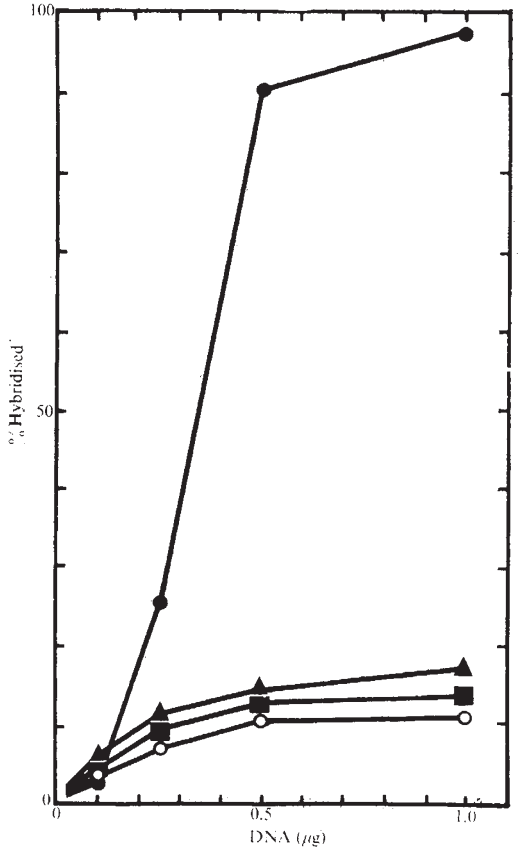

Fig. 2 Molecular hybridisation of plasma and heterologous DNA with ^{3}H-DNA of Dane particles. ●, HB_sAg plasma DNA; ▲, salmon sperm DNA; ■, WI 38 DNA; ○, human liver DNA.

were conducted with molecules ($S_{20,w}$ of 10 to 22) much larger than small fragments of 400 to 500 nucleotides used to calculate the complexity of DNA from $C_0t_{\frac{1}{2}}$ values[9]. Thus the slower kinetics of reassociation with larger molecules would increase the $C_0t_{\frac{1}{2}}$ value[10]. Second, DNA not related to Dane particles, if present in the plasma DNA, would increase $C_0t_{\frac{1}{2}}$. Further studies will be necessary to establish the full extent of homology between the DNA from plasma and the DNA produced by Dane particle polymerase.

Having found free DNA in a few plasmas from HB_sAg carriers, we undertook a survey of 42 plasmas with regard to the presence or absence of free DNA and the ability of the DNA, if present, to hybridise with Dane particle DNA. The results of the study are shown in Table 1. In all of the 21 HB_sAg positive plasmas examined, we found detectable amounts of free DNA with a recovered quantity equivalent to about 0.1–1 μg ml^{-1} of plasma. Five of these twenty-one DNA preparations were selected randomly and were found hybridisable to ^{3}H-DNA of Dane particles. In the group of HB_sAg negative samples we found the majority of samples (19/21) negative in free DNA in that no detectable absorbancy was found upon purifying the 1.7 density regions. Two of the samples, however, showed the presence of free DNA, and this DNA showed positive hybridisations with Dane particle DNA. The significance of this observation is not clear at this time, as we do not know whether free DNA in plasma is of host or viral origin. Further studies of these two plasmas are underway to assess fully the possible presence of HB_sAg, undetectable with the methods employed.

The average length of the plasma DNA in electron micrographs was estimated to be 2–3 μm, equivalent to a molecular weight of 4×10^6–5×10^6. In some plasmas, the DNA concentration was the order of 1 μg ml^{-1}, equivalent to 10^{10} molecules ml^{-1}. By comparison, a HB_sAg concentration of 100 μg ml^{-1} in the plasma could give 3×10^{18} particles ml^{-1}, based on a molecular weight of 2 10^6 daltons per particle. The length of DNA was longer than that of the circular genome of Dane particle DNA (0.78 μm). We have observed rolling circles in electron micrographs of the DNA isolated from Dane particles actively synthesising DNA (ref. 3). These rolling circles[11] with different lengths of linear segments would represent progeny DNA in polymeric forms. Although we found considerable homology between the DNA in plasma and in Dane particles, it is yet to be proven that the plasma DNA contains homology equivalent to one or more copies of the Dane particle genome.

The Dane particle is a leading candidate for the hepatitis B infectious agent, based on the findings that they contain a unique DNA primed with a DNA polymerase and are found in infectious plasmas of HB_sAg carriers. In spite of the routine screening of blood donors with sensitive HB_sAg immunological procedures, only about half of the cases of hepatitis B associated with blood transfusion seem to be related to the presence of HB_sAg or antibody in donor blood, as revealed by these methods. The findings in this report on the presence of free DNA having homology to the DNA of Dane particles suggests the possibility of using molecular hybridisation in conjunction with immunological techniques for assessing potential infectivity of blood plasmas.

We thank Dr T. Kakefuda for electron microscopic studies of DNA, Dr W. Holleman for analytical centrifugation studies and W. Schulze for technical assistance.

P. P. Hung
J. C.-H. Mao
C. M. Ling
L. R. Overby

Department of Virology,
Abbott Laboratories,
North Chicago, Illinois 60064

Received September 3, 1974.

1 Dane, D. S., Cameron, C. H., and Briggs, M., *Lancet*, **i**, 695–700 (1970).
2 Robinson, W. S., Clayton, D. A., and Greenman, R. L., *J. Virol.*, **14**, 384–391 (1974).
3 Kaplan, P., Greenman, R. L., Gerin, J. L., Purcell, R. H., and Robinson, W. S., *J. Virol.*, **12**, 995–1005 (1973).
4 Hirschman, S. Z., Gerber, M., and Garfinkel, E., *Nature*, **251**, 540–541 (1974).
5 Ling, C. M., and Overby, L. R., *J. Immun.*, **109**, 834–841 (1972).
6 Leong, J., Garapin, A., Jackson, N., Fanshier, L., Levinson, W., and Bishop, J. M., *J. Virol.*, **9**, 891–902 (1972).
7 Mans, R. J., and Novelli, G. D., *Archs Biochem. Biophys.*, **94**, 48–53 (1961).
8 Merits, I., Schulze, W., and Overby, L. R., *Archs Biochem. Biophys.*, **115**, 197–205 (1966).
9 Britten, R. J., and Kohne, D. E., *Science*, **161**, 529–540 (1968).
10 Wetmur, J. G., and Davidson, N., *J. molec. Biol.*, **31**, 349–370 (1968).
11 Gilbert, W., and Dressler, D., *Cold Spring Harb. Symp. quant. Biol.*, **38**, 473–484 (1978).

Errata

In the article "Flow near an oscillating cylinder in dilute viscoelastic fluid" by C. Chang and W. R. Schowalter (*Nature*, **252**, 686; 1974), Figs 2*b* and 3*b* should be interchanged.

In the article "Ambisonic reproduction of directionality in surround-sound systems" by P. B. Fellgett (*Nature*, **252**, 534; 1974) the following corrections are necessary. Page 537 line 6, for π read 2π; line 9, for hyper-spheres read elliptic spaces; in ref. 3 for **189** read 1892 (date); in Fig. 2*c* the right-hand side of the CBS pan locus should be solid not dashed, to show that it is at the front (not the rear) of the sphere.

In the article by A. J. Cunningham (*Nature*, **252**, 749; 1974) the title should read "Large numbers of cells in normal mice produce antibody against components of isologous erythrocytes" and not as printed.