THE CHANGE OF ULTRAVIOLET ABSORPTION OF THYMO-NUCLEOPROTEIN AND THYMO-NUCLEIC ACID WITH P_H

by

GÖSTA FRICK

Institute of Biochemistry, University of Upsala (Sweden)

Nucleoprotein has earlier[1] been shown to give a higher light absorption at 260 mμ at p_H above 11 than in a neutral solution. Samples of nucleoprotein prepared according to MIRSKY AND POLLISTER[2] and of sodium desoxypentose nucleate prepared according to GULLAND *et al.*[3] have now been measured in ultraviolet light, diluted with buffers solutions to several different p_H values. The curves resulting from plotting absorption at 260 mμ against the p_H values show a steep increase at p_H 11.0–11.3. The absorption increases with a factor of 1.32–1.33. The quotient between absorption and mg N/ml at neutrality is 55 for the nucleoprotein and 121 for the best controlled preparation of sodium nucleate, corresponding to a content of 43% nucleic acid in the nucleoprotein (16.3% N in the nucleic acid). There is only a very slight change in the wavelength for the maximal absorption with change in p_H.

The measurements were carried out with a Beckman spectrophotometer between 400 and 230 mμ against the solvent of each solution. The unspecific absorption at 400 mμ was never more than 2% of the maximal absorption—decreasing when the latter increased to a value of 1% or less.

If a mixture is made of the purines and pyrimidines of deoxypentose nucleic acid—adenine, guanine, cytosine and thymine—the absorption of the mixture is found, both in alkaline and neutral solution, to be the same as obtained by adding the absorption found for each component. If calculated for the proportions in thymonucleic acid found by CHARGAFF *et al.*[4] this would give an absorption at p_H 7 of 2068 for 100 mg nucleate/ml which is close to the value 1950–2100 found from measurements on the nucleate preparations made here. When the p_H is increased the light absorption of the mixture decreases with a factor of 0.85 (at p_H 12), the nucleate preparations instead, as mentioned above, show an increase with a factor of 1.32–1.33.

This increase may be due to the effect of the purines and pyrimidines *in situ*. One may compare with the picture given by ASTBURY[5] of the purines and pyrimidines lying very closely packed, piled each one on top of the other with their planes parallel to one another. This type of increase in maximal absorption may therefore be a characteristic of the poly-nucleotides.

A detailed description of these experiments will appear in this journal*.

REFERENCES

1 G. FRICK, *Biochim. Biophys. Acta*, 3 (1949) 103.
2 A. E. MIRSKY AND A. W. POLLISTER, *Bil. Symposis*, 10 (1943) 247.
3 J. M. GULLAND, D. O. JORDAN, AND G. J. THRELFALL, *J. Chem. Soc.*, (1947) 1129.
4 E. CHARGAFF, E. VISCHER, R. DONIGER, C. GREEN, AND F. MISANI, *J. Biol. Chem.*, 117 (1949) 405.
5 W. T. ASTBURY, Essays in *Growth and Form*, ed. by LE GROS CLARK AND MEDAWER, Oxford Univ. Press (1945) p. 249.

Received September 22nd, 1951

* Manuscript received August 31st, 1951 (Ed.).