by the tide", and we must now seek some method of training the successors of those men who are the present leaders. A head can be a success only if he agrees to cease his work as an expert, after appointment.

Great Britain and the U.S.S.R.

THE British Association has received the following message in reply to a resolution recently forwarded through M. Maisky to the U.S.S.R. Academy of Sciences (see NATURE of August 2, p. 135): "The Academy of Sciences of the U.S.S.R. sends warmest greeting to the Committee for Social and International Relations of the British Association for the Advancement of Science. With the help of scientists of both our countries the united peoples of Great Britain and the Soviet Union will triumph in the war for the liberation of humanity from Fascist tyranny. Otto Schmidt, vice-president, Academy of Sciences of the U.S.S.R."

U.S.S.R. Academy of Sciences: Air Raid Damage

ACCORDING to the British United Press, it can now be revealed that German raiders recently set fire to the library of the U.S.S.R. Academy of Sciences, one of the most famous landmarks in the city. The fire was put out, however, before any of the three million valuable books in the library were destroyed. It may be recalled that the Germans, during the early raids on Moscow, boasted that the Academy of Sciences had been destroyed.

Black-out *v.* Controlled Lighting for Air-raid Defence

THERE has always been controversy upon this subject, and while Britain has adopted the complete black-out in this War, there is a considerable opinion held in the United States that some form of uniform lighting, to disguise landmarks, would be equally effective and less hampering to the inhabitants of the district. Experiments are being carried out, but the problem is not capable of any very precise solution, as the results are entirely dependent upon the personal estimation of the observers from the air. Even in an actual attack, the results of bombing depend upon so many variable factors that it would by no means follow that the concentrated bombing of a certain district was due to its ineffective concealment.

The principal arguments against a black-out are the impossibility of hiding rivers, railways and long, straight roads; fires and enemy agent signals are more obvious; dropping of flares effectively lights up at least a limited area. It adds to the difficulties of all forms of defence and A.R.P. work during an attack, and it hampers all work and social life as it is necessarily applied continuously, since it has been proved that it is impracticable to bring black-out into operation only when an attack is expected. It is claimed that a uniformly spread mantle of light would not make a town any more obvious, and could be made to disguise any particular object equally well.

The difficulty lies in obtaining uniformity, with the different classes of buildings, open spaces with no buildings or roads, and the irregular contour of the city that could be co-ordinated with a map. There is the further problem of enforcing that uniformity when it is attained. Watching the observance of a complete black-out is easier than seeing that a certain standard of illumination from windows, roof lights, etc., is not exceeded. Uniform lighting was used in London and certain other towns towards the latter part of the War of 1914–18, but this was introduced as an alternative to a black-out not nearly so completely worked out or rigidly enforced as the present one. There is also the wider problem of using individual towns as landmarks for navigating purposes. A series of lighted patches, indicating towns, could easily be followed successively with the aid of a map, and made to lead to any desired district. Uniformity of lighting in this respect could only be attained by illuminating the whole country-side—a task of gargantuan magnitude.

Fire Prevention in War-time

MANY of the subjects covered in a lecture delivered to the Royal Society of Arts by Colonel G. Symonds, fire adviser to the Home Office, are of more than general interest. After discussing questions of organization and the need for adequate fire-fighting parties to take immediate action, Colonel Symonds dealt with the 'protective levels' required for resisting penetration by a 1 kgm. incendiary bomb. The figures he gave were: reinforced concrete $2\frac{1}{2}$ in. thick; steel plate $\frac{3}{16}$ in. thick; a paving-stone 2 in. thick with a well-tamped standard sand-bag also gives adequate protection. As regards internal protection, floors can be made fire resisting with 2 in. of sand, $2\frac{1}{2}$ in. of brick rubble passing through $\frac{3}{8}$ in. mesh, or with material conforming to BSS/ARP 27. Less certain protection, but enough to enable a fire party arriving within five or six minutes to cope with the bomb, before floor boards started to burn, would be provided by BSS/ARP 47. Structural timber should be treated with a flame-resisting material. Communicated fire can be stopped by $2\frac{1}{2}$ inch jets supplied with 1,200 gallons of water a minute. Where an 80-ft. space is unobtainable as a fire break, windows facing a lesser gap should be bricked up, or failing this, protected with wired-glass and fire-resisting shutters. An unperforated 14-in. brick party wall with good mortar carried 10 ft. above floor-level on the line of the break will often stand up well to a 'near miss'.

Biochemistry at the Franklin Institute

THE Biochemical Research Foundation Laboratory (formerly the Cancer Research Laboratories), under the direction of Dr. Ellice McDonald, has recently moved from Philadelphia, Pa., to Newark, Delaware. The buildings at Newark are new and specially designed for the work of the Foundation. One wing insulated from the main rooms contains a cyclotron for preparing radioactive substances for use in medical and biochemical problems. The laboratories

appear to be admirably equipped for research in physics, physical chemistry and biochemistry.. Miss G. E. Woodward is still carrying on with her researches on the metabolism and structure of amino acids. In this new institute it is expected that close co-operation between chemists, physicists and biologists will lead to new advances.

Rapid Black-out of a Factory

A DESCRIPTION is given in the *Electrical Review* of July 11 of a method of almost completely blacking-out in a few seconds a factory by simply pressing a button. A camouflage installation recently completed at a large factory provides for blacking out 550,000 sq. ft. of roof lights in 15 sec. Originally hard wall-boards were fitted to the outside of all the north lights and other windows. Alternate panels have been removed from the north light windows and fixed into a frame in their respective positions over the windows, the frame being made to move laterally across the whole span of lights through grooves cut in the sections fixed to the glazing bars. Steel cables were fixed to each end of the frame, passed over spring-tensioned pulleys and secured to a winch mounted on the wall inside the factory. The winch is operated by a ½ h.p. D.C. compound-wound G.E.C. Witton motor. The forward and reverse movements of the shutters are obtained by reversing the direction of the motor, which is controlled by forward and reverse contactors operated by two limit switches. The latter are tripped by 'fingers' mounted on steel rods secured by the cables, which travel up and down through a distance equivalent to the movement of the steel frame. Each span of lights of approximately 1,000 sq. ft. is operated by one ½ h.p. motor, and more than 500 motors have been installed. In the event of damage to the electrical equipment, the motors can be disconnected and the winches operated by hand in each individual bay.

New Tone for Dial Telephone Systems

IN long-distance telephony when messages or signals have to be transmitted simultaneously over wire networks, an error in dialling may result in reaching a group of numbers not assigned for service. In such cases a special tone may be used to inform the customer of his error, and this special development in switching is widely used in the Bell System networks of the United States. In the *Bell Laboratories Record* of April, Mr. M. E. Krom communicates a paper giving the development of the 'no such number' tone. The new tone varies continuously in frequency, like that of a siren, alternately rising and falling at half-second intervals. The sound is quite different from any other tone used in the Bell system. At the lowest pitch the fundamental frequency is 200 cycles per second, and at the highest pitch, 400 cycles. Harmonics up to 6,000 cycles are in both tones, and these give the latter a richness not found in single-frequency waves. The tone is generated by a 'relaxation' oscillator consisting of a vacuum tube, condenser and resistance. The tone is amplified by another vacuum tube which raises the level above that of the dial and busy tones. To lengthen the life of the vacuum tubes, the plate circuits are closed only when the tone is required; the filaments are continuously heated, however, to maintain the circuit in readiness for instant service. During field trials it has reduced circuit-holding time on numbers wrongly dialled and resulted in a higher percentage of correct numbers on the second dialling.

Egyptian Astronomy

HERBERT CHATLEY has given in a paper on "Egyptian Astronomy" (*J. Egypt Archæol.*, **26**, 120; 1940) certain conclusions regarding the various figures found in the Egyptian "celestial diagram", of which nearly twenty copies from the Eleventh Dynasty down to Roman times are in existence. The general deductions that have been made about the figures are included under eight categories, but limits of space do not permit any detailed description; those who are interested in Egyptian archæology will find it profitable to study the paper carefully. It is difficult to discover from reading the account of the constellations, Dekanal Band (the dekans were 10-day stars from the helical risings of which the ten-day week of the Egyptian year was marked), Meta-Dekans, etc., how much astronomical knowledge the Egyptians really possessed. Popular belief credits ancient Egypt with extensive knowledge, but archæological research scarcely supports this view in the realm of astronomy. The records show very little regarding the actual observations of their inventors, and many of them are of a magical or religious nature the object of which was to protect or assist the dead. The author has previously expressed the opinion that the dekanal lists were revised about the beginning of the New Kingdom, about 1600 B.C., and he conjectures that the celestial diagram was invented then as a talisman which concentrated the power of the heavenly bodies into one form.

Mathematical Problems in Seismology

A. BLAKE has recently directed attention to many outstanding problems in mathematical seismology (*Trans. Amer. Geophys. Union*, 1940). The following problems are, more particularly, mentioned: (1) Problems in the theory of seismic waves due to inhomogeneities in the media and other causes, and to new methods available for the study of the interior of the earth. (2) Problems of instrumental seismology including the new strain meter and rotation seismograph. (3) Problems relating to the complexities encountered in determining the response of engineering structures to the motion of a strong near earthquake. (4) Problems of statistical seismology, especially the periodicity problem. In many cases Blake states that seismological calculations may be performed by machines such as the differential analyser and punched card machines.

Concerning strong-motion problems, Blake says that the analysis of the response of a structure into characteristic or normal components satisfying linear equations depends on the treatment of the strain-