the production of hecogenin, based on a laboratory unit set up under the joint auspices of the East African Industrial Research Board and the Medical Research Council, is being sponsored by the Corporation to provide a centre for more extended study of the methods of extraction and processing. In the field of scientific instruments, the Corporation has undertaken, jointly with an industrial firm, the development of a British photogrammetric plotting instrument from an invention of Prof. E. H. Thompson, professor of surveying in University College, London; and, in order to accelerate production, it has, with Board of Trade approval, undertaken a share of the financial risk involved in the development of an aural microscope and chick-sexer from the invention of Mr. C. S. Hallpike, of the Otological Research Unit of the Medical Research Council.

TESTING OF BEARING PROPERTIES OF METALS

ENGINEERS and metallurgists have long been faced with the problem of assessing the bearing properties of any particular bearing alloy. One obvious method (and perhaps the best) has been to test the materials under practical working conditions; but, although this may be effective, it is extremely costly and slow. For these reasons a number of simplified empirical methods have been devised which aim at providing a useful 'figure of merit'. In a paper on "Some Experiments with Sleeve Bearing Metals" (*Trans. Danish Acad. Tech. Sci.*, No. 2; 1952), Dr. Borge Lunn has described another test of this type. As he points out in his introduction, it has generally been recognized as a defect of existing hydrodynamic theory that it does not take into account the nature of the journal or bearing material. In practice, however, the behaviour of a bearing is very markedly dependent on the type of lubricant and bearing material used, and this, in turn, is associated with the frequency and extent to which the hydrodynamic film is penetrated. Dr. Lunn's test has therefore been primarily designed to give a measure of the breakdown and penetration of the lubricant film.

The experimental arrangement is a development of that described by Kauppi and Pedersen[1]. It consists of a hard steel ball which reciprocates over the surface of the bearing alloy at a frequency of about seventy strokes a minute, the load being of the order of several kilograms. The rubbing surfaces are insulated and the electrical resistance between them measured during the reciprocating motion. The method is similar to that described by Courtney-Pratt and Tudor[2] and by Popinga[3] in their investigation of the lubrication between the piston ring and cylinder wall of a running engine, and shows results of the same type. When the surfaces are instantaneously at rest the resistance is low, indicating some metallic contact or, at best, a regime of boundary lubrication. During the central part of the stroke the resistance fluctuates between high and low values as a fluid film is built up and then punctured. Further, as a result of a running-in effect, there is an overall increase in the resistance during the first few minutes of the test, a steady state being reached after several hundred strokes have taken place. Dr. Lunn's procedure is to determine the average resistance during the first 250 sec. of running by a current-potential method using a pen-recording voltmeter of relatively low frequency. The difference (expressed as a percentage) between the full potential drop obtained when the surfaces are completely separated by a fluid film and the average potential drop observed in any particular experiment is then taken as a measure of the breakdown of the lubricant film. The 'L-values' so obtained are found to vary with the bearing alloy examined and with the lubricant used. Thus a good combination, implying little breakdown of the lubricant film, gives an L-value of 10–20 per cent, a poor combination 80 per cent and a bearing using a silicone oil as much as 95 per cent.

Dr. Lunn finds that with tin-base bearing alloys the L-values obtained are lower when the alloy is quickly solidified. The L-values are decreased when lead is introduced in place of copper and antimony and, to a smaller extent, in place of tin. With bronze alloys the presence of a phosphide eutectic produces a low L-value.

Ageing of the lubricant usually produces a reduction in the L-value implying improved lubricating properties, while the presence of an antioxidant gives poorer lubricating properties. As a result of these investigations, Dr. Lunn suggests that the effectiveness of a bearing-lubricant combination depends on the formation of a suitable surface film as a result of chemical reaction between the rubbing metals, the lubricant and the surrounding atmosphere. In addition, Dr. Lunn claims that his L-value provides a single 'figure of merit' which agrees well with practical performance. It would be interesting to see this extended to other materials and to see if the order of performance is significantly changed by simple alterations in the experimental conditions. D. TABOR

[1] Kauppi, T. A., and Pedersen, W. W., *Nat. Petr. News*, **37**, 944 (1945).
[2] Courtney-Pratt, J. S., and Tudor, G. K., *J. Inst. Mech. Eng.*, **155**, 293 (1946); see also Tudor, G. K., *J. Coun. Sci. Indust. Res. (Australia)*, **21** (3), 202 (1949).
[3] Popinga, R., *Automobiltech. Z.*, **44**, 247 and 272 (1941).

NOISE FROM AIRCRAFT AT SUPERSONIC SPEED

REFERRING to recent correspondence on this topic in *Nature*, Dr. E. Esclangon has directed attention to two communications by him published in the *Comptes rendus* of the Paris Academy of Sciences. The first, published on November 17, is "Sur les détonations balistiques, engendrées par les projectiles et les avions supersoniques", and the second, published on November 24, 1952, is "Sur les sifflements de projectiles et bruits d'avions en vitesse supersonique". Dr. Esclangon's views on the acoustic effects of supersonic aircraft are based on his extensive work on the shock waves of projectiles during the First World War, published in 1925 in "L'Acoustique des Canons et des Projectiles" (Paris: Gauthier-Villars, 55 Quai des Grands Augustins, Paris 6e).

Dr. Esclangon points out that aircraft do not differ essentially from projectiles in the production of shock waves, except that they carry very noisy contrivances which add to the disturbance resulting from their movement alone. The distinction is emphasized between (1) the continuous and uniform disturbance due to the pushing aside of the air, and (2) the periodic disturbances due to the rear turbulence and precessional movements of the projectile and to the roar of the jets of the aircraft.