is rather less than the kilerg, being about 980 ergs.

For exact comparison, the value of g (the acceleration of a body falling in vacuo) at the station considered, must of course be known. In the above comparisons, it is taken as 980 C.G.S. units of acceleration.

One horse-power is about three quarters of an erg-ten per second. More nearly, it is 7·46 erg-nines per second, and one *force de cheval* is 7·36 erg-nines per second.

The mechanical equivalent of one gramme-degree (centigrade) of heat is 41·6 megalergs or 41,600,000 ergs.

SCIENTIFIC SERIALS

In the current number of the *Quarterly Journal of Microscopic Science*, Mr. E. T. Newton commences with a paper on the Structure of the Eye of the Lobster, his observation being the result of suggestions from Prof. Huxley. The structure of the eye is minutely discussed, and the accompanying illustrations are abundant. As a concluding remark, we read that "Notwithstanding all that has been written up to the present time concerning the mode of action of the compound arthropod eye, we are still unable satisfactorily to solve this difficult physiological problem."—A paper by Prof. Betz, of Kieff, on the methods of investigating the structure of the central nervous system in Man, will be found of special interest, the hardening, cutting, and tinting of specimens being discussed.—M. Pasteur's new contributions to the theory of Fermentation, are translated from the "Comptes Rendus," and Prof. H. L. Smith's paper on Archebiosis and Heterogenesis, is reprinted from the *Lens*.—A Résumé, by Mr. W. Archer, of recent observations on Parasitic Algæ, is followed by Dr. Klein's Contributions to the Anatomy of Auerbach's Plexus in the Frog and Toad, and this by a valuable series of observations by Prof. Lister on the Natural History of Bacteria, in which a study of the life of Bacteria under different circumstances as regards the fluid in which they grow, shows that their general appearance, size, and shape depend in great measure on the fluid in which they are growing, their removal from one to another fluid causing them to take on quite a different form, and their replacement the reassumption of the original condition. Many important facts are to be learned from this paper.—Mr. E. R. Lankester describes in detail the microscopic and spectroscopic appearances of a new Peach-coloured Bacterium, named by him *Bacterium rubescens*. The colouring matter he names Becterio-rubrin. This Bacterium does not generally occur in isolated plastids, but generally forming films, encrustations, or tufts. Most are aggregated in adherent masses, several excellent drawings of which accompany the paper.

The Journal of the Franklin Institute, Sept. 1873.—This number contains a useful paper by Mr. Hugo Bilgram, on the theory of steam governors.—In government reports on the decay and preservation of timber, Generals Cram and Gillmore recommend the Scely process as the best. It consists in subjecting the wood to a temperature above the boiling point of water, and below 300° Fahr. while immersed in a bath of creosote a sufficient length of time to expel the moisture. When the water is thus expelled the pores contain only steam; the hot oil is then quickly replaced by a bath of cold oil, by means of which change the steam in the pores of the wood is condensed, and a vacuum formed into which the oil is forced by atmospheric pressure and capillary attraction. Gen. Gillmore thinks a wooden platform, *thoroughly creosoted*, would last twenty to thirty years, and be better than a stone platform during that entire period.—An important paper by Prof. Thurston (extracted from the *Iron Age*), treats of the molecular changes produced in iron by variations of temperature.—Mr. Mott points out the conditions of good construction in lightning rods, and Dr. Feuchtwanger gives some information as to nickel and its uses in the arts, coinage, and nickel plating.—An oil discovery of unusually rich character is announced from the neighbourhood of Titusville, Pa.; the production of the new region being estimated at 30,000 barrels per day.

Der Naturforscher, September 1873.—We note, in this number, two striking observations in animal physiology. One of these refers to the torpedo, which has been a puzzle to physiologists, inasmuch as, while giving shocks strong enough to lame or kill another animal, its own muscles do not show the least contraction. Du Bois Reymond's hypothesis is, that while the stimulation to discharge goes forth from the central organ, the same organ sends out at the same time a counteractive influence through the nervous system, which neutralises the excitability of the nerves. M. Franz Boll took a recent opportunity of experimenting with the fish on the Italian coast, and, among other things, he tested this theory by cutting some nerves, and watching their muscles when he stimulated the electric nerves. The neutralising stimulation being thus cut off, the muscles should, he thought, contract, if the hyphothesis were true; and they did so, the muscles of the unsevered nerves remaining at rest. Still, he hardly thinks the experiment decisive, because nerves are more excitable after section.—The other observation is by Prof. Fick, who has found, by manometric measurement, a less pressure of blood in the left ventricle than in the aorta; 80 mm. of mercury in the one case, 104 to 128 in the other (in a dog). He supposes the blood, only partially filling the ventricle, at the apex, to be shot against the semilunar valves, forcing them open by its *vis viva*. In the neighbourhood of the valves the pressure must quickly rise. In short, as the author puts it, the blood is not pressed, but hurled (*geschleudert*) into the aorta.—There is a useful abstract of the chief points in a paper by Prof. Abbé (to Schulze's *Archiv*) on the capability of the microscope and its limits. He seeks to show, by physical deductions, that the limit of magnification is as good as reached, in our best systems. Some curious observations by M. van Tieghem are given in a note on the independence of the individual organs of the embryo of plants.—M. Ebermayer, we find, has been examining the influence of forests on ozone-contents of the air; he states there is more ozone in and near forests than in the open, but among the denser branches there is somewhat less than in the open closely bordering the forest; and in the tops of the trees there is more than in the lower parts.—Several French Academy notes are abstracted: on the magnetic force of annealed steel, on development of electricity in liquid mixtures, on the planet Mars, &c.; also Royal Society papers. Some meteorological observations as to distribution of heat in Switzerland deserve notice.

Bulletin Mensuel de la Société d'Acclimatation de Paris. August.—In a paper on the "Causes of the Depopulation of our Rivers," M. C. R. Wattel enters at length into the question of the French river fisheries, which will be read with interest by fish-culturists. Some interesting information as to the effect of navigation and trade on the rivers is given; but the great danger to the fisheries lies in the unrestricted destruction of immature breeding-fish: and M. Wattel recommends that steps should be taken to prevent over-fishing and to facilitate the erection of fishways on the rivers.—The notes of Dr. P. Marès on the acclimatisation of various sorts of Eucalyptus in Algeria, are interesting.—The results of the experiments to produce different coloured silks go to show that silk-worms fed on cherry-leaf produce a bright chromo-yellow-coloured silk, those on pear-leaves a darker shade of the same colour, those on apple-leaves a nearly white silk, but coarser than that of the silk-worms fed on mulberry-leaves.—An extract is given of a work by M. E. Perris, on "Birds and Insects," in which he considers the advisability of protecting small birds. M. Perris, granting all the birds are insectivorous, either continually or occasionally, acknowledges the good they may do, but doubts whether a large proportion of the insects destroyed are hurtful to man; and he raises the question whether, therefore, it is desirable to protect birds to kill what would otherwise do no harm.

The September number commences with a paper by the Secretary on some Australian vegetables, the introduction of which into Algeria is proposed.—An interesting paper on the breeding of ostriches in captivity is contributed by Capt. Crepu, who has kept several pairs of these birds. His observations throw much light on the natural history of the ostrich. M. Comber describes the mortality which has seized the deer and other animals in King Victor Emmanuel's park at La Mandria. The calamity is attributed partly to over-crowding and partly to the want of shelter and proper protection. In 1865, when the park and grounds were carefully cultivated, 13 deaths occurred. In 1873, the park being left in its natural state, 172 deaths are recorded.—An important paper on the production of milk is the