

is so proportioned that the principal transverse section is wholly in tension (Fig. 7) and is much more evenly distributed than before, while the elongated head allows a more even distribution in the longitudinal section. The contour is apparently not entirely satisfactory, as the head merges into the main body in a somewhat abrupt manner, and suggests that a more satisfactory solution would be obtained by more gradual transition curves following one of the system of curves of principal stress in a member of rectangular form, and of considerable width. If this is carried out as shown in the next model, you will, I think, observe that the effect of this change is a beneficial one, and the lines of stress are less curved, while there are no portions of the head which may be looked upon as of doubtful utility.

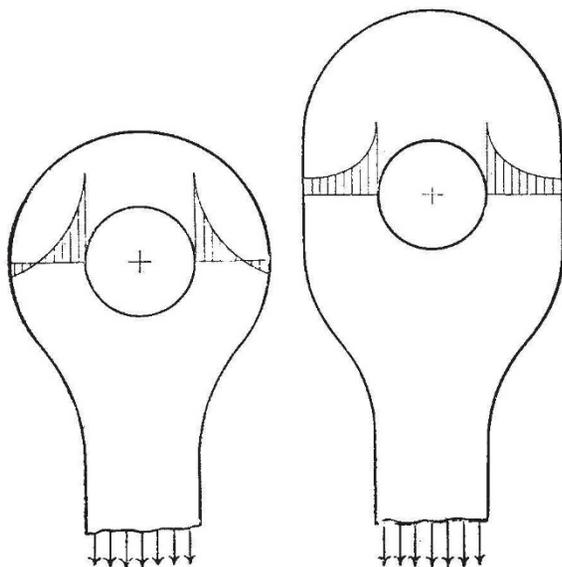


FIG. 6.

FIG. 7.

Economy in the use and distribution of material to resist stresses in a structure is clearly a most desirable end, and in perhaps no case is this more necessary than in some of the latest developments of modern engineering—the airship and the aeroplane—where weight is a most important factor; and tentative experiments upon models of links used in these structures show that some help in the solution of these new problems may possibly be afforded by optical investigations.

It would not be difficult to supply other examples, but the cases already described are possibly sufficient to show the use of polarised light in engineering problems of stress and strain, and to indicate the possible utility of stress pictures in other fields of applied science and industrial research.

#### UNIVERSITY AND EDUCATIONAL INTELLIGENCE.

OXFORD.—Mr. G. W. Walker, F.R.S., formerly fellow of Trinity College, Cambridge, has been appointed Halley lecturer for 1916, in place of Prince Boris Galitzin, resigned.

The report of the Committee for Rural Economy, which has just been issued, records the fact that the whole of the staff of the school who are of military age have accepted commissions, or are otherwise engaged on work connected with the war. The Sib-

thorpean professor (Prof. Somerville) has also accepted Government work. In spite of depleted numbers, research has been conducted on representative soils from the Belgian Congo, on soils in the Oxford district, on the reaction of soil constituents towards solutions of phosphate, the comparative value of high and low basic slag, the relation between hygroscopic value and the results of mechanical analysis of soils, the effects of grass, etc., on the growth of trees, the storage of fertility in grassland as the result of the use of phosphates, and the life-history of *Stigmonota conferrana*, a microlepidopteron. The Institute for Research in Agricultural Economics, the aim of which is the application of scientific discovery to the practical business of food-production, has continued its work under considerable difficulty, mainly arising from the war. The chief subject investigated has been the cost of production in agriculture, particularly in regard to the expenditure upon labour. An agricultural survey of Oxfordshire has also been carried out, but many promising inquiries have had to be suspended.

The Board of Finance, presided over by Sir George Murray, has reported that, largely in consequence of the generosity of individuals, of the colleges, and of delegacies, the immediate difficulties of the year 1915 have been surmounted. The Board concurs in the proposal to establish an "Emergency Relief Fund," and thinks that later on in the year it will become necessary to reconsider the financial situation.

Leave of absence on account of war service has been granted to the professor of engineering science (Prof. C. F. Jenkin), and the Waynflete professor of mineralogy (Prof. H. L. Bowman).

MISS SARAH HOLBORN, who died on January 3, has left the sum of 1000*l.* to the London School of Medicine for Women.

THE conversazione of the Battersea Polytechnic will be held on Saturday next, February 26. The laboratories, workshops, and the polytechnic generally will be on view, and the evening affords an opportunity for the public to see the kind of work which is carried on in the training of men and women to fit them for the higher technical posts in industrial life.

ANNOUNCEMENT of a gift of 50,000*l.* for a library for Amherst College was made at the annual banquet of the Amherst Alumni Association of New York. The library is, *Science* states, to be a memorial to a graduate of the class of 1867 from a brother whose name is withheld. A gift of 30,000*l.* from a graduate of Wellesley College toward the fund for a new administration building is also announced by our contemporary. The donor does not wish her name made known at present.

ACCORDING to a correspondent of the *Times*, some education authorities are contemplating the re-introduction of slates to the schoolroom. Such a step would be a retrograde one, for it is generally recognised by hygienists that the slate and slate pencil—cleaned with saliva and sucked by the pupil—possess considerable capacity for the spread of infectious disease among the scholars. The writing on a slate, moreover, does not stand out so clearly as on paper, and the strain to the eyes is therefore greater.

IN the *Times* of February 18 particulars are published of the loss of libraries and museums by Serbia consequent upon the recent invasion by the enemy. In Belgrade King Peter's private library and the Royal collections were ransacked. At Nish, the complete treasures of the National Library, the University Library, and the libraries of the various faculties, which had been removed from Belgrade, were con-

fiscated and sent to Sofia. The library of the Theological College of Prizrend met the same fate. The priceless treasures of the Ethnographical Museum in Belgrade have been disbanded, and are being divided between Austria and Hungary.

THE duty of the nation towards its children was never more serious and imperative than at the present crisis. We are under a grave obligation to raise up an educated generation of men and women to take the place of those who, being in the main the most virile of the nation, will suffer to an unprecedented extent death and disablement in the course of the war. We have found by bitter experience that our past neglect of education has placed us in grave peril, both in respect of scientific military resources and in regard to industrial and commercial enterprise. Yet, despite the indubitable truth of all this, we find that the education committees are being subjected to extraordinary pressure by interested sections of the nation, not only in rural areas, but in industrial centres also, to economise in essential features in the subjects and means of education, and, not content with this, in requiring that the children shall be released from school at an untimely age. In Lancashire it is demanded by textile employers and employed alike that the full-time school age shall be reduced; in a commercial centre like Bradford a like demand is made, and throughout the agricultural areas the cry is that the children shall be placed at the disposal of the farmers. According to a statement made by the President of the Board of Education a few days ago, there are now some 8000 children otherwise legally liable to attend school who have been exempted by various education committees. The Government should in this matter lead the nation and make unmistakably clear that the child-life shall not be exploited, but conserved so that physically and mentally it shall be fitted adequately for the onerous responsibilities which will surely be required of it. The women of the nation have shown how satisfactorily they have responded to the industrial demand, and there is little doubt that they would be found equal under proper economic conditions to the claims of agriculture.

### SOCIETIES AND ACADEMIES.

#### LONDON.

**Royal Society**, February 17.—Sir J. J. Thomson, president, in the chair.—A. R. Cushman and S. Yagi: The action of cobra venom. The action of cobra venom has generally been supposed to be exerted in part on the central nervous system, in part on the terminations of the motor nerves. It is shown that there are no symptoms of central nervous action in either cold or warm-blooded animals, and that death occurs from paralysis of the motor nerve terminations in striated muscle. In the frog this is accompanied by slowness, and finally arrest of the circulation from a direct action on the heart. In mammals the failure of the respiration is due to the paralysis of the respiratory nerve terminations, but this is often accompanied by the inhalation of saliva, which accelerates asphyxia. The heart is also weakened by quantities of venom greater than the minimum lethal dose. A number of antidotes were examined, without any great success, because no antidote appeared capable of ejecting the venom from its combinations in the tissues.—L. Doncaster: Gametogenesis and sex-determination in the gall-fly, *Neuroterus lenticularis*. Part III. In *N. lenticularis* there are two generations in the year, agamic females appearing in early spring, and sexual females and males in early summer. Previous work had shown that any individual agamic female has only

male or only female offspring, and the object of the present work was to discover the nature of the difference between these two classes of agamic females. Two possible cytological causes might account for the fact that some sexual females produce only male-producing offspring, while others produce only female-producing. If each fly pairs only once, the difference might depend on the existence of two kinds of males, or it might arise through differences in the maturation-processes of eggs laid by the two classes of sexual female. No cytological differences in the spermatogenesis of different males could be detected. The maturation phenomena of the eggs (about 300) of fifteen separate females have been examined, and while they seem to fall into two rather distinct types, the differences are not sufficiently considerable to correlate them with the sex-phenomena with any confidence.—Philippa C. Esdaile: The structure and development of the skull and laryngeal cartilages of perameles, with notes on the cranial nerves. The writer has had the unique advantage of examining in detail a series of six embryo skulls of perameles. The development has been observed and the ossification of the cartilage and membrane bones described and figured. Many questions of interest have been noted, the most important being the affinities and formation of the ala temporalis and its subsequent ossification from cartilage and membrane.—J. C. Bose and S. C. Das: Physiological investigations with petiole-pulvinus preparation of *Mimosa pudica*. The present investigation is to show how an isolated preparation of petiole-and-pulvinus of *Mimosa* may be rendered as efficient for researches on irritability as the nerve-and-muscle preparation of a frog. On isolation of the preparation from the plant, the shock of operation is found to paralyse it. Experimental conditions are described for restoration of excitability which can be maintained uniform for more than twenty-four hours, after which a depression sets in. The rate of fall of excitability becomes rapid forty hours after the operation, the sensibility being finally abolished after the fiftieth hour. For the determination of the rôle played by different parts of the pulvinus in response and recovery, response-records were taken when selective amputation was made of (1) the upper, and (2) the lower, half of the pulvinus. It is shown that the excitability of the upper half is eighty times less than that of the lower. Chemical agents induce characteristic changes in excitability. The responses exhibit fatigue when the period of rest is diminished. The passage of a constant current is found to remove the fatigue. Response is enhanced under exposure to light, and diminished in darkness. Light is shown to exert a direct stimulating action on the pulvinus, independent of photosynthesis. Injury caused by cut or section of the petiole induces a variation in the conducting power. Two different effects are produced, determined by the tonic condition of the specimen. In normal specimens, injury depresses the conducting power; in sub-tonic specimens it enhances it.

#### PARIS.

**Academy of Sciences**, January 31.—M. Camille Jordan in the chair.—The President announced the death of Guido Baccelli, correspondent for the section of medicine and surgery, and of Edouard Heckel, correspondent for the section of rural economy.—A. Laveran: Experimental infections of mice by *Leishmania tropica*; a case of infection by the digestive tract. A detailed description of the transmission of the disease to a mouse by a culture administered by the mouth. Three other mice, similarly treated, were not infected.—S. Brodetsky: An analogy between linear differential equations and algebraical equations.—A. Perot: A method of observing the coincidences of two