

From these data it seems that lymph nodes from hamsters bearing adenovirus 12 tumours have been "primed" to respond to viral antigens. After exposure to the antigen *in vitro*, the lymph nodes are capable of synthesizing specific antibodies to a viral antigen eluted from DEAE cellulose with 0.2 M NaCl². It can be concluded that lymph nodes from animals bearing primary and early passage, secondary adenovirus 12 tumours, have the ability to synthesize antibodies *in vitro* which may not be detected *in vivo*.

This work was supported by a grant from the US National Institute of Allergy and Infectious Diseases.

STANLEY S. LEFKOWITZ
RHODA ANN REDDICK

Department of Microbiology,
Medical College of Georgia,
Augusta, Georgia.

Received July 30; revised November 4, 1968.

¹ Lefkowitz, S. S., *Proc. Soc. Exp. Biol. and Med.*, **126**, 549 (1967).

² Lefkowitz, S. S., *J. Immunol.*, **101**, 611 (1968).

³ Ortiz-Muniz, G., and Stigel, M. M., *Proc. Soc. Exp. Biol. and Med.*, **124**, 1178 (1967).

⁴ Ambrose, C. T., and Coons, A. H., *J. Exp. Med.*, **117**, 1075 (1967).

Scientific Training and the Persistence of Traditional Beliefs among West African University Students

It is often taken for granted that education in general, and especially scientific training^{1,2}, can eliminate the traditional supernatural beliefs widely held in African cultures. The outcome of extensive anthropological studies in this sphere, as discussed, for example, by Horton³, lends little support to this; on the contrary, it shows that such beliefs are deeply rooted in systems of social relations. If, as has been suggested⁴, a magico-mythical world view is an obstacle to the emergence of creative scientists (as distinct from competent practitioners of scientific techniques), then the issue is an important one. There is some evidence regarding primary and secondary schooling^{5,6} which indicates that education is far less effective in this respect than is usually assumed. Little seems to be known about higher education in this context, so a study was carried out at the University of Ghana.

Two hundred and eighty male students were given tests and questionnaires, including ten questions dealing with supernatural beliefs which are widespread among the population at large. On the basis of the responses a scale was constructed ranging from 0 (total unqualified disbelief) to 20 (total unqualified belief); this provides a measure of the extent to which each individual subject maintained such beliefs. Results are shown in Fig. 1.

The overall mean of 6.67 represents a substantial degree of acceptance. Because it is difficult to appreciate this from the summary data, an example concerning one of key items will be given in Table 1.

In order to find out how far such beliefs are affected by the experience of university life, the sample was divided according to the length of residence and the type of course pursued. Table 2 shows the mean belief scores for these sub-groups. Analysis of variance of the data in this table gave no significant differences for length

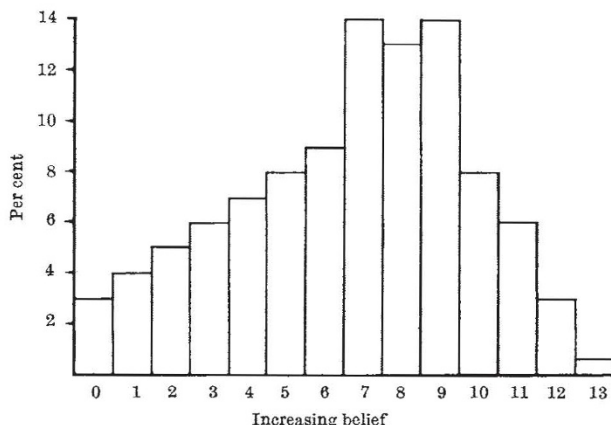


Fig. 1. Distribution of belief scores.

of residence, nor was there any interaction effect. There was, however, a significant ($P < 0.01$) difference between courses. Unexpectedly, the students taking social studies had the lowest mean score, while arts and science students were not significantly different from each other. At the same time, a simple causal interpretation in terms of the influence of course content is ruled out, because social studies students at all stages of their course had low scores and if anything the trend was for the score to rise after the first year. It therefore seems that those with fewer traditional beliefs on entry were more likely to select a course in social studies, and background factors analogous to those described by King⁷ for English sixth form pupils may have influenced such choices.

It should be added that the persistence of traditional beliefs was quite unrelated to level of intelligence as assessed by the "perceptual maze test"⁸, the value of r being 0.06.

Table 2. MEAN BELIEF SCORES BY COURSE AND YEARS OF RESIDENCE AT UNIVERSITY

	First year	Second year	Third or more years	All years
Arts	6.94	7.45	7.23	7.20
Social studies	5.00	5.81	6.09	5.80
Science	6.45	7.81	6.74	6.77
All courses	6.44	6.89	6.73	6.67

In summary there was no evidence that either university education in general or any particular type of course, including scientific training, had any discernible impact on the magico-mythical beliefs entertained by the students. If the prevalence of such beliefs is an obstacle to the growth of scientific activity in developing countries, then more direct methods of reducing them might have to be explored.

This work was supported, as part of a broader study, by a grant from the Nuffield Foundation.

GUSTAV JAHODA

Department of Psychology,
University of Strathclyde,
Glasgow.

Received July 9; revised August 6, 1968.

¹ *African Education* (University Press, Oxford, 1953).

² Caulker, S. B., in *Science and the New Nations* (edit. by Gruber, Ruth) (Andre Deutsch, London, 1963).

³ Horton, R., *Africa*, **37**, 50 (1967).

⁴ Odhiambo, T. R., *Science*, **158**, 876 (1967).

⁵ Lord, E., *J. Soc. Psychol.*, **47**, 339 (1953).

⁶ Jahoda, G., in *Studies in Religious Psychology* (edit. by Godin, A.) (Lumen Vitae, Brussels, 1961).

⁷ King, R., *Nature*, **216**, 747 (1967).

⁸ Ellithorn, A., Kerr, M. O., and Lee, D. N., *Brit. J. Psychol.*, **51**, 31 (1960).

Table 1. ANSWERS TO A QUESTION ABOUT WITCHCRAFT AS A POWER

	N	Per cent
Certainly does not exist	39	14
Probably does not exist	27	10
Probably does exist	116	41
Certainly does exist	98	35
	280	100