



Ear to stay

Rabbits are sometimes called mammalian weeds. The quintessential pest, they are justly famed for their legendary ability to reproduce rapidly and spread almost everywhere.

In other words, they are successful, and very adaptable. They have coped with a lot since being introduced here from England; as well as our attempts to control them, they have had to deal with the country's wide climatic range.

In this regard, their long, floppy ears are useful when it's hot, because they act as radiators. However, in the alpine regions of Australia they can be quite a liability, losing precious heat from a dense network of blood vessels spread over a large area.

Observers have noted that rabbits from different regions of the country have different ear sizes. Recently, Dr Kent Williams and Mr Robert Moore, of the CSIRO Division of Wildlife and Ecology in Canberra, decided to look into this.

Are the differences mere adaptations to the environment during growth, or are they genetically based and passed on to the offspring no matter where they grow up? If the latter applies, we could have a genuine case of evolution occurring during the course of the last century or so.

The scientists trapped rabbits from three sites with different climates.

Quinyambie, S.A., represents the warm arid areas; Urana,

N.S.W., is typical of a semi-arid Mediterranean-type climate; and the Snowy Plains in Kosciusko National Park, N.S.W., are mild in the summer, cold in winter, fairly wet, and at a high elevation.

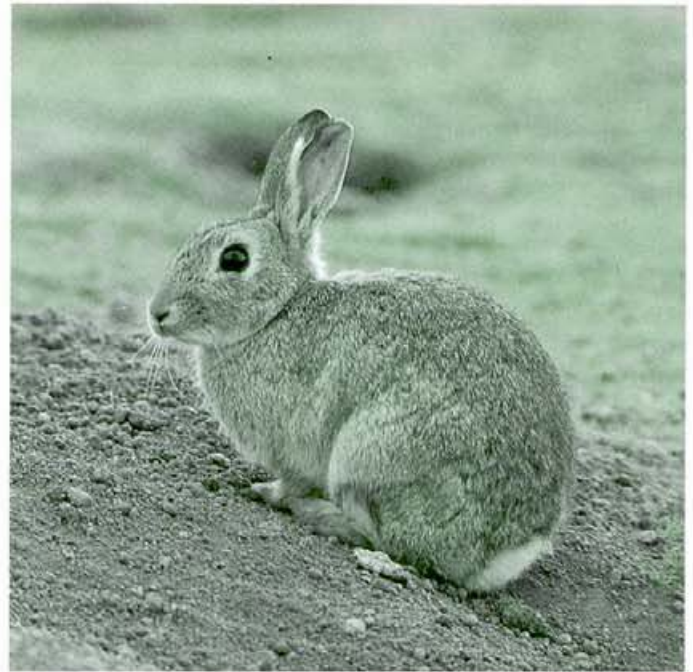
After weighing the animals, the researchers measured the length of their ears and, as a control, the length of the feet as well (biologists don't consider that these have a function in temperature regulation). They then transferred the rabbits to the Division in Canberra, where they kept and bred some of them in the laboratory at a constant temperature of either 15 or 25°C.

Results from the measurements showed that desert-dwellers did indeed have longer ears than those from cooler climes: lengths averaged 82 mm in the group from the arid zone, 79 mm in those from Urana, and only 75 mm in those from the Snowy Plains.

Furthermore, the animals from Quinyambie were generally leaner and had a less compact body shape than their stocky fellows from the mountains. (This is a common finding for many mammals.) As expected, the scientists found no significant correlation between differences in foot size and the climatic regime.

The breeding experiments showed that differences in

A scientist measures the length of the head and body. Such information was used to standardise rabbit sizes and compare body proportions.



Big ears: this young rabbit was bred and reared at a constant temperature of 25°C, at which the ears grew large.

body size and ear length similar to those found in the wild rabbits could be reproduced. Rabbits bred in the laboratory at 25°C were leaner and had larger ears than those reared at 15°C. Again, the size of the foot remained constant.

But are the ear-length and body-size differences genetic? In other words, could various 'races' have evolved since the first rabbits arrived here 130 years ago?

The data from the breeding experiments were complex. Detailed analysis suggested that, although some genetic control was present,

particularly for body size, the fact that the rabbits also had the ability to adapt their ear size to the prevailing environment over one generation meant that the environment was the dominant factor. Nurture certainly works with Nature to determine the final outcome.

In the light of all the evidence the scientists speculate that what has evolved is really an ability to be adaptable; in other words, what seems to have been selected for during the rabbits' brief evolution down under is a 'plasticity' of body form — which allows the environment to modify genetic instructions — rather than the differences themselves. And that, in part, is what has made rabbits so successful when introduced into the alien Australian environment and ensured that they probably are, unfortunately, here to stay.

Roger Beckmann

Phenotypic adaptation and natural selection in the wild rabbit, *Oryctolagus cuniculus*, in Australia. C.K. Williams and R.J. Moore. *Journal of Animal Ecology*, 1989, **58**, 495–507.