

was not identifiable. Erythrocytes were present, however.

The histological investigation showed that the structure of the organs was normal.

On the strength of accumulation of dark green bile pigment, which was also stated in the case of Ewer<sup>2</sup>, it may be concluded that the extensive destruction of the haemoglobin had occurred very recently.

Another point of correspondence with the case of Ewer was the enlarged light brown spleen which, unlike the case of De Graaf<sup>1</sup>, was not coloured slightly yellowish-white.

According to De Graaf, his animal without haemoglobin had been in that condition all its life, with the implication that the growth to maturity in natural conditions is possible without the presence of haemoglobin. Ewer, however, arrived at a different interpretation, namely, that the total anaemic condition is a pathological state, which may originate after the adult has become mature. My case, in which also the haemoglobin destruction had only just been completed, is an argument for Ewer's concept.

Survival without haemoglobin is distinctly possible, which, however, by no means implies that an animal without haemoglobin can be as active as a normal one. In my specimen the latter state could be clearly distinguished.

According to De Graaf, normal *Xenopus laevis* are capable of functional elimination of at least 80 per cent of their haemoglobin by carbon monoxide treatment.

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<sup>1</sup> De Graaf, A. R., *J. Exp. Biol.*, **34**, 173 (1957).

<sup>2</sup> Ewer, D. W., *Nature*, **183**, 271 (1959).

### Activation of Plasminogen by Staphylokinase

SOME animal plasminogens, which are unaffected by streptokinase alone, are activated by streptokinase and human globulin. Müllertz<sup>1</sup> has postulated the existence of a proactivator in human serum. Staphylokinase, without human globulin, activates a wider range of animal plasminogens<sup>2</sup> and may, therefore, not require proactivator.

Staphylokinase was prepared from the supernatants of fibrinolytic strains of *Staphylococci* shaken for 7 hr. The supernatant was heated at 75° C. for 30 min. Some inert protein was precipitated at pH 3.3. After dialysis, staphylokinase was precipitated at pH 4.2.

Euglobulin, in the original serum volume, was used as a source of animal plasminogen. Human plasminogen, prepared by the Kline procedure<sup>3</sup>, provided proactivator. Plasmin was assayed by the caseinolytic method described by Norman<sup>4</sup>, perchloric acid being used instead of trichloroacetic acid.

0.2-0.3 ml. of euglobulin was incubated with up to 400 units streptokinase ('Dornokinase', Burroughs Wellcome and Co.) or an equivalent amount of staphylokinase (assayed against human plasminogen), and with or without  $3 \times 10^{-3}$  units human plasminogen. Maximal activity was obtained after 5-10 min. with 20-140 units kinase. Bovine euglobulin did not inhibit the activation of human plasminogen by staphylokinase.

Table 1

	Human	Guinea pig	Rabbit	Bovine
Streptokinase	+	-	-	-
Streptokinase + Proactivator	+	+	+	+
Staphylokinase	+	+	+	-
Staphylokinase + Proactivator	+	+	+	-
Plasminogen (units $\times 10^{-3}$ per ml. serum)	40	57	34	28

The results, which are shown in Table 1, indicate that staphylokinase does not act through proactivator.

A detailed report of this work is being prepared.

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<sup>1</sup> Müllertz, S., *Acta Physiol. Scand.*, **38**, Supp. 130 (1956).

<sup>2</sup> Gerheim, E. B., and Ferguson, J. H., *Proc. Soc. Exp. Biol. Med.*, **71**, 261 (1949).

<sup>3</sup> Kline, D., *J. Biol. Chem.*, **204**, 949 (1953).

<sup>4</sup> Norman, P., *J. Exp. Med.*, **106**, 423 (1957).

## PLANT PHYSIOLOGY

### Abnormal Growth and Development in Pea resulting from Exposure to Adverse Conditions during Germination

Kidd and West<sup>1</sup> showed that the amount of growth made by a plant could be determined by the conditions to which the germinating seed was exposed. In their investigations they measured the yield obtained from plants grown from seed soaked in water for varying lengths of time, and they found that in most cases of extended soaking, though the seed germinated more rapidly than seed planted directly in moist soil, the yield obtained from such seedlings was reduced. Their observations of 'physiological predetermination' have been carried further by examining the effect of soaking peas (*Pisum sativum* L.) in water. With this species when seeds are soaked in water for 48 hr. the seedlings that eventually develop may be abnormal (Fig. 1). Normally a small number of seeds, 200, is soaked in a large volume, 500 ml., of tap water kept at 20° C. in darkness. The depth of water covering the seeds was 15 cm., and



Fig. 1. The plant on the right is a seedling grown from seeds soaked in water for 48 hr. before planting. That on the left is the control planted directly in moist soil.