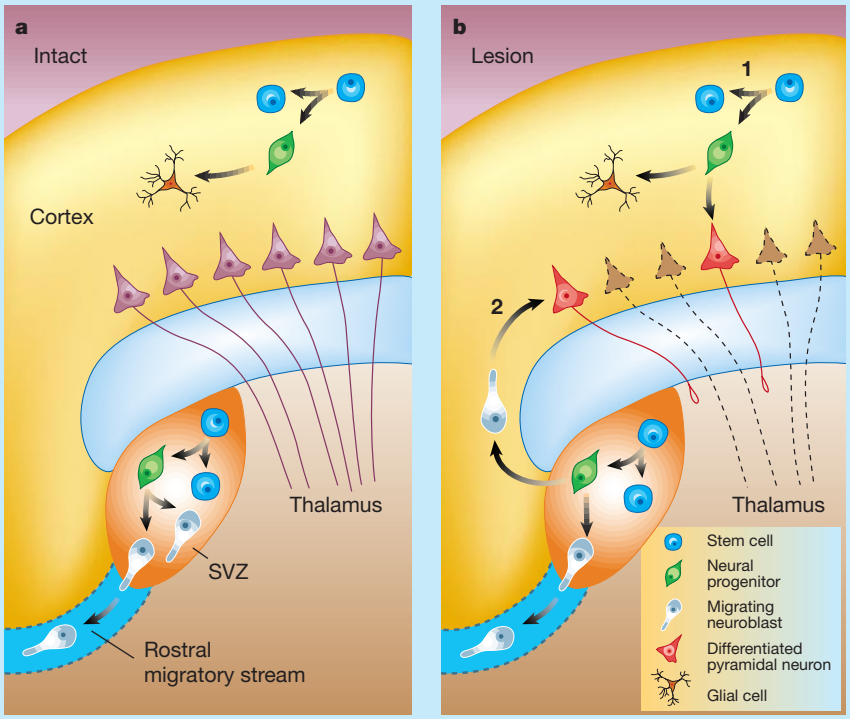

Figure 1 **Does the brain have a dormant capacity for self-repair?** a, **In the neocortex of the adult mouse, stem cells and other neural progenitors occur locally in the cortical grey and white matter, and in the underlying subventricular zone (SVZ). The cortical progenitors give rise to glial cells (non-neuronal cells) only. The neurons generated in the SVZ migrate along the rostral migratory stream to the olfactory bulb (not shown).** b, **Magavi *et al.*[1] used a refined photolytic lesion to induce apoptotic cell death in a subset of neurons that project from the neocortex to the thalamus. The cells were filled from their terminals in the thalamus with nanospheres carrying a chromophore, which becomes toxic when irradiated with red laser light. During the following weeks, Magavi *et al.* detected new neurons with features of cortical pyramidal neurons in the layers undergoing degeneration. The new neurons appeared to be recruited from the resident cortical progenitors (pathway 1) and/or from the underlying SVZ (pathway 2). A few of these cells seemed to connect back to the thalamus, suggesting a hitherto unknown capacity for neuronal replacement and functional repair.**

Such cells were not observed in the control mice. The new neuronal cells occurred only in the cortical layer that was undergoing degeneration, and some of them had a morphology characteristic of cortical pyramidal neurons. The newly formed neurons extended processes to the original target sites in the thalamus, suggesting that they joined up the damaged circuitry.

The observations are provocative, but how certain can we be that the interpretations are correct? As pointed out recently[10], bromodeoxyuridine may label cells that are repairing damaged DNA rather than replicating DNA ready for cell division. So there is a risk that neurons undergoing cell death, as well as newly divided cells, may have incorporated the label. But bromodeoxyuridine-labelled cells in the damaged neocortex expressed markers — not found in controls — characteristic of migrating young neurons, and survived for at least six months. So it seems unlikely that they were dying. It is also conceivable that a few surviving neurons might be labelled as a result of reversible DNA damage. This was not controlled for, but in this case one would expect less bromodeoxyuridine to be incorporated than was observed.

These intriguing data raise several questions. First, we need to know where the newborn neurons originate. Possibilities are the progenitors present locally in the cortex, or cells in the underlying SVZ region (Fig.1b). During postnatal development, SVZ cells migrate to neocortex to form glial cells, but in the adult they migrate only to the olfactory bulb. Yet adult SVZ cells can respond to damage by increased proliferation and migration towards the lesion[13,14]. Magavi *et al.* observed cells migrating into the lesioned cortical area. These cells, not present in controls, were apparently recruited from a distance by signals produced as a result of the apoptotic cell death.

Second, we need to identify the signals involved in the neurogenic response. In similar experiments, Macklis and colleagues[15] showed that the expression of several neurotrophic factors (required for neuronal survival, migration and differentiation) is upregulated in interneurons near the degenerating neocortical neurons. Similarly, insults leading to increased neurogenesis in

100 YEARS AGO

The determination of the strength of collateral heredity is a problem of great scientific importance, and it can only be achieved by co-operative action. I have found so many teachers in all classes of schools willing to give disinterested aid in the cause of science that I venture to make a further appeal through *Nature* for more assistance. Besides observations of physical and mental characters, which can be recorded without measurement, my data papers ask for certain head-measurements, which can, following the printed instructions, be taken quite easily. I shall be most glad to send sample papers to any one willing to assist, and if, after considering these, they find themselves able to assist, say by filling in data papers for ten or more pairs of brothers or sisters, I will at once despatch a head-spanner, of which I have several at the present time, free. The head-spanner should not be retained (unless under special circumstances) for more than a few weeks. Where the school is a small one, one master has, as a rule, filled in the papers entirely; in larger schools, one of the science masters, or even the medical officer, has done the head-measurements, and the other data have been provided by house, form or consulting masters. Karl Pearson
From *Nature* 21 June 1900.

50 YEARS AGO

Dictionary of Genetics

This book contains, or attempts to contain, every word connected with genetics in the widest sense. It therefore spreads over (though it does not cover) the whole range of biology; psychology and anatomy, embryology and biochemistry are all represented… For some terms (such as cytomicrosome), the author proceeds by describing *ignotum per ignotius*; others (such as mitoschisis or merostathmokinesis) have never been used except by their anonymous inventors. Let us hope that others again (such as thermocleistogamy, tachyauxesis and spermiocalyptrotheca) never will be used. Others which have a known meaning lose it (such as "mass mutation" in *Œnothera*) or do not appear at all (such as "sterility"). Then again, others (such as heterofertilization or parthenogamy) describe rare or even imaginary phenomena. One supreme example which is non-existent as a technical term (perultimate chromomere) appears to be at once misplaced, misspelt and misdefined.
From *Nature* 24 June 1950.