identified by history as having been treated for lead poisoning, had a tooth lead level of 110 p.p.m. While eleven children in the suburban group had tooth lead levels of 2 p.p.m. or less, four children had levels too low to be detected by the atomic absorption technique. No urban children showed levels of lead below 2 p.p.m. This finding may be due to differences in atmospheric lead in the city and the suburbs. The data show that in areas where lead eating by children is frequent, tooth lead levels are elevated. This finding suggests that the deciduous tooth can be used as an indicator of lead intake, and possibly that of other trace elements, in children. Studies are now under way to examine neurological and psychological function in subjects with elevated tooth lead levels.

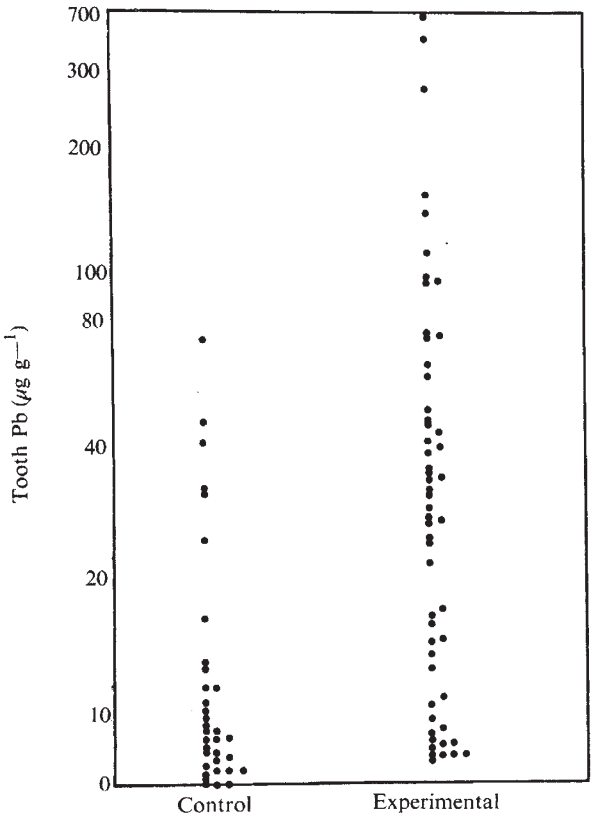

Fig. 1 Tooth lead levels of urban (experimental) and suburban (control) children.

We thank Drs Frank Castano, Richard Mumma, and Mr Bruce Dobkin for assistance. The work was carried out during the tenure of a general research support grant to Temple University School of Medicine and a Public Health Service grant to the University of Pennsylvania.

HERBERT L. NEEDLEMAN

Department of Psychiatry, Harvard Medical School

ORHAN C. TUNCAY

Center for Oral Health Research, University of Pennsylvania

IRVING M. SHAPIRO

Center for Oral Health Research, University of Pennsylvania

Received June 18; revised July 26, 1971.

1 Perlstein, M. A., and Attala, R., *Clin. Pediat.*, **5**, 292 (1966).
2 Oberle, M. W., *Science*, **165**, 991 (1966).
3 Altshuler, L. F., Halah, D. B., and Landing, B., *J. Pediat.*, **60**, 224 (1962).

Assessment of Marginal Malnutrition

Kanawati and McLaren have proposed that the ratio of mid-arm circumference to head circumference is a measure of marginal malnutrition[1]. Midarm circumference can indeed be used as a rapid and cheap indicator of severe protein–calorie malnutrition (PCM)[2,3] if measurements can be compared with standards for children of the same age. But in many areas parents do not know the precise age of their children. In such cases, arm muscles mass, which reflects body protein status, may have to be appraised in community studies by comparison with body tissues which reflect age but which are less affected by PCM. These ratios are less precise than arm circumference related to age because the normal growth rates of the indirect parameters differ from that of arm circumference. They are also affected by nutritional status to some extent.

Kanawati and McLaren report a strong correlation between arm circumference/head circumference ratio and the "index of thriving", but since the "index of thriving" also contains arm circumference and head circumference this is to be expected. They also report a good correlation between weight for age and the proposed ratio. But, given a large population and substantial differences between normal and clinical conditions, a good correlation would be obtained when there are few or no intermediate cases, precisely the group of most interest. The question is not whether a good correlation exists between population means but rather, given the variation in normal populations, does the ratio found in marginal malnutrition differ significantly from normal?

Inadvertently, they interpret a tissue test that we have used incorrectly[4,5]; we reported that the mean bulb diameters of each of the depressed weight for age groups were significantly smaller ($P < 0.01$) than those of the healthy controls and that the mean bulb diameters of each of the moderate malnutrition groups were significantly larger ($P < 0.01$) than those of clinical cases. On the basis of diameter measurements alone we could not separate the three weight for age classifications of mild to moderate PCM from each other.

The authors also maintain that epilation is traumatic and that laboratory equipment is required. In fact, children rarely show distress during the procedure. We feel that it is the most rapid tissue test for field work,the total sample time being about one minute. The only equipment needed is a pair of forceps and an envelope in which to store the samples. Unlike many biological specimens there is no need for immediate stabilization procedures and the samples do not need to be refrigerated. In the laboratory, the only equipment needed to examine specimens is a low power microscope. Hair tissue preparations afford the opportunity to screen a population at three levels in the PCM sequence: as an index of early malnutrition (reduction in normal bulb diameter), of severe PCM (increase in bulb atrophy), and of chronicity (anagen-telogen shift). (A technique manual is now in the press.)

R. B. BRADFIELD

Department of Nutrition Sciences, University of California

E. F. P. JELLIFFE
D. B. JELLIFFE

Caribbean Food and Nutrition Institute, Kingston, Jamaica

Received March 24; revised July 13, 1971.

1 Kanawati, A. A., and McLaren, D. S., *Nature*, **228**, 573 (1970).
2 Jelliffe, D. B., and Jelliffe, E. F. P., *Amer. J. Public Health*, **50**, 1355 (1960).
3 Jelliffe, E. F. P., and Jelliffe, D. B., *J. Trop. Pediatrics*, **15**, 177 (1969).
4 Bradfield, R. B., and Jelliffe, E. F. P., *Nature*, **225**, 283 (1970).
5 Bradfield, R. B., *Amer. J. Clin. Nutrit*, **24**, 405 (1971).