It remains to point out the widespread importance of liquid crystals in Nature. This was considered in a paper by Prof. Rinne, whose recent lamented death overclouded the proceedings at the beginning of the Conference. The liquid crystals mostly studied are provided by melts of pure substances: far more, however, are to be found in two-component systems, where greater or less concentration in a solvent is equivalent to a rise in temperature. Such liquid crystals show all the phenomena observed in melts, besides others due to their disperse nature, and are widespread, indeed universally found in biological structures.

Most of the protein, fat and myelinic substance of living bodies exists in liquid crystals, but this is only directly visible as such when all the molecules are oriented in definite directions, as in spermatozoa, muscles, nerves and their myelinic sheaths. Indeed the liquid crystal state seems the most suited to biological functions, as it combines the fluidity and diffusibility of the liquid while preserving the possibility of internal structure of crystalline solids.

The spontaneous structures—threads, cones, etc.—of liquid crystals have dimensions intermediate between those of molecules and those of living cells, so that we may say that the liquid crystal has as much right as the colloid to be considered the basis of vital activity.

The existence of this virtually new state of matter will have to be taken into account in any modern comprehensive picture of the material world, whether physical, chemical or biological.

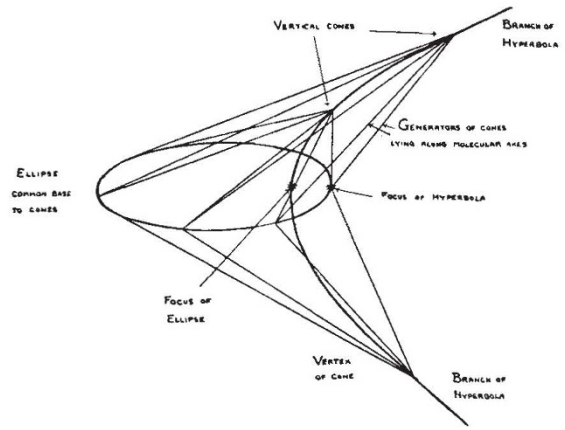

FIG. 5. Focal conic structure. The ellipse and hyperbola must be imagined in planes at right angles. Each cone has its vertex on the hyperbola and its base on the ellipse.

The Faraday Society Conference will have well fulfilled its purpose if it succeeds in provoking further research in the field of liquid crystals.

[1] The photographs reproduced as Figs. 1, 2 and 3, were taken by Dr. Lawrence at the Colloid Physics Department, Cambridge.

Royal Cornwall Polytechnic Society

THE Royal Cornwall Polytechnic Society was instituted in 1833 to encourage and stimulate the ingenuity and inventive faculties of Cornishmen and others, with the view of introducing new inventions and improving the mechanical appliances of the age, also of discovering and assisting persons talented in the fine arts and those showing aptitude in the study of natural history and its allied subjects.

The credit for the Society's inception must be given to Robert Were Fox, F.R.S. and his daughters, Anna Maria and Caroline Fox, who were ably and enthusiastically supported by Lord de Dunstanville, M.P., F.R.S., Sir R. R. Vyvyan, M.P., F.R.S., and a company of the most distinguished gentlemen of the county. Lord de Dunstanville was elected its first patron. In 1835, His Majesty King William IV graciously consented to become patron, and from that date the Society has enjoyed the patronage of succeeding sovereigns. Davies Gilbert, president of the Royal Society, was its first vice-patron. Since 1856 the Society has been honoured by Royal vice-patrons, the present holder being H.R.H. the Prince of Wales and Duke of Cornwall. Viscount Clifden of Lanhydrock, the president, follows in office many distinguished and learned men.

At the time of the Society's foundation there was great mining activity in Cornwall, some four hundred mines working, chiefly for copper. The county was the world's chief producer of this metal, the exploitation of which was attended by considerable financial gain. The lodes contained minerals rich in copper, comprising chiefly oxides, arsenides and grey sulphides, these passing in depth to yellow sulphides below which the lodes became tin-bearing. The richest mines were in the Gwennap, Camborne, and St. Just districts, and millions of pounds sterling were paid in dividends. John and Richard Taylor, and members of the Williams of Scorrier House, Bolitho, and the Fox families, were the principal mine owners; these men joined the Society at its foundation, thereby assuring its close association with the mining industry.

Early in the Society's history, its attention was attracted to the extreme exertion demanded of miners who, in the deep mines, had to descend and ascend 1,200–1,500 ft. by means of ladders. This daily recurring exercise materially impaired the miner's energies, and was very detrimental to his physical well-being. In view of this, valuable premiums were offered for inventions devised to eliminate these conditions and thereby make the lot of the miner less laborious. Interest in this subject was greatly stimulated and led to the invention of the 'man-engine' by Michael Loam. This appliance was first installed at Tresavean

mine and the sum of £500 was contributed by the Society in order that it should be thoroughly tested. The successful outcome of the trials resulted in the man-engine coming into general use in the mining world, and when a second one was installed at Poldice mine a further contribution of more than £100 was provided towards the expenditure.

Underground blasting operations at this time were effected by filling a reed or straw with gunpowder, igniting this, and thereby exploding the charges. This primitive method was extremely dangerous and often caused serious accidents, in consequence of the premature ignition of the powder. Premiums were offered for a solution to this very important problem, and the dangers were minimised by the introduction of the safety fuse, which rendered blasting operations comparatively safe. Improvement in the methods of ventilation in the deep mines was also for many years a pressing necessity, and valuable advances were made through the auspices of the Society.

Some ninety exhibitions have been held by the Royal Cornwall Polytechnic Society, at which many important inventions of the past century were first shown. Among those which received valuable awards were: the dipping needle deflector, by Robert Were Fox, F.R.S., which was later adopted by the Navy, 1834; the mining theodolite, by William Wilton, 1835; the safety fuse, by William Bickford; the steel wire rope, ventilation appliances, gas and oil engines, electrical machinery, rock drills, etc. Prior to 1864 a sum of more than £4,000 had been awarded as premiums for inventions, exclusive of medals and other prizes.

The Society was the first institution to organise scientific education in the county; a considerable amount of valuable work of this nature was later carried out by the Miners' Association of Cornwall and Devon, which had its inception in the Society, under the superintendence of Robert Hunt, then the secretary of the Polytechnic Society. Evening classes for instruction in mining and allied subjects were instituted in many towns of Cornwall, the lecturers being Sir Clement le Neve Foster, J. H. Collins, Dr. Richard Pearce, and Benedict Kitto. A Science School, established at the Polytechnic Hall, Falmouth, existed for many years and opportunities were afforded for exhibition of the work of its students.

The Falmouth Meteorological Observatory, established by the Board of Trade in 1867, was placed under the local control of the Polytechnic Society; grants for its maintenance being made by the London Meteorological Council from 1868 until 1921. The present Observatory building was erected by the Society in 1885, and through the generosity of the Royal Society and the British Association, a set of recording magnetographs was added to its equipment and it became one of the three magnetic observatories of England. Its work was carried out for many years under the superintendence of Edward Kitto, ably supported by Wilson Lloyd Fox. At the invitation of the Falmouth Council, responsibility for the control and maintenance of the Falmouth Museum has been assumed by the Society, and the exhibits have been transferred to the Polytechnic Hall.

During recent years the depression in the mining industry, resultant from the low market value of metals, has necessitated the suspension of operations at many of the Cornish mines. It is hoped, however, that the present higher price for metals will be maintained, in which case the prospect of considerable increase in mining activities appears promising. The Society watches this improvement with satisfaction and is ever ready to assist in the advancement of the interests of industry.

The Royal Cornwall Polytechnic Society has now completed its first hundred years' service in the interests of science and industry; and its centenary celebrations will take place on July 18–21 inclusive. The Royal Society, Royal Institution, Institution of Mining and Metallurgy, British Association, and other learned and professional bodies are sending delegates. The programme for the meeting includes visits to places of historical and geological interest, engineering works, etc., and papers presented by eminent men of science, including Sir John Cadman, Sir Richard Gregory, Sir William Napier Shaw, Dr. G. C. Simpson and Prof. S. J. Truscott. H. C. G. NEWTON.

William Froude (1810-1879)

THOUGH the name of William Froude has long been a household word among naval architects, and his methods of studying the resistance of ships have been adopted in all important maritime countries, yet it may safely be said that few who are familiar with his pioneering experiments know anything of his life and character. This is not to be wondered at for, so far, the only sources of information regarding him have consisted of brief sketches. There will therefore be many who will read with interest the presidential address delivered to the Devonshire Association at Ilfracombe on July 4 by Sir Westcott Abell, who took for his theme "William Froude—His Life and Work".

Like Froude, Sir Westcott is a Devonshire man and for many years was in the service of the Admiralty. He has thus had ample opportunities of familiarising himself with the career of Froude. Froude was the fourth son of the rector of Dartington, near Totnes, and the brother of Richard Hurrell Froude (1803–1836) and James Anthony Froude (1818–1894). He was born at Dartington on November 24, 1810, and after attending a school at Buckfastleigh, he went to Westminster School and entered Oriel College, Oxford, in 1828.