

Asia is the utilitarian and mercantilist nature of a good portion of U.S. science. This motive would seem to account for the preponderance of elite students from China, Korea, India, and—on the rare occasion—Indonesia or Thailand in science and engineering graduate programs in the United States. There seems to be little interest on the part of U.S. government agencies (not to mention academic mentors) in supporting non-upwardly mobile students from Southeast Asia (particularly from Malaysia, Indonesia, and Myanmar/Burma). U.S. science policy is predicated on fast results, and the criteria used to assess foreign student performance do not lend themselves well toward “Peace Corps-type” science. Thus, the majority of nonaffluent students in Southeast Asia will continue to be ignored equally by local government institutions and by self-serving U.S. science policies.

U.S. international science policy should assist poorer nations in Southeast Asia in developing proactive education and science programs in order to raise the overall standards locally; we should not be in the business of mining elite talent in Asia to augment putative efforts toward U.S. scientific supremacy. Graduate science programs in the United States should return to their original purpose of educating all students, and end their present role of serving as would-be surrogates for the U.S. Immigration and Naturalization Service.

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■ Anatomy of “Regenerating Axons”

In their Report “Repair of adult rat corticospinal tract by transplants of olfactory ensheathing cells” (26 Sept., p. 2000), Ying Li *et al.* describe destroying unilaterally the upper cervical corticospinal tract (CST) of adult rats by focal electrolytic lesions and then transplanting homologous olfactory ensheathing cells (OECs) onto the injury site. They found that the transected CST axons grew through the transplant and elongated into the denervated caudal host tract, forming a continuous bridge across the lesion. These results are relevant because of the possibility of future applications in patients with spinal cord injuries. The anatomical findings shown in the report, however, call for some comment.

An example of the regenerated CST axons at 4 weeks after transplantation (figure 2 in

the report) shows a fascicle of parallel, unbranched axons with occasional varicosities and no terminal clubs traveling in the transplanted area. These axons, however, do not exhibit the typical features of the regenerating CST axons (1–3). The morphology of the regenerating CST fibers is peculiar and makes them distinguishable from unlesioned CST fibers (3). One possible explanation for the results (figure 2 in the report) may be that the transplanted OECs modified the growing environment, affecting the regenerative pattern of the CST fibers. Alternatively, the axons depicted might not represent transected CST fibers that regenerated across the injured area, but CST axons that survived the lesioning procedure. The electrolytic method that was used in this study is likely to produce partial lesions of the CST, as demonstrated by the control group, where only 7 out of 21 rats (33%) showed a complete CST transection. In the transplanted group, the actual extent of the CST lesion was not determined. It would be interesting to know whether Li *et al.* observed Dextran-labeled terminal plexuses in the anterior horns of segments innervating the forepaw.

Another point concerns the demonstration with electron microscopy (EM) of Schwann-like OECs that formed peripheral-type myelin around regenerated CST axons. The EM technique per se cannot show conclusively that the myelinated axons (figure 3, B and C, of the report) represent CST fibers. These axons may derive from sources different from the pyramidal neurons. Li *et al.* identified the cells in figure 3B as Schwann-like OECs, but this determination is not justified because they did not label the OECs that were transplanted. It is known that the Schwann cells can migrate into injured SC areas and myelinate the regenerated axons that arise from dorsal root ganglion cells, as well as from intraspinal neurons (2, 4, 5). We cannot exclude the possibility that the axons seen with EM may represent CST fibers that were first demyelinated, but not transected, by the electrolytic lesion, and then remyelinated with peripheral myelin formed by the Schwann cells. It is important to distinguish between the regeneration of transected CST axons, which may be potentially aided by the transplanted OECs, and the myelination of the regenerated axons, possibly by Schwann cells that have migrated into the lesion.

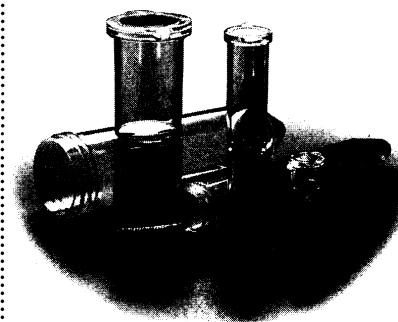
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Response: We observed an unbranched axonal morphology in adult rat spinal cord lesions with transplants of olfactory ensheathing cells. We do not consider that the studies cited by Pallini have established a morphology of regenerating axons sufficiently "typical" that it can be used to distinguish them from unlesioned axons.

In our opinion, the unbranched axons in our material are regenerating (rather than intact axons surviving as a result of incompleteness of the lesion) because (i) at the shorter survival times, we can see their free tips (indicating that they must have been cut); (ii) at increasing survival times, these tips advance through the transplants, and reenter the host tract; and (iii) we have not observed such structures in the lesioned area of animals without olfactory ensheathing cell transplants (1).

In the report of our findings, we were guided by the potential importance of these initial observations, and especially the correlation with functional recovery. We would agree that such experiments raise many fur-

ther questions. With the use of injections of biotin Dextran, we now have electron microscopic data which confirm that the peripherally myelinated axons originate in the motor cortex, and we are examining the terminal distribution of the labeled regenerating corticospinal axons (2).

The extent to which endogenous Schwann cells might contribute to the observed peripheral-type myelination is being investigated in an ongoing labeling study. In this regard, however, it should not be unexpected that olfactory ensheathing cells would myelinate corticospinal axons, as it has been well established that these cells produce peripheral myelin both in vitro (3) and also after transplantation into the spinal cord (4).

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Traffic Jams on the Internet

We find the basic premise of the report "Social dilemmas and Internet congestion" by Bernardo Huberman and Rajan Lukose (25 July, p. 535) quite intriguing. Social forces such as those at work in the well-known "tragedy of the commons" (1) would indeed influence patterns of some forms of Internet use because, in many situations, the network's utility does diminish as it becomes overburdened. A question arises, however, as to what proportion of Internet use fits into this category—it seems plausible that quite a bit does, but some might not. For example, when a user's primary concern is to eventually retrieve some information, he might not mind turning his attention to other tasks while he waits for it.

Determining how much Internet use fits in each category might be difficult. Still, if we accept the plausibility of the premise of Huberman and Lukose, we might then examine the methodology they used to test it. These methods (time scales and particular measurements) are most likely measuring transmission control protocol (TCP) behavior, not social behavior.

On what sort of time scales might the effects of "social forces" manifest themselves, and, on those time scales, might other factors play as great or greater a role in the dy-

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