philanthropy inactive, or that the hatred of evil will become indifference. Science will not cease to search for knowledge, or to make it useful when she can; we shall not see less than we do now, and here, of the good results of enterprise and rivalry, and of the sense of duty and the sorrow for shame that there should be evil in the land.

What more, then, it may be asked, is wanted? I answer, that which I have tried to stir: a larger and more practical recognition of the value and happiness of good national health; a wider study and practice of all the methods of promoting it; or, at least, a more ready and liberal help to those who are striving to promote it. In one sentence, we want the complete fulfilment of the design of this Exhibition, with all the means towards health and knowledge that are shown in it, and with its handbooks, lectures, conferences, and the verdicts of its juries.

We want more ambition for renown in health. I should like to see a personal ambition for renown in health as keen as is that for bravery, or for beauty, or for success in our athletic games and field-sports. I wish there were such an ambition for the most perfect national health as there is for national renown in war, or in art or commerce. And let me end soon by briefly saying what I think such health should be.

I spoke of the pattern healthy man as one who can do his work vigorously wherever and whatever it may be. The union of strength with a comparative indifference to the external conditions of life, and a ready self-adjustment to their changes, is a distinctive characteristic of the best health. He should not be deemed thoroughly healthy who is made better or worse, more or less fit for work, by every change of weather or of food; nor he who, in order that he may do his work, is bound to exact rules of living. It is good to observe rules, and to some they are absolutely necessary, but it is better to need none but those of moderation, and, observing these, to be able and willing to live and work hard in the widest variations of food, clothing, and all the other sustenances of life.

And this, which is a sign of the best personal health, is essential to the best national health. For in a great nation, distributed among its people, there should be both muscular and mental powers suited to the greatest possible variety of work. No form or depth of knowledge should be beyond the attainment of some among them; no art should be beyond its reach; it should be excellent in every form of work. And, that its various powers may have free exercise and influence in the world, it must have, besides, distributed among its people, abilities to live healthily wherever work must be or can be done.

Herein is the essential bond between health and education; herein is one of the motives for the combination of the two within the purpose of this one Exhibition; I do not know whether health or knowledge contributes most to the prosperity of a nation; but no nation can prosper which does not equally promote both: they should be deemed twin forces, for either of them without the other has only half the power for good that it should have.

It is said, whether as fact or fable, that the pursuit of science and of all the higher learning followed on the first exercise of the humanity which spared the lives of sick and weakly children; for that these children being allowed to live, though unfit for war or self-maintenance, became thinkers and inventors. But learning is not now dependent upon invalids; minds are not the better now for having to work in feeble bodies; each nation needs for its full international influence both health and knowledge, and such various and variable health that there should be few places on earth or water in which some of its people cannot live, and multiply, and be prosperous.

If, therefore, we or any other people are to continue ambitious for the extension of that higher mental power of which we boast, or for the success of the bold spirit of enterprise with which we seek to replenish the earth and subdue it; if we desire that the lessons of Christianity and of true civilisation should be spread over the world, we must strive for an abundance of this national health, tough, pliant, and elastic, ready and fit for any good work anywhere.

UNIVERSITY AND EDUCATIONAL INTELLIGENCE

CAMBRIDGE.—The Senior Wrangler, Mr. W. F. Sheppard, scholar of Trinity College, is a native of Australia; the Second Wrangler, Mr. W. P. Workman, also a scholar of Trinity, is the son of a Wesleyan minister.

The Natural Sciences Tripos, Part 1, contains the names of fifty-three men, of whom thirteen are placed in the first class; in addition six are allowed an ordinary degree, and six are excused the general examination. Two ladies attained a first class, four a second, and one a third.

In the Natural Sciences Tripos, Part 2, the first class includes the names of Messrs. Adami (Physiology) Christ's College; Chree (Physics), King's; Green (Botany, Physiology), Trinity; Head (Physiology), Trinity; Laurie (Chemistry), King's; Phillips (Botany), St. John's; Shipley (Zoology), Christ's; and Threlfall (Chemistry, Physics), Caius. The subjects mentioned are those for distinction in which the candidates are placed in the first class.

Mr. C. Potter will give lectures on Systematic Botany with field excursions and practical work, in the long vacation, beginning July 8.

SOCIETIES AND ACADEMIES

LONDON

Mathematical Society, June 12.—Prof. Henrici, F.R.S., president, in the chair.—Mr. G. S. Ely, Fellow of the Johns Hopkins University, Baltimore, was elected a member.—The chairman announced that the Council had awarded the first De Morgan gold medal to Prof. Cayley, F.R.S.—A note on the induction of electric currents in a cylinder placed across the lines of magnetic force, by Prof. H. Lamb, was read in abstract.—Mr. J. Hammond gave some results of a paper which is shortly to appear in the *American Journal of Mathematics*.

Linnean Society, June 5.—Wm. Carruthers, F.R.S., vice-president, in the chair.—Messrs. J. Starkie Gardner, F.G.S., and J. H. Leech were elected Fellows of the Society.—Mr. J. Harris Stone exhibited and made remarks on specimens and photographs, viz. portion of the wood and of a remarkable wart (as large as a cocoa-nut) from the famous dragon-tree, *Dracæna draco*, of the Canaries; photograph of the young dragon-tree planted by the Marquesa de Sawyal, and now growing on the site of the old celebrated tree of Oratova; photograph of the dragon-tree of Icod-de-los-Vinos in Teneriffe; and a photograph of the Peak of Teneriffe, showing how the "Retana" grows on the Cañadas.—There was shown, on behalf of Mr. R. Morton Middleton, a small branch of *Cotoneaster microphylla* grown at Castle Eden, Co. Durham, and a good example of fasciation in this plant.—Dr. R. C. A. Prior afterwards drew attention to specimens of the rare *Potentilla rupestris* from Craig Breidhin, Montgomeryshire, and of *Rumex sanguineus*, from the neighbourhood of Bristol, both freshly gathered by Mr. T. Bruges Flower, F.L.S.—A paper by Mr. G. Claridge Druce was read, in which he describes a new variety of *Melampyrum pratense*, L., and which he suggests should be known as var. *hians*.—Prof. J. Martin Duncan read a paper on a new genus of recent Fungida allied to the fossil form *Micrabacia*; the genus being based on a specimen of coral obtained from shallow water in the Corean Sea.—A communication was made by Mr. Arthur R. Hunt, on the influence of wave-currents on the fauna inhabiting shallow seas. The author refers to various physical data, among others quoting Prof. Stokes and Mr. T. Stevenson, the latter stating that a current of 0·6819 of a mile per hour will carry forwards fine gravel, and that of 1·3638 roll along pebbles an inch in diameter. From this and other facts Mr. Hunt argues that wave-currents do materially influence the marine fauna inhabiting shallow water, not only those of the tidal strand, but likewise those inhabiting the deeper sea-bottom. He adduces instances of animals living among or on rocks, and of those frequenting sand or other deposits, enumerating species of star-fish, mollusks, shrimps, crabs, and fish. He says that even the flat-fishes (Pleuronectidæ) seem to have changed their original forms and habits for the purpose of being able to live in shallow waters agitated by waves. Referring more particularly to species of *Cardium*, he endeavours to show how, under the influence of wave-currents, the variation of species may be promoted and even their local extinction brought about.—A paper was read, on the Longicorn Beetles of Japan, by Mr. H. W. Bates. In a former paper (in 1873), on the same subject, the author treated of 107 species, but now adds many new genera and 129 more species, or a total of 236 specific forms as at present known to belong to the Japanese fauna. This great accession is due to the later collections of Mr. Geo. Lewis, who made a second

visit to the islands in 1880–81. Mr. Bates, reasoning from this fresh material, is inclined to modify his previously-stated views as to the predominance of a supposed tropical element in the Longicorn group in question; the relative number of absolutely new genera now turning the scale in favour of Palæarctic or Nearctic affinities.—The last zoological communication taken was on three new species of *Metacrinus*, by P. Herbert Carpenter, with note on a new *Myzostoma*, by Prof. von Graff. Mr. Carpenter describes *Metacrinus rotundus* from Japan, dredged there by Dr. Doderlein of Strasburg, and *M. superbus* and *M. stewarti*, two remarkable forms obtained by the Telegraph Company on picking up a cable near Singapore. The *Myzostoma cirripedium* was found on the Japan Crinoid.

Chemical Society, June 5.—Dr. Perkin, F.R.S., president, in the chair.—It was announced that a ballot for the election of Fellows would take place at the next meeting.—The following papers were read:—On β-napthaquinone, by C. E. Groves. In a preliminary notice read before the Society some time since (*Chem. News*, xliii. 267) the author mentioned that he had carefully repeated some experiments of Liebermann. In the present paper full details are given of the preparation of amido-β-naphthol hydrochloride from β-naphthol orange by reduction with stannous chloride and with alkaline sulphides. This reaction is very inferior in simplicity and economy to the process originally proposed by Stenhouse and the author. Several improvements in the original process are suggested, and the author gives an account of some products obtained by the action of reducing agents on the nitroquinone.—On a by-product of the manufacture of aurin (part ii.), by A. Staub and Watson Smith. The authors have prepared a perfectly pure specimen of this product, phenylorthooxalic ether; they conclude that it plays no part as an intermediate product in the formation of aurin. Analogous compounds with α- and β-naphthols were prepared, but no compound with resorcinol could be obtained.—On calcium hydrosulphides, by E. Divers and Tetsukichi Shimidzu. When hydrogen sulphide is passed through milk of lime, the lime dissolves; by adding more lime, a solution is finally obtained, which, after decantation and cooling, deposits colourless prismatic crystals of the hydrosulphide; by the action of water on this body, calcium hydroxyhydrosulphide is formed. The authors find that hydrogen sulphide decomposes calcium carbonate. They have also studied calcium monosulphide and the formation of the thiosulphate from the hydrosulphide and the pentasulphide.

Anthropological Institute, May 27.—Prof. Flower, F.R.S., president, in the chair.—The election of F. C. J. Spurrell was announced.—Mr. H. O. Forbes read a paper on the Kubus of Sumatra. The Kubus are a nomadic race inhabiting the central parts of Sumatra. In their wild state they live in the deep forest, making temporary dwellings, consisting of a few simple branches erected over a low platform to keep them from the ground, and thatched with banana or palm leaves. They are extremely timorous and shy, so that it is a very rare thing for any of them to be seen, and if suddenly met in the forest by any one not of their own race, they drop everything and flee away. They cultivate nothing, and live entirely on the products of the chase. Their knives and the universal spear with which they are armed are purchased from the Malays, with whom they trade. They are of a rich olive-brown colour, and their jet-black hair, apparently far less straight than that of the village Malays, was always in a dishevelled state and in curls. The average height of the males was about 1·59 m. and that of the females 1·49 m.—Dr. Garson read a paper on the osteology of the Kubus.—Mr. Theodore Bent read some notes on prehistoric remains in Antiparos, and exhibited several specimens of pottery, some rudely carved marble figures, and a skull, from cemeteries in that island.

Institution of Civil Engineers, May 20.—Sir J. W. Bazalgette, C.B., president, in the chair.—The paper read was on the passage of upland water through a tidal estuary, by W. R. Peregrine Birch, M.Inst.C.E.

CAMBRIDGE

Philosophical Society, May 12.—Mr. Glaisher, president, in the chair.—The following were elected Honorary Members:—On the Foreign List—A. Baeyer, Professor of Chemistry at Munich; Anton Dohrn, Director of the Zoological Station at Naples; Carl Gegenbaur, Professor of Comparative Anatomy in the University of Heidelberg; G. Mittag Leffler, Professor of Mathematics in Stockholm; E. F. W. Pflüger, Professor of Physiology in the University of Bonn; Gustav Quincke, Professor of Physics in the University of Heidelberg; H. A. Rowland, Professor of Physics in the Johns Hopkins University, Baltimore, U.S.A.; Julius Sachs, Professor of Botany in the University of Würzburg; H. G. Zeuthen, Professor of Mathematics in Copenhagen. On the Home List—R. Stawell Ball, Astronomer-Royal for Ireland; W. T. Thiselton Dyer, Assistant Director of the Royal Gardens, Kew; J. Whitaker Hulke, ex-President of the Geological Society.

May 26.—Mr. Glaisher, president, in the chair.—Prof. E. Ray Lankester was elected an Honorary Member. Mr. S. L. Hart, St. John's College, was elected a Fellow.—The following communications were made:—On some irregularities in the values of the mean density of the earth as determined by Baily, by Mr. W. M. Hicks. The author showed that the numbers obtained by Baily for the mean density of the earth depended on the temperature of the air at which the different observations were made; and he exhibited a table showing that as the temperature increased from 40° F. to 60° F. the deduced mean densities fell continuously from 5·734 to 5·582. He considered several possible causes of error, but showed that they were either inadequate to explain the irregularities, or tended in the opposite direction. The only further suggestion that occurred to him was that Baily's personal equation was a function of the temperature, leading him, as his temperature rose, to estimate distances more liberally.—On some physiological experiments, by Dr. Gaskell.—On a method of comparing the concentrations of two solutions of the same substance but of different strength, by Mr. A. S. Lea.—On the many-layered epidermis of *Cliia nobilis*, by Mr. W. Gardiner.—On the possible systems of jointed wickerwork and their degrees of internal freedom, by Mr. J. Larmor.

DUBLIN

University Experimental Science Association, June 3.—Dr. Tarleton, F.T.C.D., in the chair.—G. F. Fitzgerald, F.T.C.D., F.R.S., on Prof. Osborne Reynolds' mechanical illustrations of heat-engines.—J. Joly, B.E., on the eruption of Krakatoa.—The Cambridge Instrument Company's reflecting galvanometer was exhibited by Prof. Fitzgerald, and a portable calorimeter designed for approximately determining the specific heats of minerals, by J. Joly.—An apparatus for determining the latent heat of vaporisation was exhibited by F. Trouton. The chief gain in the use of the apparatus is, that to effect a determination by its means it is not requisite to know either the boiling-point of the liquid or the specific heat of the body in either the liquid or gaseous condition. Both of these are very irregular and extremely difficult to determine at temperatures approaching the boiling-point. The use of calorimeters is also avoided, often a source of serious error. In the vessel in which the liquid is placed there is a spiral of platinum or other substance unattacked by the liquid. On passing a current of electricity (the difference in potential being insufficient to decompose the body if a compound) through the spiral, heat is generated, and the liquid vaporised if at the boiling-point. According as the body is vaporised it is conducted away to a condenser, collected, and weighed. All sensible loss of heat is prevented by surrounding the vessel by a larger one full of vapour obtained by boiling some of the liquid itself in the bottom of the outside vessel under the same pressure as in the inner one; so that, if in any experiment the weight is determined of the liquid vaporised while a known quantity of electricity passes, the heat required to vaporise unit weight of the body can be deduced, the resistance of the spiral being also known. As the electrical measurements are difficult to make sufficiently accurate, it is simpler to compare the latent heat of the body with that of a liquid of which the latent heat is known. This may be easily effected by employing a second apparatus similar to the first, in which the liquid taken as the standard (say water) is put. The same current is passed through both spirals, so that the ratio of the latent heats may be deduced on weighing the quantities vaporised, if the ratio of the resistances of the spirals is known. This, if both liquids boil at nearly the same temperature, may be obtained by a previous experiment where one of the bodies is put into both apparatuses, the ratio of the resistances being that of the weights of the substance to be vaporised.

EDINBURGH

Mathematical Society, June 13.—Mr. A. J. G. Barclay, vice-president, in the chair.—Mr. William Peddie read a paper,

illustrated by models, on the graphical representation of physical properties; and Mr. David Traill one on geometry from first principles.

PARIS

Academy of Sciences, June 9.—M. Rolland, president, in the chair.—Remarks on the apparent contour of the planet Venus, based on the study of the photographic plates obtained at Puebla during the recent transit of Venus, by MM. Bouquet de la Grye and Arago.—Note on heavy ordnance in connection with the large gun (16 cm.) lately supplied to the Spanish Government by the Société des Forges et Chantiers de la Méditerranée, by M. Dupuy de Lome.—Memoir on the presence of manganese in plants and animals, and on the part played by this substance in the animal system, by M. E. Maumené. Tea and tobacco are found to contain the largest quantities of metallic manganese, which is on the whole injurious to animals, and constantly rejected by them, hence it should no longer be employed medicinally.—On the aspect of Uranus and the inclination of its equator, as observed at the Paris Observatory during the first days of the present year, by MM. Paul and Prosper Henry.—Note on the symmetrical functions of the differences in the roots of an equation, by M. J. Tannery.—Description of a dynamo-electric machine on a new principle, a model of which has been constructed by MM. A. Damoiseau and G. Petitpont. For this engine it is claimed that it does double the work of those now in use.—On the property of silver to absorb oxygen gas at high temperatures, by M. L. Troost.—Note on the action of the sulphuret of copper on the sulphuret of potassium, by M. A. Ditte.—On the solubility of the bromides, iodides, and chlorides of potassium, sodium, calcium, and other halogenous salts, by M. A. Etard.—Observations on some colloidal substances, by M. E. Grimaux.—Synthesis of pyridic hydrides, results of two years' researches with β-lutidine and β-collidine (boiling at 196° C.), derivatives of cinchona and brucine, by M. Oechsner de Coninck. These somewhat incomplete results are now published in consequence of the remarkable facts recently disclosed by MM. Hofmann and Ladenburg.—On tribenzoylmesitylene, by M. E. Louise.—On crystallised colchicine, by M. A. Houdès.—Experiments on manure artificially prepared with a view to determining the amount of loss of nitrogen sustained during the process of fermentation, by M. H. Joulie. The loss of nitrogen was found to be about 20 per cent., a proportion inferior to what takes place in practice.—Note on the minerals associated with the diamond in the newly-discovered diamantiferous district of Salobro, province of Bahia, Brazil, by M. H. Gorceix.—Anatomy of the Echinoderms; on the organisation of the Comatules, by M. Edm. Perrier.—On the constitution of the Echinoderms, by M. C. Viguier.—Objections to the theory that the Sahara was a marine basin during the Quaternary period, by M. G. Rolland. From more recent surveys in various parts of this region the author concludes that since the Tertiary period the Sahara was mainly dry land, while at the close of the Miocene all North Africa had been upheaved, and since then during the Pliocene and Quaternary the South Mediterranean coast-line has undergone no important modifications.—On the lesions of the nerve-ducts of the spinal marrow in sclerotic affections, by M. J. Babinski.—M. Jamin was elected Perpetual Secretary in the Section of Physical Sciences in place of the late M. Dumas.

BERLIN

Physical Society, May 23.—Prof. H. W. Vogel reported on the final practical results of his researches conducted for many years on the means of photographing coloured objects in their natural shades. Sensitive plates are known to be affected only by the more refrangible rays, the less refrangible remaining inoperative. Hence, of coloured objects quite unnatural pictures are obtained, even the darkest shades of blue appearing as white; yellow and red, however bright and dazzling, as black; and so on Starting from the idea that the sensitive collodium is affected only by such rays as are absorbed by it, Prof. Vogel had years ago been occupied with the attempt to render his plates sensitive to less refrangible rays, by alloying the silver coating with a substance capable of absorbing these rays. The results corresponded at once with this *a priori* assumption. In fact, plates so prepared invariably produced an effect in the solar spectrum wherever the absorption bands of the alloy were found. It was impossible, however, to obtain like results with artificial colours. Many colouring substances which, when blended with the collodium, beautifully reproduced the yellow of the solar spectrum, were ineffective against the artificial and infinitely fainter yellow of painters. Prof. Vogel was induced constantly to resume these attempts by the progress made both in the preparation of photographic appliances and in the discovery of new organic substances possessing a power of absorption more intense and lying nearer to the yellow of the spectrum. He has thus at last succeeded in obtaining in eosine, and more especially its various derivatives, colouring substances which scarcely possess more than a broad absorption band in the yellow, and which led to the desired result. When these bodies were mixed in due proportion with the dry gelatine plates, the yellow of the coloured objects already appeared quite clear on the photograph; but the blue was still always brighter. No satisfactory result was obtained until Herr Vogel had inserted between the object and the camera a yellow glass, which partly absorbs the blue rays while leaving the yellow unimpaired. He now obtained photographs in which the blue, as well as the green and yellow, and partly even the red parts of the coloured objects, presented to the observer's eye the same vivid effects as the original. A series of photographs exhibited by Herr Vogel side by side with the original pictures attest the good results with which this method may be carried out in practice.—Prof. Landolt referred to the controversy between MM. Pasteur and Jungfleisch, the former of whom had obtained from the optically inactive racemic acid dextro-gyrate tartaric acid by the culture of Penicillium. This he explained by supposing that the mould assimilates the other constituent of the inactive racemic acid, that is, the lævo-gyrate tartaric acid, leaving the other constituent over, whereas Mr. Jungfleisch accounts for the elimination of the dextro-gyrate tartaric acid simply by its greater solubility. In support of Pasteur's view Prof. Landolt now adduced the experiment with amygdalic acid made last year by Dr. Lewkowitsch in his laboratory. Inactive amygdalic acid was by him, also by means of Penicillium, converted into dextro-gyrate amygdalic acid, which, jointly with the lævo-gyrate amygdalic acid formed from amygdaline, constituted inactive amygdalic acid, such as is obtained from prussic acid. Herr Landolt further reported that in his laboratory it had recently been demonstrated that tyrosine and leucine are optically active. Hence, according to the still unshaken theory of van t'Hoff, these substances must contain unsymmetrically united atoms of carbon.

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