peatedly evaluated and can be discounted (5). Accordingly, the available evidence remains consistent with a requirement for protein synthesis in long-term memory storage. This view does not, of course, exclude an important role for catecholamines in some aspects of learning and memory.

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References and Notes
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We were pleased that Squire et al. were able to replicate our findings. We also noted that CXM-treated animals appear ill for several days after an injection, although mice pretreated with PBZ were not noticeably more ill. We believe the fact that CXM produces illness lends support to the hypothesis that CXM, like other amnestic treatments, elicits physiological stress responses that impair memory storage. The PBZ also attenuates amnesia produced by many other treatments in the absence of obvious illness.

With regard to the specific data Squire et al. provide, all groups show decreased retention performance at the day 7 test interval. Just as amnesia is seldom, if ever, complete (that is, retention latencies of amnesia groups are above those of nonshocked controls: approximately 20 seconds), attenuation of amnesia may also be incomplete. The day 7 results may simply reflect different rates of forgetting, a finding that would be interesting but that would not alter our general conclusion. In direct response to their findings, we examined retention performance after 1 week in an analogous experiment with rats. Under these conditions, PBZ still attenuated CXM-produced amnesia (Fig. 1).

In addition, we now have more evidence about the generality of our findings. Several other peripheral administers adrenergic antagonists block the amnesias produced by electrical stimulation of frontal cortex and the amygdala for both inhibitory (passive) avoidance training and for Y-maze discriminated-avoidance training (a task similar to that used by Squire et al.) (1). Thus, the findings seem general to both rats and mice, to several adrenergic antagonists, to at least two behavioral situations and, under some conditions, at test intervals as long as 1 week after training. It seems unlikely that the attenuation of amnesia seen under these various combinations of conditions can be attributed to illness.

Finally, we wish to emphasize that our data do not directly bear on the issue of whether protein synthesis is involved in memory storage processing; protein synthesis must at least provide the constituents necessary for memory processing. Our results do, however, cause us to question the attribution of antibiotic effects on memory to inhibition of protein synthesis. Whether CXM acts on memory because of inhibition of protein synthesis that is specifically involved in memory processing or whether inhibition of protein synthesis is a stressor that elicits physiological responses that impair memory is still open to question (2).

An examination of physiological stress responses [such as a transient decrease in brain norepinephrine content that is highly correlated with other amnesias (3)] after CXM injections may help to resolve this issue.

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References and Notes

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Recombinant DNA

A broad survey of new results from recombinant DNA research will be presented in a special issue of Science dated 19 September. Leaders in the field from the United States and abroad have contributed 21 articles. The power of the recombinant DNA techniques is such that important discoveries are being made with unprecedented speed. In consequence, many observers believe that we are in the midst of a revolution in biology. The issue will provide a view of this turbulent activity.

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