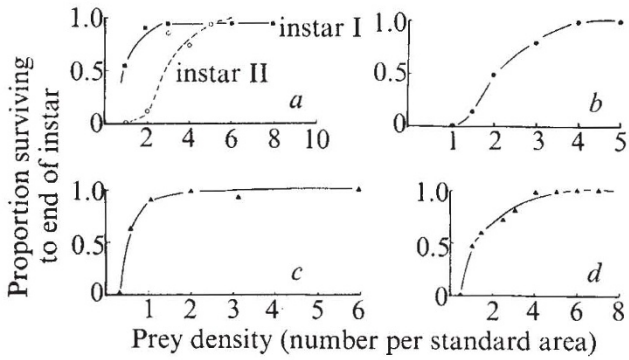

Fig. 4 Relationships between mean prey density during an instar and the proportion of individual predators surviving to the end of that instar. Data are for (*a*, *b*) coccinellids[18,23] (*Adalia decempunctata*, and *Adalia bipunctata*), (*c*) an hemipteran[15] (*Blepharidopterus angulatus* (Fall.) and (*d*) a spider[13] (*Linyphia triangularis*). ■, Instar I; ○, instar II.

Having documented well-corroborated relationships between the components of the predator rate of increase and the prey death rate, the task remains to investigate their implications for the behaviour of predator–prey systems. These problems, together with a more detailed treatment of the material in this paper, will be discussed elsewhere.

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1 Lotka, A. J., *Elements of physical biology* (Williams and Wilkins, Baltimore, 1925).
2 Hassell, M. P., and May, R. M., *J. Anim. Ecol.*, **42**, 693–726 (1973).
3 Murdoch, W. W., and Oaten, A., *Adv. Ecol. Res.* (in the press).
4 Royama, T., *Res. Popul. Ecol. Suppl.*, **1**, 1–91 (1971).
5 Leslie, P. H., *Biometrika*, **35**, 213–45 (1948).
6 May, R. M., *Stability and Complexity in Model Ecosystems* (Princeton University Press, Princeton, 1973).
7 Beddington, J. R., *J. Anim. Ecol.*, **44**, 331–340 (1975).
8 Hassell, M. P., and May, R. M., *J. Anim. Ecol.*, **43**, 567–594 (1974).
9 Holling, C. S., *Can. Ent.*, **91**, 385–398 (1959).
10 Holling, C. S., *Mem. Ent. Soc. Can.*, **48**, 1–86 (1966).
11 Fox, L. R., thesis, Univ. California, Santa Barbara (1973).
12 Hodek, I., *Biology of Coccinellidae* (Academia, Prague, 1973).
13 Turnbull, A. L., *Can. Ent.*, **94**, 1233–1249 (1962).
14 Mukerji, M. K., and LeRoux, E. J., *Can. Ent.*, **101**, 387–403 (1969).
15 Glen, D. M., *Ent. exp. appl.*, **16**, 255–267 (1973).
16 Fransz, H. G., *The functional response to prey density in an acarine system* (PUDOC, Wageningen, The Netherlands, 1974).
17 Toth, R. S., and Chew, R. M., *Ann. Ent. Soc. Am.*, **65**, 1270–1279 (1972).
18 Dixon, A. F. G., *J. Anim. Ecol.*, **28**, 259–281 (1959).
19 Dixon, A. F. G., *J. Anim. Ecol.*, **39**, 739–751 (1970).
20 Evans, H. F., thesis, Univ. Oxford (1973).
21 Pruszynski, S., *W.P.R.S. Bulletin, Integrated Control in Glasshouses*, 1973–74, 41–46 (1973–74).
22 Rivard, I., *Can. J. Zool.*, **40**, 1233–1236 (1962).
23 Wratten, S. D., *J. Anim. Ecol.*, **42**, 785–802 (1973).

Polymorphism of erythrocyte potassium concentration in seaweed-eating sheep

INDIVIDUAL normal adult sheep have either a high or low erythrocyte potassium concentration, determined genetically by a simple allelic pair in which the gene for low K is dominant. High potassium (HK) animals have low erythrocyte sodium and low potassium (LK) animals high. Both phenotypes are present, and in all proportions, in 115 of 129 populations listed[1].

It is tempting to expect that such a striking physiological distinction would have a clear adaptive significance in an environment that offered an appropriate selection pressure. North Ronaldsay seems to be such an environment. The primitive native sheep of this small island in Orkney have been confined by a wall to the sea-shore for at least 140 years. Their diet is almost entirely of fresh seaweed and it is presumed that their intake of sea-salt is unavoidably high. These sheep number approximately 4,500 (ref. 2).

Blood samples were taken on the island from 113 adult sheep; 5 were HK and the rest LK. The average plasma sodium and potassium concentrations of the LK sheep were found to be about the same as those of LK mainland sheep, but the estimates for erythrocyte concentrations were significantly lower.

The diet of the Orkney sheep therefore does not seem to have affected plasma electrolyte levels, but the reduced values for the erythrocytes implies that the factors maintaining the electrolyte gradient across the erythrocyte membrane differ from those in mainland sheep. Although one phenotype is thus shown to have been modified, the exigencies of life on North Ronaldsay have not overwhelmingly favoured either phenotype.

Table 1 Blood electrolyte estimates for LK sheep, (mEq l^{-1})

Origin	North Ronaldsay	Scottish mainland
Number of sheep	108	314
Plasma Na	133.5± (0.51)	136.3± (0.32)
Plasma K	5.0± (0.05)	5.1± (0.04)
Erythrocyte Na	59.7± (1.44)	70.9± (0.94)
Erythrocyte K	9.8± (0.26)	19.9± (0.27)

Arithmetic means (s. e.) for North Ronaldsay sheep. Adjusted means ± s. e. for Scottish mainland sheep. (Values for the latter were calculated from the data of reference[3] by Mr E. A. Hunter.)

Our conclusion is that if there were any ecological significance in the polymorphism of blood electrolyte concentrations it remains obscure. A detailed account will be given elsewhere.

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1 Agar, N. S., Evans, J. V., and Roberts, J., *Anim. Breed. Abstr.* **40**, 407 (1972).
2 Hall, S. J. G., *Mammal Rev.* 5, no. 2 (975).
3 Hall, J. G., and Hunter, E. A., *Heredity*, **31**, 325 (1973).

Antibody-induced cell-mediated damage to human endothelial cells *in vitro*

THE blood vessels of allografted organs are important sites for immunological injury[1–3]. *In vivo*, this is thought to be the result of interactions between antigenic determinants on donor vessel endothelium and recipient immunocompetent cells and antibodies. *In vitro*, damage to cultured pig endothelium by cytotoxic xeno- and alloantisera in the presence of rabbit complement has previously been described[4]. In addition, both