coagulates in 15–45 min. and always coagulates sooner than the blood in the enclosed part of the tube (Fig. 2).

Settling of relatively stagnant blood in blood vessels may be an important factor in the pathogenesis of venous thrombosis, especially in dependent veins of immobilized patients. Fahraeus[5] demonstrated rapid sedimentation of blood in a vein by applying two separated tourniquets on the forearm that was held in a vertical position. In pregnant women or diseased individuals, clear plasma could be obtained in 15 min. by venipuncture just below the uppermost tourniquet. Convincing evidence that settling of blood occurs in horizontal blood vessels in conditions such as stasis has been reported by Harding and Knisely[6]. It is interesting that sedimentation of blood in the apparatus described here was first observed when the tube was horizontal. Settling to the lower side of the tube occurred in a few minutes. Sedimentation of blood as reported here provides a method for studying the suspension stability of stagnant blood *in vitro* without anticoagulants.

The suspension stability of blood is known to be affected by the type and concentration of anticoagulant used in the various sedimentation methods that require anticoagulants[7]. The sedimentation-rate of incoagulable hæmophilic blood can be altered by the addition of heparin or sodium citrate[8]. It is important to know whether or not sedimentation methods using anticoagulants give values paralleling those with the method here described. This method is easily applicable to such a study of both normal and abnormal blood. We are at present using this method to record sedimentation on all specimens of blood used in our *in vitro* thrombosis studies[1], and these results will be reported.

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[1] Chandler, A. B., *Lab. Invest.*, **7**, 110 (1958).
[2] Spaet, T. H., Cintron, J., and Kropatkin, M., *J. Lab. and Clin. Med.*, **54**, 467 (1959).
[3] Babington, B. G., *Med. Chir. Trans.*, **16**, 293 (1830).
[4] Müller, J., "Elements of Physiology", 143 (Lea and Blanchard, Philadelphia, 1843).
[5] Fahraeus, R., *Physiol. Rev.*, **9**, 241 (1929).
[6] Harding, F., and Knisely, M. H., *Angiology*, **9**, 317 (1958).
[7] Denson, K. W., *J. Clin. Path.*, **12**, 262 (1959).
[8] Ham, T. H., and Curtis, F. C., *Medicine*, **17**, 447 (1938).

A Fast-moving Hæmoglobin in Hydrops Fœtalis

During a study of the hæmoglobins of premature and still-born infants, a fast-moving hæmoglobin was found in a premature baby which clinically showed the symptoms of hydrops fœtalis associated with anæmia, hepato- and spleno-megaly, and which died shortly after birth.

Hæmoglobin analysis of the blood of the fœtus by the paper electrophoretic method as described previously[1] at *p*H 8·6 showed two hæmoglobin spots. One had the mobility of fœtal hæmoglobin, while the other was a fast-moving hæmoglobin, which was much faster than hæmoglobin *A*, slower than hæmoglobin *H* and resembled hæmoglobin *J* and hæmoglobin Fessas and Papaspyrou. At *p*H 6·5, however, *H* and *J* did not separate from hæmoglobin *A*, while the above-mentioned hæmoglobin was clearly separated, and resembled the hæmoglobin of Fessas and Papaspyrou. It was clearly more cathodic than hæmoglobin *H*. It is a pity that we did not have available for comparison the Barth's hæmoglobin, which was described by Ager and Lehmann[2] as being slightly faster than hæmoglobin Fessas and Papaspyrou and faster than hæmoglobin *J* at *p*H 8·6.

The unusual component in the fœtus mentioned above formed the major component, contrary to what has been found up to now in all the cases of newly born infants carrying a fast-moving hæmoglobin component. The amount of alkali-resistant hæmoglobin examined by the method of Singer *et al.* (1951) was found to be 44·3 per cent of the total amount of hæmoglobin.

The symptoms found in the fœtus closely resembled those seen in hydrops fœtalis caused by antagonism between infants and mother's blood.

Also the pathological signs in the grossly enlarged placenta were those seen in hydrops and erythroblastosis fœtalis. There were no indications of antagonism between mother's and infant's blood. However, both parents showed hæmatological abnormalities resembling those found in thalassæmia minor. No pathological hæmoglobin was detected in either parents. The alkali-resistant hæmoglobin was within normal limits.

This is, so far as we know, the first report of a case of hydrops fœtalis associated with the presence of an unusual hæmoglobin.

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[1] Lie-Injo Luan Eng and Oey Hoey Giok, *Lancet*, i, 20 (1957).
[2] Ager, J. A. M., and Lehmann, H., *Brit. Med. J.*, i, 929 (1958).

PLANT PHYSIOLOGY

Relation of Sugar Content to Frost-Hardiness in Plants

It has long been said that in various plant cells there is an apparent correlation between the sugar content and frost-hardiness. Because of the difficulties in artificially introducing the appreciable amount of sugar into the plant cell, direct evidence has not yet been obtained to show whether the increase in sugar content is the main cause of the frost-hardiness in plant cells or not.

In artificial frost-hardening of the parenchyma cells in cortex of mulberry tree with a constant length of hardening period, the lower the temperature to which material is exposed, the greater the effectiveness of the hardening treatment becomes. At a definite temperature a relatively longer period of the treatment is more effective than shorter ones within