centrifuge, until no measurable activity remained in the supernatant. The residues were then treated with *Crotalus atrox* venom and incubated for 1 h at 37 deg C in a metabolic shaker in order to solubilize the insoluble fraction of AChE. Finally, the supernatants obtained from this procedure by centrifugation as above were assayed for AChE activity and protein, using the methods of Ellman, Courtney, Andres, & Featherstone (1961) and Ellman (1962). Results, in terms of specific activity, are expressed as nanomols substrate hydrolyzed per minute per milligram protein. Of a total of 11 pairs of animals, matched for genetic background, sex, and age, which were sacrificed over a 140-day period, four pairs were discarded (before code-breaking) because of apparatus failure or technician error in the laboratory. The ages at sacrifice of the seven remaining pairs were 102, 110, 123, 130, 172, 214, and 242 days.

RESULTS

Figure 1 shows the mean specific activities in the motor and visual areas of the two groups. The means were almost identical for the two groups. Within each group, mean specific activity was considerably greater in motor than in visual cortex. In four of the seven pairs, specific activity in the visual cortex was lower in light-deprived than in control animals; in three pairs, specific activity in the motor cortex was lower in light-deprived animals than in controls. In 11 of the 14 rats, specific activity was higher in motor than in visual cortex. A 2 (rearing conditions) by 2 (cortical areas) by 7 (pairs) variance analysis revealed that none of the first order interactions was significant, nor was the main effect of rearing condition. The effects of area and pair were both significant ($0.001 < p < 0.005$ in each test).

DISCUSSION

So far as condition of rearing is concerned, the results indicate that under the stated conditions, light deprivation from birth well into maturity has no measurable effect upon AChE activity in visual and motor cortex of rats. This finding thus extends the observation of Maletta and Timiras (1967) on immature rats. As regards the areal gradient in mature rats, the present results are in agreement with those of both groups in Berkeley.

In considering the results, two comments at least are in order. First, light deprivation was not absolute, and there is the question of minimum stimulation required for enzyme induction, or possibly to "trigger" the process, which, once it has been initiated, might be maintained without further exogenous stimulation. Second, the extent of neuronal interconnections within cortical areas, and between these and subcortical centers, is such that the elimination of input from only one or two pathways such as those of the optic system may not be sufficient to lead to a measurable change of the nature under investigation.

It should, however, be noted that the nature of the measure used—specific activity—i.e., rate of hydrolysis/unit weight protein, is such that, should there actually be a decrease in enzyme activity with deprivation (as one might a priori expect) and should this be accompanied by a concomitant, more or less proportional decrease in protein, as measured by this assay, then one would obtain no apparent change in the specific activity, even though changes have taken place. That such changes might occur is suggested by reports from various workers [e.g., Gyllensten, Malmfors, & Norrlin (1965, 1966); Globus & Scheibel (1967); Maraini, Carta, Franguelli, & Santori (1967); as well as the observation of Krech et al (1960) and Bennett et al (1965) cited in the introduction]. Thus, it might be necessary to measure specific AChE activity with reference to some tissue component other than protein as measured by the UV modification of the Biuret, in order to uncover such changes.

Matched pairs of experimental and control animals were always processed simultaneously. The significant effect of pairs found here is of interest in any consideration of laboratory techniques, instrument response, etc., and underlines the importance of running such controls.

REFERENCES

BENNETT, E. L., DIAMOND, M. C., KRECH, D., & ROSENZWEIG, M. R. Chemical and anatomical plasticity of brain. Science, 1964, 146, 610-619.

ELLMAN, G. L., COURTNEY, K. D., ANDRES, V., & FEATHERSTONE, R. M. A new and rapid colorimetric determination of acetylcholinesterase activity. Biochemical Pharmacology, 1961, 7, 88-95.

ELLMAN, G. L. The Biuret Reaction: Changes in the ultraviolet absorption spectra and its application to the determination of peptide bonds. Analytical Biochemistry, 1962, 3, 40-48.

GLOBUS, A., & SCHEIBEL, A. B. The effect of visual deprivation on cortical neurons: A Golgi study. Experimental Neurology, 1967, 19, 331-345.

GYLLENSTEN, L., MALMFORS, T., & NORRLIN, M. Effect of visual deprivation on the optic centers of growing and adult mice. Journal of Comparative Neurology, 1965, 124, 149-160.

GYLLENSTEN, L., MALMFORS, T., & NORRLIN, M. Growth alteration in the auditory cortex of visually deprived mice. Journal of Comparative Neurology, 1966, 126, 463-470.

KRECH, D., ROSENZWEIG, M. R., & BENNETT, E. L. Effects of environmental complexity and training on brain chemistry. Journal of Comparative & Physiological Psychology, 1960, 53, 509-519.

MALETTA, G. J., & TIMIRAS, P. Acetylcholinesterase activity in optic structures after complete light deprivation from birth. Experimental Neurology, 1967, 19, 513-518.

MARAINI, G., CARTA, F., FRANGUELLI, R., & SANTORI, M. Effect of monocular light deprivation on leucine uptake in the retina and the optic centers of the newborn rat. Experimental Eye Research, 1967, 6, 299-302.

ROSENZWEIG, M. R., KRECH, D., & BENNETT, E. L. Brain chemistry and adaptive behavior. In H. F. Harlow and C. N. Woolsey (Eds.), *Biological and biochemical bases of behavior.* Madison: University of Wisconsin Press, 1958. Pp. 367-400.

ROSENZWEIG, M. R., KRECH, D., BENNETT, E. L., & DIAMOND, M. C. Effects of environmental complexity and training on brain chemistry and anatomy. Journal of Comparative & Physiological Psychology, 1962, 55, 429-437.

NOTE

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ERRATUM

MARTIN, JOAN C. Sex differences in the activity wheel as a function of fetal age at irradiation. Psychonomic Science, 1968, 13 (5), 249-250.—On page 249 the sentence beginning line 41 should read "At 60 days of age there remained five males and five females in the 17 day/200 R group, 12 males and four females in the 19 day/200 R group, 10 males and four females in the 21 day/200 R group, and six males and four females in the 19 day/0 R group."