Finney². Of the eight families, one must be rejected as the parent with polyposis is group *M*, and in three families the parent affected with polyposis died before the investigation was begun and examination of the offspring is not sufficient to be able to determine the mating type with certainty. One further family of Finney's mating type 4 has only two offspring, one of which is group *MN* and so cannot contribute to the linkage test. The remaining three families appear in the analysis of Table 1, which follows Finney's scheme.

Table 1

Family	Mating type	a	b	c	d	$\lambda = \frac{1}{2}u_{11}$	$Kc = \omega_1$
III (1)	4	2	0	0	0	1.00	1.00
III (5)	4	0	1	3	0	6.00	6.00
III (8)	3	1	0	0	1	1.00	1.00
						$S(\lambda) = 8.00$	$8.00 = S(Kc)$

$$\frac{S(\lambda)}{\sqrt{S(Kc)}} = \frac{8}{\sqrt{8}} = 2.828; P < 0.01 \quad (1 \text{ per cent point} = 2.33)$$

An attempt has been made to include three 'uncertain' families using Finney's technique for test factors showing dominance, but as some of these families are now part-Maori in origin and the gene frequencies for *M* and *N* are not known for Maoris, the results can be only tentative. However, the significance of the results does not seem to be affected by the inclusion of these families using estimated gene frequencies, and an estimate of the recombination fraction shows that the linkage is close (probably less than 5 per cent).

This pedigree will yield further information during the next ten to twenty years as a number of families too young for any member to have developed polyposis have already been extensively examined for blood group and from time to time they will be examined for polyposis.

This work was financed by the Medical Research Council of New Zealand.

A. M. O. VEALE

Department of Medicine,
University of Otago Medical School,
Dunedin, New Zealand.

¹ Dukes, C. E., *Ann. Eugen.*, 17, 1 (1952).

² Finney, D. J., *Ann. Eugen.*, 10, 171 (1940).

Migration of Spleen Cells from Subcutaneous Implantation Sites

PARTICULATE matter and cells injected subcutaneously are normally localized at the site of injection, while the suspending medium diffuses outwards¹. Exceptional behaviour might be expected of cells from the bone marrow and spleen, however, for these cells can become established in homologous tissues after intravenous injection into irradiated hosts². On the other hand, the intravenous route of injection is more effective than the subcutaneous in procuring the functional survival of these cells, as judged by protection against lethal irradiation³, and the adoptive transfer of immunity⁴. The continued production of a specific antibody by spleen cells was used in the present experiments, to determine their localization after subcutaneous implantation.

Spleen cells were transferred from immunized mice of the *CBA* strain into adult non-immunized hosts of the same strain. Immunization was carried out by

Fig. 1. Antibody titres of sera from host mice after transfer of spleen cells (means with standard deviations from 3-7 mice). Untreated cells, ○—○; subcutaneous site removed on fourth day, □—□; subcutaneous site removed on sixth day, ■—■; subcutaneous site removed on tenth day, ■—■; frozen-thawed cells, △—△.

intravenous injection of *Salmonella typhi* (H), according to Mitchison's procedure⁵. The spleen cells were suspended in saline and injected subcutaneously into the flank, at a dose equivalent to one whole spleen into each host. At intervals after transfer, the *H*-agglutinins in the serum of the hosts were titrated (Fig. 1). One group of hosts received frozen and thawed cells. In the other hosts the cells remaining at the subcutaneous injection site were either removed surgically after an interval, or were left undisturbed.

No antibodies were detected in the hosts after injection of cells that had been frozen and thawed, indicating that no significant quantities of antigen or pre-formed antibody had been transferred with the cells. The appearance of antibodies in the other hosts can therefore be attributed to synthesis by the transferred cells; antibody synthesis occurred, although at a lower level than after transfer of comparable cells by the intraperitoneal route⁵. Removal of the cells at the injection site on the fourth day after transfer was followed by a drop in antibody titre, whereas removal on the sixth or tenth day was without significant effect. It appears, therefore, that functionally active cells were still present at the subcutaneous site up to the fourth day, but that the active cells later migrated elsewhere—presumably into the regional lymph nodes.

Histological examination confirmed the absence of active cells from the subcutaneous site after the fifth day. The remaining lymphoid cells were gradually degenerating and dying, within a well-defined, generally encapsulated nodule. Holub has described similar nodules in the omentum of young rabbits after intraperitoneal injection of lymphoid cells⁶.

V. HAŠKOVÁ*
N. A. MITCHISON

Department of Zoology,
University of Edinburgh.

* Present address: Biological Institute, Czechoslovak Academy of Sciences, Praha-Dejvice, Na cvičišti 2, Czechoslovakia.

¹ Hewitt, H. B., *Brit. J. Exp. Path.*, 35, 35 (1954).

² Ford, C. E., Hamerton, J. L., Barnes, D. W. H., and Loutit, J. F., *Nature*, 177, 452 (1956).

³ Kaplan, H. S., Brown, M. B., and Paull, J., *J. Nat. Cancer Inst.*, 14, 303 (1953).

⁴ Billingham, R. E., Brent, L., and Medawar, P. B., *Proc. Roy. Soc. B*, 143, 58 (1954).

⁵ Mitchison, N. A., *J. Cell. Comp. Physiol.* (Supp.), 50, 247 (1957).

⁶ Holub, M., *Folia Biol. (Prague)* (in the press).