gave the ancient hieroglyphic or hieratic forms of some cuneiform characters, with their values. Among these is a triangle the sides of which are represented by doubled lines carefully finished off, while the base, which is to a certain extent dissevered, is represented only by a single line or wedge. We thus see a tendency already to that dropping of the base exemplified in the Cypriote symbol. But is the meaning the same? The cuneiform character giving the value is unfortunately gone, except a small portion of a single wedge, which alone would yield but slender grounds for determining the import of the triangle. We are able, however, to take, together with the small portion of the wedge, the archaic cuneiform character denoting "life," and still retaining the semblance of an equilateral triangle. The value of "life" was that assigned to the triangle as it appears on the broken tablet, by M. Menant; and Mr. Pinches, of the British Museum, is also of opinion that the fragment of the wedge remaining is entirely in accordance with this view.

Whence the idea originated that the primordial source of life was of triangular form, it is of course impossible to say. This was, however, an idea which prevailed very widely indeed in the East. A distinguished scholar and archæologist has directed my attention to symbols found on Indo-Scythian coins as being analogous to the Hittite and Cypriote symbols (see Fig. V, 4). It is not difficult to discern the two sides of the triangle and the horizontal stroke or bar. Instead, however, of the circular or rounded head, there are four vertical strokes, which there can be little difficulty in recognizing as a symbol of fire, a symbol which, in the case of Zoroastrians and fire-worshippers, would be entirely suitable.

In connecting the Hittite symbol of the Tarsus seal with the Babylonian hieroglyphic triangle, we have gone back to an antiquity very remote indeed. But if we are to regard the symbols already discussed as connected also with the well-known Egyptian symbol of life, the *ankh*, and with other Egyptian symbolic forms, our demand on time must probably be much greater. That the Egyptian talismans (Fig. Z, 2, 3, 4) might have been evolved from

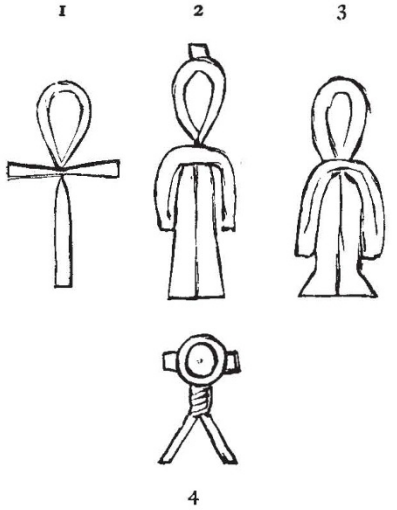

FIG. Z —1, *Ankh*, Egyptian symbol of life, from coffin of Men-ka-ra, in the British Museum; 2, 3, 4, Egyptian talismans in the British Museum.

a form identical with, or resembling, the headed triangle of the Phœnician monuments, it requires no great stretch of imaginative power to discern.[1] But with regard to the *ankh* (1), so often seen in the hands of deities, though the points of resemblance are tolerably obvious,[1] yet it may seem difficult to understand how the triangle could have assumed the form of the vertical bar. True, the bar is pointed at the apex; and elsewhere on the Egyptian monuments an acute-angled triangle in the corresponding position is sufficiently common. But it is remarkable that this latter form is not seen on a monument so very ancient as the coffin of the king Men-ka-ra. Still, on the whole, it can scarcely be regarded as other than probable that the *ankh*, like the other Egyptian forms depicted, must be referred ultimately to the headed triangle. But, if this view is just, and the triangle had collapsed, as shown in the figure, when the coffin of Men-ka-ra was constructed, the period of man's existence on the earth in a condition of somewhat advanced civilization must be of exceedingly protracted duration.

As to the age of the greater Hittite monuments, it is impossible to speak. To argue that the Hittite hieroglyphs could not have remained long in use by the side of either the cuneiform syllabary or the Phœnician alphabet would be somewhat perilous. A better argument for their great antiquity is furnished by the total absence, so far as can be seen, of any indication of horses or chariots. Yet, in the wars with the Egyptians some fifteen or sixteen centuries before Christ, the Hittites appear well equipped with this kind of forces, in a state of organization from which lengthened usage may be reasonably inferred.

What has been said may suffice to show the extremely great interest of the questions suggested by the Hittite monuments. Unfortunately the material for investigation is at present but scanty, though there are probably hundreds, perhaps thousands, of monuments awaiting the spade of the excavator. The very important results obtained by the British Museum from the excavations at Jerablûs have not prevented these excavations from being for a considerable time wholly suspended. That this should be the case is certainly matter for regret; for I hope that I have at least succeeded in showing that the idea that the solution of the Hittite problem is hopeless is one which cannot be reasonably entertained.

[1] The distinguished Egyptologist, Mr. Le Page Renouf, now Keeper of Oriental Antiquities at the British Museum, tells me that, while (2) and (3) may not be earlier than the eighteenth dynasty, (4) is of very great antiquity, occurring in the name of Hor-em-sa-f, one of the Pyramid kings.

[1] The connection with, or analogy between, the Tarsus and Cypriote symbols and the *ankh* was suggested by Mr. Pinches, and subsequently, with respect to the Tarsus symbol, on different grounds, by Prof. Sayce.

CLASS EXPERIMENTS.

THE following is a brief account of some experiments shown to the students of the Natural Philosophy Class in the University of Glasgow during the present Session. It is communicated to NATURE with the permission of Sir W. Thomson.

I. (1) Suspend a heavy ball by a long wire, as shown in Fig. 1. To the middle of the ball attach a worsted thread, A D. Pull the thread in the direction of the arrow-head, with a pull that will not break it, and let the pull be finished before the ball is sensibly displaced. Observe the greatest subsequent displacement of the ball.

(2) Bring the ball to rest. Pull it now with a pull sufficient to break the thread. Note that the displacement is smaller than in case (1).

(3) Bring the ball to rest once more. Give a very sudden pull to the thread: it breaks, and the displacement of the ball is hardly perceptible.

In each of the three cases the momentum is equal to $\int F dt$ for the whole duration of the pull. The pull in case (1) is smaller than the pull in cases (2) and (3), but the duration of the pull is greater in a greater ratio; hence the momentum communicated, being the time integral of the pull, is the greatest for case (1). Although the pull in case (2) is equal to the pull in case (3), still its

duration is so exceedingly small in case (3) that the momentum communicated is very small.

II. Support a cylinder with a fly-wheel, as shown in Fig. 2. E E are two pieces of wood, both screwed at the

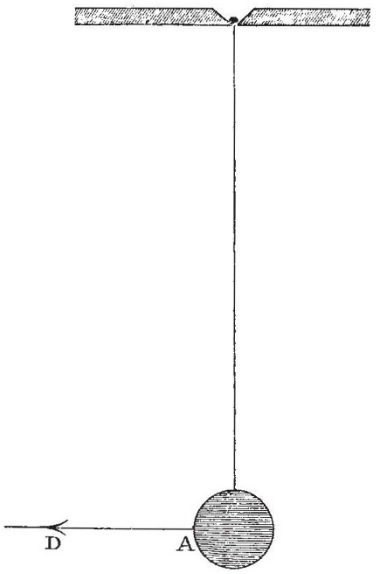

FIG. 1.

top to another piece of wood, L, of convenient thickness. Each has a slot cut along its centre, in which fits a ball, F, to which is attached a stiff wire, a string, and a weight, as shown in the figure. H is an india-rubber band, which presses E E together with a pressure at least sufficient to

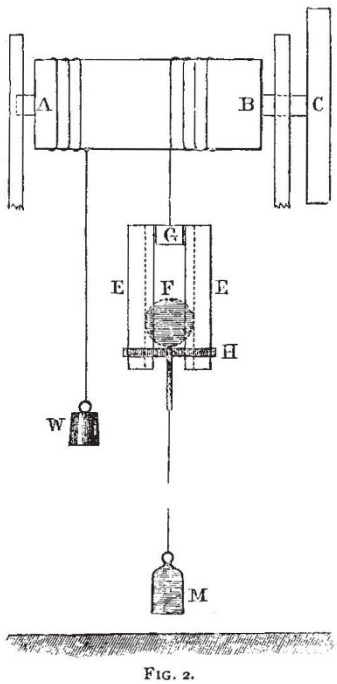

FIG. 2.

cause the ball F not to slip when the weight M is hung on to its string. Another string is wound round the end A of the cylinder, and a weight attached to it so as to balance the weight of the two pieces of wood, E E. The fly-wheel has a friction-brake upon it, and if the retarding force of the brake be constant, the angular displacement of the fly-wheel is proportional to the square of the momentum communicated.

(1) Lift the weight M a distance of about half an inch, and let it fall. The cylinder goes round through a certain angle, and the ball F is not pulled out of its slot.

(2) Lift the weight M through 2 or 3 inches, and let it fall. The ball F is pulled out of its slot; the cylinder goes round, but through a smaller angle than in case (1).

(3) Let the weight M fall through a height of 4 or 5 feet. The ball F is pulled out of its slot, and the angular displacement of the cylinder is barely perceptible.

The same explanations are applicable to the results of II. as were made concerning the results of I., provided couple be substituted for force, and moment of inertia for mass.

III. The following, though somewhat inconvenient as a class experiment, illustrates the same subject. Fix up

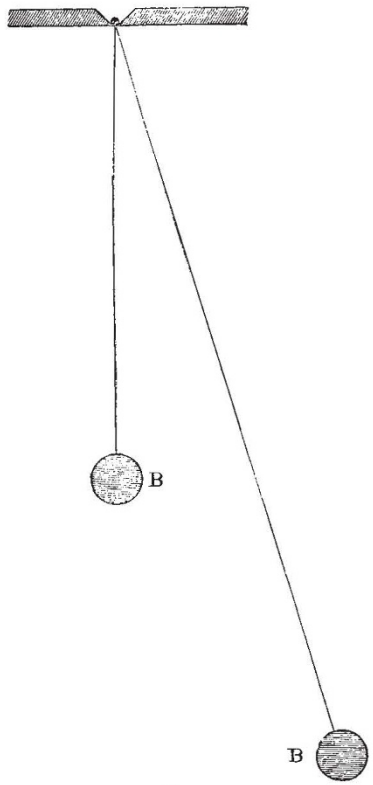

FIG. 3.

a plain deal or other board in the manner of Robins' ballistic pendulum. From a rifle with a small charge of powder, fire a bullet into the board, at right angles to its plane, and as near as possible to its centre of inertia. The bullet lodges in the board, which is deflected through a large angle. Increase the charge of powder, so that the bullet pierces the board. The deflection of the board is now smaller. Put the maximum charge of powder in the rifle, and the deflection of the board on firing the bullet into it is exceedingly small.

IV. Suspend a light ivory or other ball by a long india-rubber thread several feet long, as shown in Fig. 3. Pull the ball into the position A B′, and let it go. Looking at it as seen in the figure, it first begins to describe a curve against the hands of a watch. After two or three periods it begins to go round in a direction with the hands of a watch.

Bring the ball to the position B′ again, and project it at right angles, or at any angle, to the plane B A B The ball now illustrates three-dimensional motion. The period is slow, and the experiments are very interesting and instructive. MAGNUS MACLEAN.

NOTES.

THE bi-centenary of the publication of Newton's "Principia" was celebrated on Thursday last at Trinity College, Cambridge. A long and admirable address was read by Dr. Glaisher to a distinguished audience which had been invited to Cambridge by the Master and Fellows of the College. At a numerously attended dinner in Hall in the evening, speeches were made by the Master, the President of the Royal Society, the Astronomers-Royal for England and Ireland, and other distinguished guests.

AMONGST the missions just approved by the Special Commission of the French Ministry of Public Instruction are the following: M. Nickles, mining engineer, to carry out in the provinces of Valencia and Alicante, in Spain, geological investigations; Dr. Morisse, to undertake various medical and natural history studies in the basins of the Upper Orinoco and Amazon; the Abbé Hyvernat, to proceed to Armenia to copy the cuneiform inscriptions on the shores of Lake Van, to investigate the art of Assyria, and to study on the spot the Neo-Syriac dialects spoken in the basin of Lake Urumiyah; M. Gay, to undertake a mission to Nicaragua, Columbia, and Venezuela, to study the natural history, and make collections for the State Museums; M. Thoulet, Professor of Mineralogy in the Faculty of Sciences at Nancy, to study the organization of the Observatory of Christiania, and of the Scottish Marine Biological Station at Edinburgh.

THE Bill to provide for technical education in England and Wales, prepared and brought in by Sir H. Roscoe, Sir U. Kay-Shuttleworth, Sir B. Samuelson, Mr. G. Dixon, and Mr. A. Acland, has been printed. It provides (1) that any School Board may make provision for giving technical education in any school under their management, and either by day or evening classes, or both, as may seem fit, having regard to the daily occupations of the persons to be benefited thereby; (2) that if no such provision is made, or if it is insufficient, and if the local authority by special resolution determine that provision or further provision ought to be made, they may themselves make such provision. The Bill also provides for the rendering of aid by School Boards or local authorities to voluntary schools in which technical instruction may be given; and two sections define the conditions under which Parliamentary grants shall be made for the encouragement of such instruction both in voluntary schools and in Board schools. It is proposed that any School Board or local authority, should they think fit, may institute an entrance examination in reading, writing, and arithmetic, for persons desirous of attending technical schools or classes under their management, or to which they contribute.

THE *Colonies and India*, commenting on the movement in favour of technical education in the colony of Victoria, says it will not be the fault of the Victorian Government if technical education is neglected, as there is a feeling in the Cabinet that if the country is to progress the rising generation should have the advantage of technical teaching. The Minister of Public Instruction has issued a minute on the policy of founding a Victorian Technical University, which is a digest of some of the evidence given before our own Royal Commission on Technical Instruction. Mr. Pearson estimates the initial expenditure involved in the foundation of a separate technical University at from £500,000 to a million, besides a yearly endowment of at least £30,000. The latter sum appears out of proportion to the average endowments of such institutions in Europe and America. It is not doubted that the money required will be freely voted.

THE following resolution was passed at a meeting of the American Philosophical Society on January 6, and has just been received by some of the scientific Societies of Great Britain in a circular dated March 12:—"*Resolved*, That the President of the American Philosophical Society be requested to address a letter to all learned bodies with which this Society is in official relations, and to such other Societies and individuals as he may deem proper, asking their co-operation in perfecting a language for learned and commercial purposes, based on the Aryan vocabulary and grammar in their simplest forms; and to that end proposing an International Congress, the first meeting of which shall be held in London or in Paris."

THE general meeting of the Institution of Mechanical Engineers will be held on Thursday evening, May 3, and Friday afternoon, May 4. The chair will be taken by the President, Mr. Carbutt, at 7.30 p.m. on Thursday evening, and at 2.30 p.m. on Friday afternoon. The following papers will be read and discussed as far as time permits:—Third Report of the Research Committee on Friction: experiments on the friction of a collar bearing; description of the emery testing machine, by Mr. Henry R. Towne, of Stamford, Connecticut; and supplementary paper on the use of petroleum refuse as fuel in locomotive engines, by Mr. Thomas Urquhart, Locomotive Superintendent, Grazi and Tsaritsin Railway, South-east Russia.

SURGEON-MAJOR F. S. B. FRANÇOIS DE CHAUMONT, F.R.S., Professor of Military Hygiene at the Army Medical School, Netley, died at his residence at Woolston, near Southampton, on the 18th inst. He was fifty-five years of age.

AT the meeting of the Society of Arts on the 18th inst., Sir Howard Grubb read a paper on telescopes for stellar photography. His object was to discuss and describe a few of the more important mechanical details of the instruments which are to be used for the international photographic survey of the heavens. The paper is printed in the current number of the Journal of the Society of Arts.

ON March 31, about 10 p.m, a splendid meteor was seen at Asker, in Nerice, in Sweden. It appeared in the southern sky, increasing in brilliancy in its descent. Finally it seemed to burst into three parts, each of which left a trail in the sky observable a few seconds. The colour was intense bluish-white.

SEVERE shocks of earthquake were felt at Oldenburg on April 12. Several houses fell in at Eisenstadt. Shocks were also noticed at Pottendorf, in Lower Austria.

A HYDROGRAPHICAL BUREAU has been opened in Würtemberg, under the direction of Herr von Marten.

WE are glad to hear that a regular meteorological organization is to be established in Spain. The Director, appointed by "competitive examination," is Señor Augusto Arcimis, formerly of the Institution Libre de Ensenanza, Madrid. M. Arcimis has long been known as a meteorologist.

MM. MOHN AND HILDEBRANDSSON have published an important discussion on the "Thunderstorms of Scandinavia" (Upsal, 1888, 55 pp. and 12 plates). The first network of thunderstorm stations was established in France by Leverrier in 1865, and his plan has been adopted in most other countries, almost without change. Norway followed next, in 1867, and Sweden in 1871. The storms are divided into two classes: (1) heat thunderstorms, which occur generally in summer, and mostly originate in the central and eastern parts of the Scandinavian peninsula 2) cyclonic thunderstorms, which generally