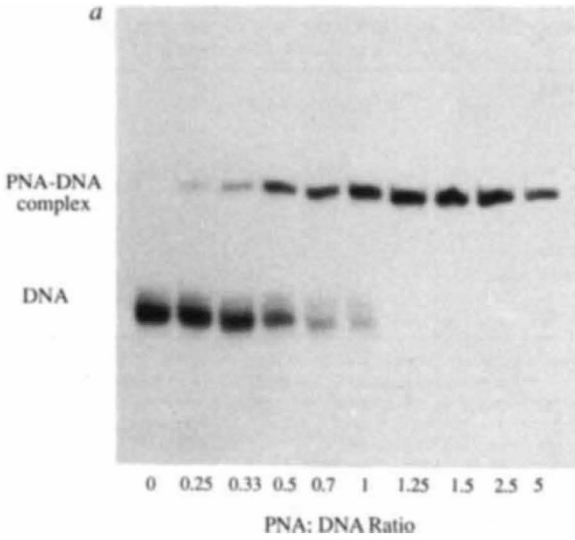

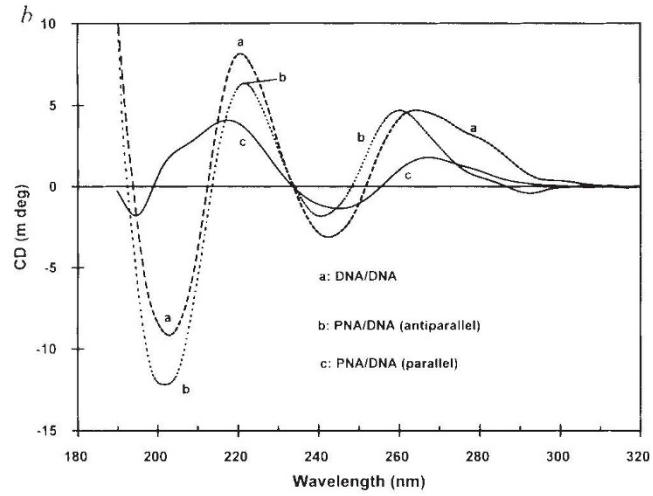

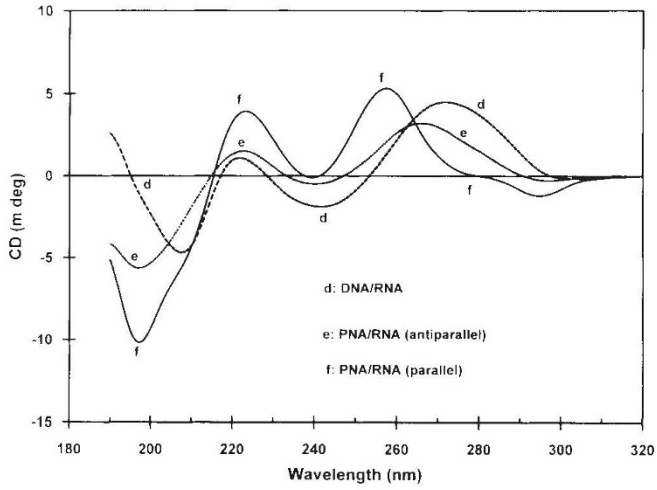

FIG. 2 Structural properties of PNA DNA complexes. *a*, Titration by gel-shift of the binding of PNA H-TGTACGTCACAACTA-NH_2 to the 5′-end labelled oligonucleotide 3′-d(ACATGCAGTGTTGAT). *b*, Circular dichroism spectra of PNA–DNA (b, antiparallel; c, parallel), PNA-RNA (e, antiparallel; f, parallel), DNA DNA (a) and DNA-RNA (d) complexes. The DNA sequence (a–c) was 3′-d(ACATGCAGTGTTGAT), and the RNA sequence (d–f) was 3′-ACAUGCAGUGUUGAU.

METHODS. The oligonucleotide was labelled with ^{32}P at the 5′ end using standard techniques[21]. The oligonucleotide (1 nmol; 10^3 c.p.m.) was incubated with various amounts of PNA (0–5 nmol) in 10 μl 10 mM Tris HCl, 1 mM EDTA, pH 7.4, for 1 h at 37 °C. The samples were analysed by electrophoresis in 20% polyacrylamide gels (TBE buffer, 89 mM Tris-borate, pH 8.3, 1 mM EDTA) and the radiolabelled DNA visualized by autoradiography. Concentrations of oligonucleotides and PNA were measured photometrically. Similar results were obtained using the complementary oligonucleotide of reversed polarity (5′-d(ACATGCAGTGTTGAT)). Complexes for circular dichroism were formed by mixing equal molar amounts of the two complements in distilled H_2O. Circular dichroism spectra were recorded on a Jasco 700 instrument at room temperature using an optical path of 1 mm. All measurements were averaged 10 times and smoothed.

world was preceded by an RNA world[13,14]. But RNA is a chemically fragile molecule, unlikely to survive the harsh prebiotic conditions. Note that a 'peptide nucleic acid' like PNA has the recognition properties of DNA and consequently the potential to carry genetic information. It has been shown that both amino acids[15] and nucleobases[16] are formed under conditions designed to mimic the 'prebiotic soup'. Thus it is conceivable that 'peptide nucleic acid'-like compounds could also have been formed, and might have played a prebiotic role. Finally we note that the properties of PNA reported here, especially their capacity for sequence recognition and hybrid stability, emphasize the potential of such compounds as antisense drugs[17–19]. □

Received 1 March; accepted 20 July 1993.

1. Hélène, C. & Toulmé, J.-J. *Biochim. biophys. Acta* **1049,** 99–125 (1990).
2. Goodchild, J. *Bioconjugate Chem.* **1,** 165–187 (1990).
3. Uhlmann, E. & Peyman, A. *Chem. Rev.* **90,** 544–584 (1990).
4. Eschenmoser, A. & Loewenthal, E. *Chem. Soc. Rev.* **21,** 1–16 (1992).
5. Nielsen, P. E., Egholm, M., Berg, R. H. & Buchardt, O. *Science* **254,** 1497–1500 (1991).
6. Egholm, M., Buchardt, O., Nielsen, P. E. & Berg, R. H. *J. Am. Chem. Soc.* **114,** 1895–1897 (1992).
7. Egholm, M., Buchardt, O., Nielsen, P. E. & Berg, R. H. *J. Am. Chem. Soc.* **114,** 9677–9678 (1992).
8. Egholm, M. *et al. J. chem. Soc. chem. Commun.* 800–801 (1993).
9. Cherny, D. Y. *et al. Proc. natn. Acad. Sci. U.S.A.* **90,** 1667–1670 (1993).
10. Borer, P. N., Dengler, B., Tinoco, I. Jr. & Uhlenbeck, O. C. *J. molec. Biol* **86,** 843–853 (1974).
11. Freier, S. M., Burger, M. D., Alkema, D., Neilson, T & Turner, D. *Biochemistry* **22,** 6198–6206 (1983).
12. Vesnaver, G. & Breslauer, K. J. *Proc. natn. Acad. Sci. U.S.A.* **88,** 3569–3573 (1991).
13. Orgel, L. *Nature* **358,** 203–209 (1992).
14. Cech, T. *Proc. natn. Acad. Sci. U.S.A.* **83,** 4360–4364 (1986).
15. Miller, S. L. *Science* **117,** 528–529 (1953).
16. Oro, J. *Biochem. biophys. Res. Commun.* **2,** 407–415 (1960).
17. Crook, S. T. *Curr. Opinion. Biotech.* **3,** 656–661 (1992).
18. Harvey, J. C. *et al. Science* **258,** 1481–1485 (1992).
19. Nielsen, P. E., Egholm, M., Berg, R. H. & Buchardt, O. *Anti-Cancer Drug Design* **8,** 53–63 (1993).
20. Freier, S. M., Albergo, D. D. & Turner, D. *Biopolymers* **22,** 1107 (1983).
21. Maniatis, T., Fritsch, E. & Sambrook, J. *Molecular Cloning: A Laboratory Manual* (Cold Spring Harbor Laboratory Press, New York, 1982).

ERRATUM

Lethal effect of the anti-Fas antibody in mice

Jun Ogasawara, Rie Watanabe-Fukunaga, Masashi Adachi, Akio Matsuzawa, Tsutomu Kasugai, Yukihiko Kitamura, Naoto Itoh, Takashi Suda & Shigekazu Nagata

Nature **364,** 806–809 (1993)

DURING the production process, a line of text in this letter was accidentally omitted. The fourth sentence of the last paragraph should read, "The liver showed gross injury by administration of the anti-Fas antibody and acute hepatic failure seems to be responsible for the *death of mice, although we cannot rule out lethal damage* in tissues such as heart and lung." □