## A Comparative Biochemical Study of Nucleohistones from Different Vertebrates

RESULTS recently reported by Crampton *et al.*[1] lead those authors to the conclusion that the nucleohistones extracted from the different tissues of the same animal are very similar in composition. Our own investigations on different organs of the calf confirm these results (Table 1, Fig. 1).

Table 1. AMINO-ACID RESIDUE (GM.) PER 100 GM. PROTEIN

| | Calf thymus histone | Calf liver histone | Calf kidney histone |
|---|---|---|---|
| Arginine | 12·6 | 11·8 | 12·3 |
| Lysine | 15·5 | 15·2 | 16·1 |
| Histidine | 2·4 | 2·5 | 2·3 |

in all these nucleohistones were also determined (Table 2).

This comparison reveals a striking similarity between all the nucleohistones studied, so it appears that if differences do exist between the histones of the various animals, they are beyond the sensitivity of our analytical technique. The classical results of Chargaff[3], at least concerning vertebrates, on the analysis of deoxyribonucleic acid from different organs of an animal and the same organ in various animal species (mammals, birds, fishes and reptiles) fail to reveal very marked differences between these deoxyribonucleic acids, though the slight differences detected could be significant. In the nucleohistone a similarity of general composition seems to occur in

Table 2. AMINO-ACID RESIDUE (GM.) PER 100 GM. PROTEIN

| | 1 Carp erythrocyte histone | 2 Trout erythrocyte histone | 3 Pike erythrocyte histone | 4 Calf thymus histone | 5 Fowl erythrocyte histone | 6 Duck erythrocyte histone | 7 Tench erythrocyte histone | 8 Frog erythrocyte histone |
|---|---|---|---|---|---|---|---|---|
| Arginine | 13·5 | 13·5 | 11·4 | 12·6 | 13·3 | 13·0 | — | 12·8 |
| Lysine | 15·5 | 15·2 | 13·5 | 15·5 | 16·6 | 15·7 | — | 14·0 |
| Histidine | 2·3 | 2·5 | 1·9 | 2·4 | 2·5 | 2·4 | — | 2·9 |

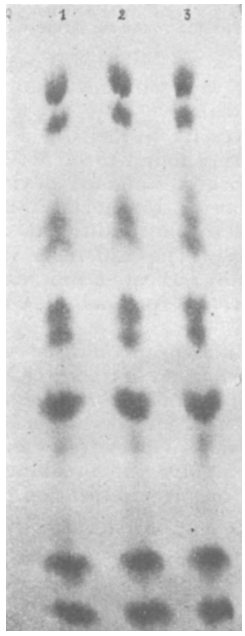


Fig. 1. Chromatograms of nucleohistones extracted in *M* sodium chloride from calf thymus, liver and kidney. Hydrolysates containing identical quantities of deoxyribonucleic acid were used in all three cases. Whatman paper No. 1. Solvent: 4 parts, butanol; 1 part, ethanol; 1 part, acetic acid; 2 parts, water

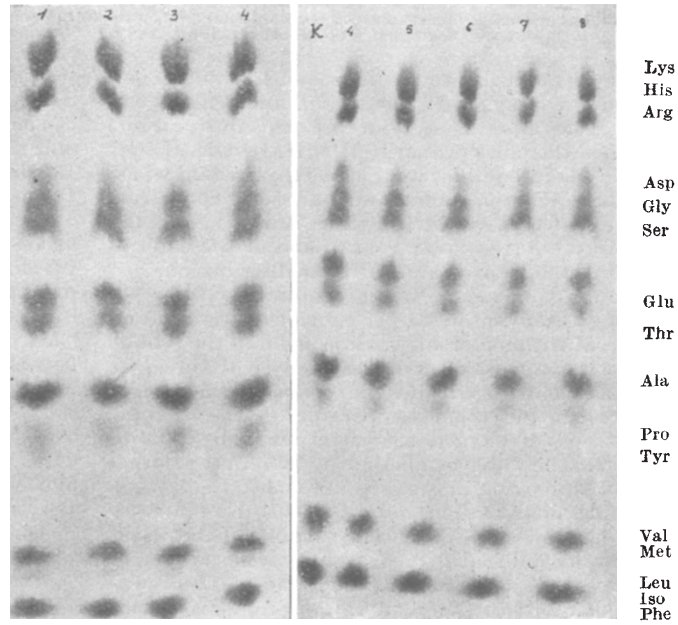


Fig. 2. Chromatograms of nucleohistones from different vertebrates (each volume of hydrolysate corresponds to the same quantity of deoxyribonucleic acid. Nucleohistone from: (1) carp erythrocytes; (2) trout erythrocytes; (3) pike erythrocytes; (4) calf thymus; (5) fowl erythrocytes; (6) duck erythrocytes; (7) tench erythrocytes; (8) frog erythrocytes. Whatman paper No. 1. Solvent: 4 parts, butanol; 1 part, ethanol; 1 part, acetic acid; 2 parts, water

But a comparison of nucleohistones extracted from different animal species is also of interest. For that reason, we have studied nucleoproteins isolated by the technique of Signer and Schwander[2] from different materials, namely, calf thymus and erythrocytes of carp, trout, pike, tench, frog, fowl and duck. Chromatograms were made of all these nucleohistones. Before chromatography, the hydrolysates were adjusted to identical content of deoxyribonucleic acid, in order to permit an easy comparison of the chromatograms run in parallel on the same paper (Fig. 2). The amounts of arginine, lysine and histidine the samples studied, and reflects the similarity of the general composition of the nucleic acids.

R. VENDRELY
A. KNOBLOCH
H. MATSUDAIRA*
Centre de Recherches sur les Macromolécules, Strasbourg.

* Present address: Faculty of Medicine, University of Tokyo.

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[2] Signer, R., and Schwander, H., *Helv. Chim. Acta*, **32**, 853 (1949).
[3] Chargaff, E., in "The Nucleic Acids", **1**, 307 (Academic Press, New York, 1955).