stranded form of DNA, tending to stabilize the DNA helix against strand separations, and non-specifically decreasing the rate of synthesis of all RNA species⁶.

Recent investigations suggest that the strand separation loops within active euchromatin may be sensitive sites of action during radiosensitization³¹ and during the interaction of the host genome with oncogenic viruses³².

This work was carried out during the tenure of a research career development award (CA-17857) from the U.S. Public Health Service.

JOHN H. FRENSTER

Laboratory of Cell Biology,
Rockefeller Institute, New York.

- ¹ Watson, J. D., and Crick, F. H. C., *Nature*, **171**, 737, 964 (1953).
- ² Geiduschek, E. P., Tocchini-Valentini, G. P., and Sarnot, M. T., *Proc. U.S. Nat. Acad. Sci.*, **52**, 486 (1964). Bassel, A., Hayashi, M., and Spiegelman, S., *Proc. U.S. Nat. Acad. Sci.*, **52**, 796 (1964). Green, M. H., *Proc. U.S. Nat. Acad. Sci.*, **52**, 1888 (1964).
- ³ McCarthy, B. J., and Hoyer, B. H., *Proc. U.S. Nat. Acad. Sci.*, **52**, 915 (1964).
- ⁴ Frenster, J. H., *Nature*, **206**, 680 (1965).
- ⁵ Frenster, J. H., *Nature*, **206**, 1269 (1965).
- ⁶ Frenster, J. H., in *The Chromosomes: Structural and Functional Aspects* edit. by Dawe, C. J., and Yerganian, G. (Williams and Wilkins, Inc., Baltimore, 1965).
- ⁷ Frenster, J. H., Allfrey, V. G., and Mirsky, A. E., *Proc. U.S. Nat. Acad. Sci.*, **50**, 1026 (1963).
- ⁸ Frenster, J. H., *Nature*, **205**, 1341 (1965).
- ⁹ Littau, V. C., Allfrey, V. G., Frenster, J. H., and Mirsky, A. E., *Proc. U.S. Nat. Acad. Sci.*, **52**, 93 (1964).
- ¹⁰ Langan, T. A., and Lipmann, F., *J. Biol. Chem.* (in the press).
- ¹¹ Rose, H. G., and Frenster, J. H., *Biochim. Biophys. Acta* (in the press).
- ¹² Loeb, P. M., and Wilson, J. D., *Clin. Res.*, **13**, 45 (1965).
- ¹³ Kawade, Y., *Biochim. Biophys. Acta*, **26**, 61 (1957). Phillips, D. M. P., *Prog. Biophys. Chem.*, **12**, 211 (1962).
- ¹⁴ Akinrimisi, E. O., Bonner, J., and Ts'o, P. O. P., *J. Mol. Biol.*, **11**, 128 (1965).
- ¹⁵ Schildkraut, C. L., and Litson, S., *Biopolymers*, **3**, 195 (1965).
- ¹⁶ Dyer, A. F., *Cytologia*, **29**, 155 (1964).
- ¹⁷ Wilkens, M. H. F., Zubay, G., and Wilson, H. R., *J. Mol. Biol.*, **1**, 179 (1959). Luzzati, V., and Nicolaieff, A., *J. Mol. Biol.*, **7**, 142 (1963). Lloyd, P. H., and Peacocke, A. R., *Biochim. Biophys. Acta*, **95**, 522 (1964).
- ¹⁸ Huang, R. C., and Bonner, J., *Proc. U.S. Nat. Acad. Sci.*, **48**, 1216 (1962). Allfrey, V. G., Faulkner, R., and Mirsky, A. E., *Proc. U.S. Nat. Acad. Sci.*, **51**, 786 (1964).
- ¹⁹ Printz, M. P., and von Hippel, P. H., *Proc. U.S. Nat. Acad. Sci.*, **53**, 363 (1965).
- ²⁰ Klevecz, R. R., and Hsu, T. C., *Proc. U.S. Nat. Acad. Sci.*, **52**, 811 (1964).
- ²¹ Roffe, R., *Proc. U.S. Nat. Acad. Sci.*, **49**, 386 (1963). Rosenberg, B. H., and Cavallieri, L. F., *Proc. U.S. Nat. Acad. Sci.*, **51**, 826 (1964); *Nature*, **206**, 999 (1965).
- ²² Schmid, W., *Cytogenetics*, **2**, 175 (1963).
- ²³ Dyer, A. F., *Cytologia*, **29**, 171 (1964). Sasaki, M. S., and Makino, S., *Amer. J. Human Gen.*, **15**, 24 (1963).
- ²⁴ Davidson, R. G., Nitowsky, H. M., and Childs, B., *Proc. U.S. Nat. Acad. Sci.*, **50**, 481 (1963).
- ²⁵ Love, R., *Nature*, **180**, 1338 (1957). Feinendegen, L. E., and Bond, V. P., *Exp. Cell Res.*, **30**, 393 (1963). Jackson, L. G., Barr, M. A., and Wiess, A. J., *Proc. Amer. Assoc. Cancer Res.*, **5**, 31 (1964).
- ²⁶ Ts'o, P. O. P., and Lu, P., *Proc. U.S. Nat. Acad. Sci.*, **51**, 17 (1964).
- ²⁷ Schinke, R. T., Sweeney, E. W., and Berlin, C. M., *J. Biol. Chem.*, **240**, 322 (1965).
- ²⁸ Reich, E., *Science*, **143**, 684 (1964). Gellert, M., Smith, C. E., Neville, D., and Felsenfeld, G., *J. Mol. Biol.*, **11**, 445 (1965).
- ²⁹ Lerman, L. S., *J. Cell. Comp. Physiol.*, **64**, suppl. 1, 1 (1964).
- ³⁰ Cohen, S. N., and Yelding, L. K., *J. Biol. Chem.*, **240**, 3123 (1965); *Proc. U.S. Nat. Acad. Sci.*, **54**, 521 (1965).
- ³¹ Kaplan, H. S., and Howsden, F. L., *Proc. U.S. Nat. Acad. Sci.*, **51**, 181 (1964).
- ³² Axelrod, D., Habel, K., and Bolton, E. T., *Science*, **146**, 1466 (1964).

Properties of Hyaluronic Acid from a Human Myxosarcoma

It is known that the degree of polymerization of purified hyaluronic acid depends on the sources of preparation and the method of isolation. Caputo and I previously reported¹ the occurrence in Rous sarcoma of highly polymerized hyaluronic acid complexed with protein. Investigations of the effect of proteolytic enzymes on this complex have revealed the prominent part played by the protein in the molecular conformation of the complex².

This communication reports some properties of a very special hyaluronic acid which I have purified from a human myxosarcoma.

The polysaccharide was isolated by precipitation with cold, acid acetone, according to the technique previously

Table 1. MOLECULAR CHARACTERISTICS OF A HYALURONIC ACID-PROTEIN COMPLEX ISOLATED FROM HUMAN MYXOSARCOMA

$S_{20,w}^0$ *	16.8×10^{-13}
$D_{20,w}^0$ †	5.7×10^{-7}
$\bar{V}$	0.710
M_w	2.5×10^5

$S_{20,w}^0$, sedimentation coefficient; $D_{20,w}^0$, diffusion constant; $\bar{V}$, partial specific volume; M_w , molecular weight.

* Extrapolated to zero protein concentration.

† Protein concentration 5 mg/ml.

reported¹. At the end of the preparation several further attempts to reduce the nitrogen content of the compound failed, and therefore it seemed certain that the polysaccharide was stably complexed with a protein. The resulting material behaved as a monodispersed system in the free boundary electrophoresis and was homogeneous in the ultracentrifuge. When compared with other types of hyaluronic acid, the sedimentation boundary of the myxosarcoma polysaccharide was always found to be perceptibly less sharp and to have a great tendency to diffuse. Some molecular characteristics of myxosarcoma hyaluronic acid-protein complex are given in Table 1.

The molecular weight of 2.5×10^5 is very low compared with values of about 1 million described previously for the same polysaccharide isolated from different sources.

After treatment with hyaluronidase, a decrease in the viscosity of the hyaluronic acid complex solution and the disappearance in electrophoresis and the ultracentrifuge of the homogeneity of the boundary were observed.

Preliminary chemical analyses have shown that the protein content of hyaluronic acid complex from myxosarcoma is about 45 per cent. Until now this value is the highest found for all types of hyaluronic acid-protein complex.

The fact that proteolytic enzymes have a very weak effect on the hyaluronic acid complex from myxosarcoma provides strong evidence that the polysaccharide occurs in this tumour in a completely different molecular state, not only from that isolated from normal sources, but also from Rous sarcoma. Stronger evidence for this hypothesis has been provided by additional chemical analyses of the amino-acid composition of the protein moiety of the complex. In this connexion it is interesting to note that hydroxyproline was found in the hydrolysate, among seventeen different amino-acids. The fact that myxosarcoma hyaluronic acid containing hydroxyproline has a low molecular weight indicates that there is a similarity between this polysaccharide and that already isolated from vitreous humour and that it is completely different from that previously isolated from the Rous sarcoma.

MARIA LUISA MARCANTE

Instituto 'Regina Elena' per lo
Studio e la Cura dei Tumori,
Rome.

¹ Caputo, A., and Marcante, M. L., *Cancer Res.*, **19**, 1010 (1959).

² Caputo, A., and Marcante, M. L., *Clin. Chim. Acta*, **5**, 477 (1960).

Oleic Acid labelled with Iodine-131, and Triolein De-iodination *in vitro*

THE de-iodination of ¹³¹I-labelled Rose Bengal¹ and thyroxine² has been studied before, and it can be assumed that a thermostable factor is present in the organs in different concentrations¹ and that some proteins² have a stimulative effect on the de-iodination.

This experimental work was carried out to study the de-iodination *in vitro* of ¹³¹I-labelled oleic acid and triolein, widely used as diagnostic radiopharmaceuticals. Some variable results obtained in the investigation of fatty-acid metabolism with these radiocompounds could be related to the de-iodination *in vivo*³.

The tested rat organs were homogenized with saline to give a final organ concentration of approximately 200 mg/ml. (wet organ weight). Three series of experi-