fresh *Arenicola* blood is somewhat higher. But even if allowance be made for this slight uncertainty, we believe that there remains a real although small difference between the sedimentation constants of the blood pigments of *Arenicola* and *Lumbricus*.

The fact that not only the hæmocyanins but also other respiratory pigments in the blood of the lower animals have molecules of enormous mass seems to us very remarkable. It would be of considerable interest to try to find out at what stage of evolution the normal hæmoglobin appears, and whether its existence is exclusively connected with the formation of blood corpuscles. Perhaps hæmoglobin with its comparatively low molecular weight is strictly limited to the blood of the vertebrates, and the very high molecular weight respiratory pigments to the blood of the invertebrates. A study of the molecular weights or the sedimentation constants of the blood pigments throughout the animal kingdom might serve to throw light upon the relationships of the various classes of animals and upon their relative age.

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[1] *Proc. Roy. Soc.*, B, **96**, 28; 1924.

The Limiting Mobilities of some Monovalent Ions and the Dissociation Constant of Acetic Acid at 25°

MACINNES, Shedlovsky, and Longsworth [1] claim to have obtained accurate figures for the limiting mobilities of certain monovalent ions, *inter alia*, K^+, 73·50; Na^+, 50·10; H^+, 349·72; Cl^-, 76·32; CH_3COO^-, 40·87; and they refer to the discrepancies between these and the older figures compiled by Noyes and Falk.[2] We would point out that all these constants, except that for the acetate, were determined by us some time ago,[3] and were based on the use of the Ferguson and Vogel method [4] for extrapolation to infinite dilution and a value of 0·490 for the cation transport number for potassium chloride; our figures are K^+, 73·4; Na^+, 49·8; H^+, 348·0; Cl^-, 76·4, that for the hydrogen ion being based on conductivity measurements of iodic, hydrochloric, and benzenesulphonic acids in dilute solution in silica cells.

We have recently carried out conductivity measurements on sodium and potassium acetates and have corrected the results for hydrolysis by a method which is of general application; our figure for the mobility of the acetate ion is 37·85. New determinations of the conductivity of acetic acid over the concentration range 0·0001 – 0·01N in silica cells of the Hartley and Barrett type gave the value of $1{\cdot}776 \times 10^{-5}$ for the true or thermodynamic dissociation constant of this acid. This is much higher than the figure $1{\cdot}753 \times 10^{-5}$ obtained by MacInnes and Shedlovsky.[5] Full details of these results will be published in the near future.

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[1] *J. Amer. Chem. Soc.*, **54**, 2761; 1932.
[2] *J. Amer. Chem. Soc.*, **34**, 454; 1912.
[3] *J. Chem. Soc.*, 1715; 1931: 400; 1932.
[4] *Phil. Mag.*, **50**, 971; 1925.
[5] *J. Amer. Chem. Soc.*, **54**, 1429; 1932.

Structure of Polished Solids

IN consequence of the recent communication of R. C. French [1] on the structure of polished surfaces —investigated by high-speed electrons—and the fact that at the same time W. Boas and E. Schmid,[2] using Laue reflection diagrams, come to rather different conclusions, it seems desirable to mention some of the results, obtained on different experimental lines and published in Holland about a year ago.[3] These latter results suggest that polishing should be considered primarily as a very fine process of abrasion of the suitably prepared surface, accompanied by a levelling of surface lamellæ (or micellæ), the first step in this direction already being made when grinding the specimen (plastic deformation in the surface layers).

Delicate polishing leads, *inter alia*, to a dragging of minute particles along from the surface, the size of the detached aggregates of atoms ranging mainly in the case of most common hard metals at room temperature from about three to about thirty atoms.[4] Now it is well known that, in the region of dimensions of this size, the properties of aggregates show an exceedingly large variation with particle size. One must therefore consider the process which yields such aggregates—in spite of their very small dimensions—as still being essentially different from a 'molecular' process.

The amicrons [5] concerned may be made discernible ultramicroscopically by means of suitable physical development (Daguerre, Houllevigue, Stern, etc.). A part of the originally detached particles, however, fills up existing pits in the surface and recombines with it (by a process of adhesion, as well established in previous work of the late Sir G. Beilby). The mechanism of polishing always occasions the formation of a surface film ('skin') which largely differs in properties from the underlying material ('core').

The polishing of glass meets with a complication as a consequence of the presence of a eutectic rich in alkali embedded in a framework rich in silica. The soft alkali is the more easily removed part; [6] moreover, that part of the detached particles which is richest in silica—being chemically inactive and fitting easily into the surface pits—adheres best to the surface. In this way a more resistant form of surface-film may be produced.

According to H. Zocher and K. Coper,[7] even such delicate working as the one-directional rubbing of a very hard body, such as quartz, with, for example, a piece of cotton wool, gives rise to a surface anisotropy, as a consequence of deformation, ranging to depths below the surface which are large in comparison with molecular dimensions. Heating may occasion a disappearance of the surface anisotropy, depending on the time of heating and the maximum temperature applied, in a way which agrees with general rules as already given some time ago by W. Reinders and L. Hamburger,[8] who investigated the microscopical, ultramicroscopical, and electrical behaviour (resistance) of thin metal and salt films under varying conditions of film thickness, film backing, mode of preparation, temperature, effect of catalysts and chemical agents.[9]

The carefully polished surface films of crystalline materials—prepared and kept at a temperature far below the melting point — consist of lamellæ of levelled crystallites of non-microscopic dimensions which show a frequency distribution of particle size. These films ordinarily pass into the core material via a transition layer of relatively great thickness, along which the structure and texture show a *continuous* change.[10] The nature of polished surfaces is, more-