Army have received the recognition both of Lord French and of Sir Douglas Haig. A large number of chemists have been engaged to work in the laboratories and works of Government and controlled establishments making munitions of war. The chemical staffs of Woolwich Arsenal and of the Government Laboratory have been largely increased, whilst university and college laboratories have in many cases become small factories for the preparation of drugs, antiseptics, etc. Finally, and perhaps most important of all, the Government has accepted the guidance of our most able and experienced chemists in the investigation of such problems—become acute by reason of the war—as merit their special attention. At last the chemist seems to be coming into his heritage.

AN interesting paper on the subject of sulphur in petroleum oils was read by Dr. F. M. Perkin at a recent meeting of the Institution of Petroleum Technologists. Nearly all naturally occurring petroleum oils contain sulphur, some having only a very small proportion, others large amounts. Oils obtained by the distillation of shales also contain sulphur, the proportion depending partly upon the quantity present in the material distilled, and partly upon the form in which the sulphur exists in that material. The paper illustrates the numerous forms in which sulphur may occur in the oils by reference to the homologous thiophenes, thiophanes, and alkyl sulphides; the probable origin of the sulphur in petroleum is also discussed. Be the origin what it may, as a constituent of petroleum oils sulphur is very objectionable. In petrol it gives rise to a disagreeable exhaust; in lamp-oils it causes an unpleasant odour, decreases the luminosity, and tarnishes domestic ornaments; in oil fuel it vitiates the atmosphere of the stokeholds and corrodes boiler-plates and tubes. Hence the question of desulphurising the oils is one of much importance. We have in the Kimmeridge shales a considerable source of shale oil, but, unfortunately, the sulphur content is very high. If a practicable method of removing the sulphur could be found, the Kimmeridge shale oil would be of immense value to this country. Many attempts have been made, but so far without success. Dr. Perkin describes various methods of desulphurising which have been employed or proposed, and also outlines a new process, which consists in the treatment of the oil at high temperatures with gaseous ammonia. In these circumstances sulphur is eliminated from the oil in the form of hydrogen sulphide. At present, however, the process is only in its initial stages, and not much information could be given as to its practical application.

THE eighty-third annual report of the Royal Cornwall Polytechnic Society (vol. iii., part ii., 1916), just issued, is of more than local interest, because of the important scientific and industrial research papers included in it. A paper on "The Physical Condition of Cassiterite (Tin Ore) in Cornish Mill Products," by the late Mr. J. J. Beringer, contains a new theory to account for the loss of the tin mineral which present appliances fail to recover. It is explained by a thoughtful introduction by Mr. W. H. Trewartha-James, who collated and revised the author's notes just before he died. This paper attracted wide attention, and nearly all the mine managers in Cornwall were present at the society's meeting at Falmouth in 1915 to discuss the important conclusions. The discussion ultimately resulted in the decision of the Government Department of Scientific and Industrial Research to subsidise and establish a scheme of research in tin and tungsten minerals at the suggestion of the Institution of Mining and Metallurgy in co-operation with the Royal Cornwall Polytechnic Society. Other papers in the report are: "Tin and Tungsten Minerals in the West of England," by the late Mr. J. H. Collins; "The Prospects of Tin in the United States," by Mr. H. Foster Bain, presenting important facts with regard to the international position of the tin industry; "The Development of Mechanical Appliances in China Clay Works," by Mr. J. M. Coon; "Piskies," a Cornish folk-lore study, by the president, Mr. H. Jenner; and a lecture on the fly problem by Mr. F. Balfour Brown. The report can be obtained from the society, or from William Brendon and Sons, Ltd., printers, Plymouth, price 5s.

OUR ASTRONOMICAL COLUMN.

COMET 1917*a* (MELLISH).—The discovery of a new comet by Mr. Mellish, on March 20, has been announced by Prof. Strömgren. It was observed at Copenhagen on March 22 in R.A. 2 h. 9 m., decl. 15° 1′ N., and was rated at mag. 7·5. The comet is situated in the constellation Aries, and is consequently only visible for a short time after sunset.

D'ARREST'S PERIODIC COMET.—On the basis of corrected elements for this comet, which has a period of six and a half years and returns to perihelion this year, the following ephemeris has been given by J. Braae (*Ast. Nach.*, 4874):—

1917		R.A. h. m. s.	Decl. ° ′	Log r	Log Δ
March	29	22 41 59	−6 25·3	0·1031	0·3101
April	2	22 56 29	5 34·9	0·1027	0·3092
	6	23 10 52	4 43·8	0·1030	0·3086
	10	25 8	3 52·1	0·1039	0·3084
	14	39 14	3 0·4	0·1054	0·3086
	18	23 53 11	2 8·9	0·1076	0·3088
	22	0 6 58	1 17·9	0·1103	0·3094
	26	20 34	−0 27·8	0·1136	0·3102
	30	33 57	+0 21·2	0·1175	0·3113
May	4	0 47 9	1 8·8	0·1218	0·3125
	8	1 0 9	+1 54·7	0·1266	0·3138

The date of perihelion passage is April 2. During the above period the comet will be about two hours west of the sun.

BRIGHT METEORS IN MARCH.—Mr. Denning writes: On March 14 at 10 h. a meteor equal to Jupiter was observed at Totteridge and Stowmarket. It fell over the south-east coast from a height of 71 to 17 miles. On March 15 at 11 h. 30 m. a meteor as bright as Venus was observed by Miss G. Lewis from Droitwich, and by several other persons in various parts of the country. The records of its flight are not, however, in good agreement, though the radiant point was probably in the Lynx, and the position of the object nearly over Cheltenham at its disappearance. On March 19 at 7 h. 32 m., a fine meteor was seen through clouds at Bristol, as it sailed almost vertically down the northern sky. On March 27 at 10 h. 17 m. and 10 h. 43 m. a pair of brilliant meteors were seen by Mrs. Wilson at Totteridge, and by Miss T. E. Gall at Hornsey, N. They were directed from a radiant low in the east near μ Libræ, and pursued nearly horizontal flights at heights of about 54 miles, and velocity 15 miles per sec.

PHOTOGRAPHS OF JUPITER.—Photographs of the planet Jupiter showing a large amount of interesting detail were obtained during the recent apparition by Mr. J. H. Reynolds with a 28-in. reflector at his observatory near Birmingham (Journ. B.A.A., vol. xxvii., p. 151). The telescope was adapted as a Cassegrain with an equivalent focal length of 55 ft., and the image was further magnified from three to six times by a Barlow lens. At the opposition of 1916, the N. temperate belt, which was absent in 1915, reappeared with strength and size comparable with that

of the S. temperate belt, and the intervening zone between it and the N. tropical belt was occupied by a remarkable series of bright elliptical formations, usually accompanied by dark condensations on the south preceding side. These elliptical forms appear on all the photographs taken during 1916, and are probably to be interpreted as representing cyclones.

THE INSTITUTION OF NAVAL ARCHITECTS

THE spring meetings of the Institution of Naval Architects were held in the rooms of the Royal Society of Arts on March 28 and 29. In the unavoidable absence of the president—the Earl of Durham—the Marquis of Bristol took the chair and delivered an address, in which he referred to the question of the formation of a council for co-ordinating the common interests of the various institutions representing engineering professions. Such a council, in making recommendations, would have the weight of the whole profession behind it.

The Elgin scholarship has been awarded to Mr. R. J. Shepherd, and the annual gold medal to Prof. T. B. Abell for his paper on experiments to determine the resistance of bilge keels to rolling. A premium has been awarded to Mr. A. T. Wall for his paper on some effects of the Bulkhead Committee's report in practice.

Despite the disadvantages under which the institution has been placed owing to so many of its members being engaged on work intimately connected with the war, thirteen papers were read and discussed. The standard of the papers has in no way diminished, and many contain matter of considerable scientific interest.

Mr. D. B. Morison's paper on standardisation as applied to the machinery for cargo-boats is of much interest at the present time, when a strong effort is being made to make good losses due to piratical submarine operations. A specification for such machinery is being discussed now by the North-East Coast Institution, and an appeal was made for joint action by all the institutions connected with shipbuilding. An interesting feature of Mr. Morison's paper is the many references to economic problems. It is futile for capital to expect that labour will consent to any great reduction in wages, and equally hopeless for labour to expect the maintenance of the present high rate of wages without concession on its part. To render it possible to pay high wages in the future and yet maintain our trade, the requisites are (i) a candid acknowledgment by labour of the economic law that good general trade is dependent on maximum production, and (ii) capital must recognise that maximum production entails correspondingly high pay.

Mr. J. Montgomerie contributed a valuable paper giving an account of experiments conducted at the West Ham Technical Institute on stress determination in a flat plate. In these experiments the plates were bolted in a very heavy frame, rectangular in plan, leaving a surface of plate measuring 4 ft. by 2 ft. exposed to water-pressure. The object was to hold the plate round the edges as rigidly as possible. Bach's plates—which constitute the only experimental work on the large scale up to the present—were not held so rigidly at the edges Crawford's experiments on the same subject were on too small a scale. Mr. Montgomerie has experimented on several plates of various thicknesses; the plate 0·75 in. thick alone is reported upon in the paper, although the experiments on the other plates have been completed.

Measurements of deflection were made at many stations on the plate, and curves plotted showing the cross-sections in directions parallel to the edges. From these curves, by application of graphical methods, the stresses at the stations were determined. Owing to the nature of the graphical methods employed, it was considered desirable that the strains in the plate should be measured directly, and for this purpose a strain-meter was devised by Mr. J. Duncan and used in such a manner as to determine the principal axes of strain at the stations. The principal strains were then measured at each station, and from the knowledge thus obtained, together with the measured values of Young's modulus and Poisson's ratio for the material, the principal stresses were determined and the ellipses of stress drawn for each station. The results by these two methods show very fair agreement.

The resulting diagram is very interesting, and shows the elastic behaviour of the entire plate. It shows that the maximum stress actually occurs at the centre of the plate and not at the frame ends of the short diameter, as has been supposed hitherto. There is no doubt that this fact is due to the elastic movements of the portion of the plate clamped in the frame, which permit the "wall section" to assume slope instead of remaining in the plane of the wall, as is assumed in the usual mathematical theory The effect of this behaviour is to diminish the bending moment at the plate edges and to increase that at the centre; the stresses, of course, alter correspondingly. Mr. Montgomerie has promised further information regarding the other thinner plates tested, and his contribution must be regarded as a valuable addition to our knowledge of cases of complex stresses.

Mr. Thomas Graham described an apparatus for interpreting stability for the use of shipmasters, whereby the stability of vessels under any ordinary conditions of loading can be shown graphically and easily interpreted. This instrument illustrates three features of stability which are of most practical importance, viz. :—(i) An automatic record of the variation of the righting arm as the ship heels over from the upright to the vanishing angle. (ii) The approximate angle of heel at which the freeboard deck edge becomes awash. (iii) The position of the water-line throughout the range of moderate angles met with in practice. The appliance consists of a pivoted wooden lamina representing a cross-section of the ship, and having a pointer moving over a protractor showing angles of heel. A plumb line is hung from the position on the lamina corresponding to the known centre of gravity of the ship. A brass plate having a curved edge representing the metacentric evolute for the given draught and displacement is attached to the lamina, and another plumb line is arranged to pass over the edge of this evolute and to hang tangentially. The distance between the two plumb lines thus shows to scale the magnitude of the actual righting lever at all angles of heel. An additional feature is an arrangement for indicating the position of the water-line.

Prof. W. E. Dalby read a paper illustrating the inner structure of mild steel, and showing how its strength is correlated with this inner structure. This paper is one of the most readable produced up to date, and contains explanations which can be followed readily by reference to the many micrographs included. Load extension diagrams of all the steels have been obtained by use of the author's well-known apparatus.

Lieut. Walter A. Scoble contributed a paper on the design of pin joints based on ultimate strength. The author gives reasons leading to the conclusion that the maximum load carried is the best criterion for the strength of a pin joint, and describes in detail a method by which the calculations required in designing a joint can be made.

Mr. J. J. King-Salter gave an account of some experiments on the influence of running balance of propellers on the vibration of ships. Since the introduction of turbines in warships, running at a much higher