

COMPARISON OF THE SERUM PROTEIN
FRACTIONS OF THE NEWLY HATCHED CHICK WITH
THOSE OF ADULT BIRDS USING STARCH-GEL
ELECTROPHORESIS

by

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It has been established by several investigators that serum protein components of chick embryo undergo qualitative as well as quantitative changes throughout the developmental period until the time of hatching (1-4). The serum protein composition of the newly hatched chick, however, resembles that of the adult bird, as revealed by moving-boundary and paper electrophoresis. The technique of starch-gel electrophoresis suggested by Smithies (5) is promising in that it enables one to detect numerous fractions in the pattern of the serum proteins, particularly in the alpha and beta-globulin regions, which cannot be detected by the conventional method of Tiselius or paper electrophoresis. By using the starch-gel method, I have been able to demonstrate differences in the patterns of serum proteins of the day-old and week-old chicks when compared with pooled sera of one- and two-year-old roosters, as shown in Fig. 1. The electrophoresis was performed on a vertical tray (6) for 18 hr. using borate buffer of pH 8.6 and a field-strength of 6 V./cm. Repeated electrophoretic runs gave patterns similar to those shown in Fig. 1, for the four age groups. Twelve fractions could be distinguished on the patterns of the adult roosters (two pre-albumin components are not seen on the photographs). The same number of fractions could also be seen on the electrophoretic patterns of the young chicks. The mobility and the number of fractions of alpha-globulins of the newly hatched chicks are distinctly different from those of adult birds. The fraction *b* of the serum of a day-old chicks does not seem to be present in the serum

of an adult bird, and of fraction *d* only traces are observed. Very little gamma-globulin is present in day-old and week-old chicks. A distinct narrow

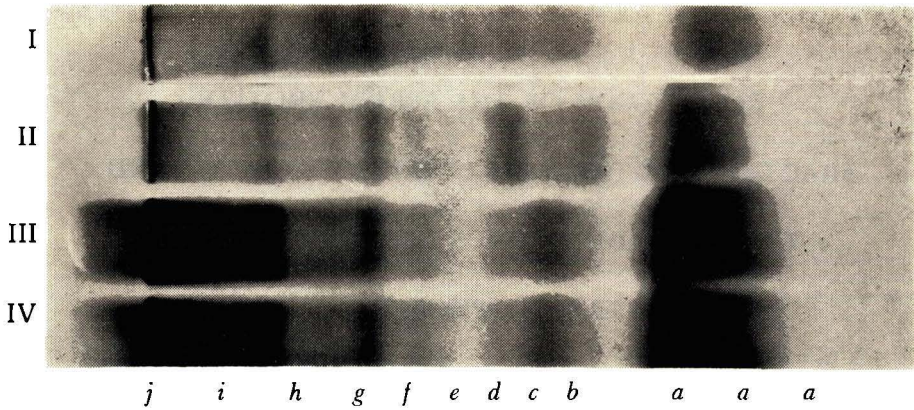


Fig. 1. Starch-gel electrophoresis of the sera of chicken at various ages. I, Day-old chick; II, week-old chick; III, one-year-old rooster; IV two-year-old rooster

band which is immediately behind the albumin (a post-albumin?) in the adult bird cannot be seen in the young chicks.

- 1 - Moore, D.H., Shen, S.H., and Alexander, C.S., *Proc. Exp. Biol. Med.*, 58, 307 (1945).
- 2 - Marshall, m.E., and Deutch, H.F., *J. Biol. Chem.*, 185, 155 (1950).
- 3 - Hradec, J., and Lemez., *Ceskoslov. Morfol.*, 2, 260 (1954).
- 4 - Vanstone, W.E., Maw, W.A., and common, R.H., *Canad. J. Biochem. Physiol.*, 33, 891 (1955).
- 5 - Smithies, O., *Biochem. J.*, 61, 629 (1955).
- 6 - Smithies, O., *Biochem. J.*, 71, 385 (1959).

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