The acidic protein fraction obtained from rat liver nuclei contained about 6 per cent arginine and less than 0.5 per cent phosphorus. No light absorption due to nucleic acids (at 260 m μ) could be detected in the acidic protein fractions (pH 6 fractions) from rat liver nuclei, calf thymus 'chromosomes' or boar spermatozoa.

The heads of boar spermatozoa were separated from the tail-midpieces prior to extraction, and it was found that all the protein fractions previously reported⁴ come from the heads.

The location of the acidic protein in the nucleus is not clear. Our present knowledge of the structure of interphase nuclei such as rat liver nuclei does not seem to warrant any conclusion as to whether or not the extracted material is a part of the chromosomes. Lamb⁷ has interpreted his work on the 'isolated chromosomes' of Mirsky and Ris⁶ as indicating that these thread-like structures are shredded nuclei rather than chromosomes. If Lamb's interpretation is correct, the location of the acidic protein which we have obtained from calf thymus 'chromosomes' is also uncertain.

The spermatozoa of the boar contain a rather large amount of an arginine-rich residue which is insoluble in either sodium chloride or alkali solutions⁴. Recently we have found this residue to be composed entirely of 'ghost' heads. Our work gives some indication that an alkali-insoluble residue may also be present in rat liver nuclei.

TUNG-YUE WANG
WILLIAM R. KIRKHAM
R. DUNCAN DALLAM
DENNIS T. MAYER
LLOYD E. THOMAS

Departments of Biochemistry
and Agricultural Chemistry,
University of Missouri.

¹ Mayer, D. T., and Gulick, A., *J. Biol. Chem.*, **146**, 433 (1942).

² Stedman, E., and Stedman, E., *Nature*, **152**, 267 (1943).

³ Stedman, E., and Stedman, E., Cold Spring Harbor Symposia on Quantitative Biology, **12**, 224 (1947).

⁴ Thomas, L. E., and Mayer, D. T., *Science*, **110**, 393 (1949).

⁵ Dounce, A. L., *J. Biol. Chem.*, **147**, 685 (1943).

⁶ Mirsky, A. E., and Ris, H., *J. Gen. Physiol.*, **31**, 1 (1947).

⁷ Lamb, W. G. P., *Nature*, **164**, 109 (1949).

Amino-Acids in Posterior Pituitary Protein

The protein isolated from the pars neuralis of the pituitary by van Dyke *et al.*¹ contains 1 I.U. per 61 μ gm. Pressor, antidiuretic and oxytocic activities are present in constant amounts and in the same ratio found in crude posterior pituitary powder. This protein contains 4.3 per cent sulphur which appeared to be entirely in cystine. It seemed of interest to confirm the earlier conclusion that cystine is the only sulphur-containing amino-acid in the protein and to identify qualitatively as many amino-acids as possible.

10 mgm. of the protein was dissolved in 10 ml. of 6 N hydrochloric acid. After boiling for 20 hr. under reflux, the solvent was removed by vacuum. The dry residue was dissolved in 1 ml. of 10 per cent isopropanol. A volume of 0.005 ml. or a multiple of this volume was used for filter-paper chromatograms. Two-dimensional chromatograms (0.005–0.030 ml. of hydrolysate) were run with phenol followed by lutidine as well as in reverse order. Sulphur-containing amino-acids were investigated in one-dimensional chromatograms by the platonic iodide reaction; proline and hydroxyproline were

similarly sought by the isatin reaction. Tests for tryptophane were performed without hydrolysing the protein. The results obtained are summarized in the accompanying table.

QUALITATIVE TESTS FOR AMINO-ACIDS IN POSTERIOR PITUITARY PROTEIN

Alanine	+++	Leucine	+++
Arginine	+++	Lysine	++
Aspartic acid	++	Methionine	—
Cysteine	—	Phenylalanine	+++
Cystine	+++	Proline	+++
Glutamic acid	+++	Serine	++
Glycine	+++	Threonine	+
Histidine	+	Tryptophane	—
Hydroxyproline	—	Tyrosine	++
Isoleucine	+	Valine	++

The earlier conclusion that all the organically bound sulphur is in cystine was confirmed. Therefore, this amino-acid accounts for about one-sixth of the weight of the protein. Previous work demonstrated that the biological activity of the protein is reduced or abolished by partial or complete reduction of the dithio groups of cystine.

RICHARD J. BLOCK

Department of Physiology and Biochemistry,
New York Medical College.

H. B. VAN DYKE

Department of Pharmacology,
College of Physicians and Surgeons,
Columbia University.

Jan. 25.

¹ van Dyke, H. B., Chow, B. F., Greep, R. O., and Rothen, A., *J. Pharmacol. Exp. Ther.*, **74**, 190 (1942).

Effects of Iodoacetate on Zymase Fermentation

THE earlier investigators of iodoacetate poisoning^{1,2} suggested that a phosphorylation process was primarily inhibited; but more recent work^{3,4,5} has attracted attention to the iodoacetate sensitivity of dehydrogenases containing —SH groups. It is now generally assumed that the first point of attack, when iodoacetate is applied to fermenting yeast, is the stage controlled by the triosephosphate dehydrogenase, while the alcohol dehydrogenase may also be inactivated.

However, even these very sensitive dehydrogenases require concentrations as high as 10^{-3} M for strong inhibition *in vitro*³, whereas glucose fermentation, whether by yeast⁶ or by extracted zymase, can be suppressed by concentrations considerably less than 10^{-4} M. The following observations may be of interest in this connexion.

The fermentation in air of 1 ml. aliquots of a 5 per cent zymyn preparation from baker's yeast suspended in M/15 phosphate buffer at pH 6.0 provided with manganese ions was slow until glucose or hexosediphosphate was supplied, when a rapid and constant rate of carbon dioxide production was induced. Glucose was added to give a final concentration of 20 mgm./ml. and hexosediphosphate to 5 mgm./ml. In the inhibitor experiments appropriate amounts of iodoacetate to give the desired final concentrations were added to selected flasks containing zymyn suspension immediately before the addition of substrate. The carbon dioxide outputs of these aliquots were compared with those of control systems.

When the inhibitor was applied in concentrations greater than 10^{-3} M, fermentation of either glucose or hexosediphosphate was arrested almost completely. In lower concentrations, however, there