required or not, it is entirely safe and thoroughly effective.

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[1] Hardy, R H, *Accidents and Emergencies*, 2nd edn. London, Oxford University Press, 1978.

Dental caries and between-meal snacks

SIR,—Dr A R P Walker and Professor P E Cleaton-Jones (11 February, p 361) have commented on the fact that epidemiological studies often do not support the conventional view that dental caries is strongly promoted by the amounts of sugar and snacks that are consumed. On the other hand experiments with animals and, less conclusively, with human subjects show that dental decay is promoted by the carbohydrate fraction of the diet and that the most cariogenic of the carbohydrates is sucrose [1] We believe that the reason for this discrepancy lies in the fact that experimental studies attempt to control all factors except sugar intake, whereas epidemiological studies usually do not adequately allow for some of the other environmental causes that determine whether teeth will develop caries.

Most people accept that for sucrose to produce tooth decay it must adhere to the tooth surface for a sufficient length of time. Thus sucrose in tea, coffee, or soft drinks or in most sorts of ice-cream may produce little or no caries. On the other hand biscuits, chocolate, cakes, and sweets such as toffee could be strongly cariogenic, but the degree of damage that occurs may be affected by the extent to which the individual uses a toothbrush or has fluoride in the drinking water. In addition, people have a varying degree of resistance to dental decay, determined chiefly by genetic factors, so that it cannot be expected that even identical diets and identical practice of oral hygiene will produce identical degrees of caries. These genetic factors may account at least in part for the differences noted by Dr Walker and Professor Cleaton-Jones between their groups of white, Indian, coloured, and black children. Nevertheless, it should be possible to demonstrate some association between sugar consumption and caries by ignoring the sugar drunk in solution and by allowing for the frequency with which people brushed their teeth.

We examined the teeth of 133 Caucasian children—89 boys and 44 girls—aged 15 to 18 and independently assessed their sugar intake by means of a questionnaire devised especially for this purpose.[2] Subsequent analysis revealed no relationship between total sugar intake and the extent of dental caries as assessed by the decayed-missing-filled (DMF) index; we did, however, find a small but significant correlation between sugar intake in solid foods and the DMF index (table above). We then assessed the practice of dental hygiene in the girls by asking them whether they used a toothbrush more than twice a day (good hygiene), twice a day (moderate hygiene), or less than twice a day (poor hygiene). Those who claimed good or moderate hygiene showed no significant correlation of DMF index with sugar taken in solid foods, whereas the 12 who admitted to bad dental hygiene showed a high correlation ($r=0{\cdot}81$; $P<0{\cdot}001$). This was in line with what we had predicted: the cariogenic effect of sucrose can be reduced or eliminated if good dental hygiene is practised.

Thus the extent of caries in children is not related to the total amount of sugar taken, is slightly related to the amount taken as solid foods, and is more strongly related in those children who do not clean their teeth frequently and regularly. Similarly, we need not be surprised that Dr Walker and Professor Cleaton-Jones found no relationship with the total amount of snack foods consumed, especially since these foods included not only those containing sugar but also potato crisps and sandwiches. As has been said, "Epidemiological studies have a function to perform in identifying causes of disease, but this function is limited. . . . It cannot be expected that a strict relationship can be demonstrated between the presence of the disease and one suggested cause unless all the causes can be identified and quantified."[3]

Relation of intake of sugar in solid foods to dental caries in children aged 15-18 years

	Boys	Girls
No	89	44
Mean DMF index of high consumers*	11·8	15·9
Mean DMF index of low consumers*	9·0	12·5
Correlation coefficient (r)	0·24	0·25
P value	<0·02	<0·05

*Sugar intake above or below median value.

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[1] Salter, A J, and Grenby, T H, *Caries Research*, 1969, **3**, 200.
[2] Bett, D G G, Morland, J, and Yudkin, J, *British Medical Journal*, 1967, **3**, 153.
[3] Yudkin, J, *American Journal of Clinical Nutrition*, 1975, **28**, 1343.

Hospital laboratory computing

SIR,—Your leading article on this subject (18 February, p 387) has an accurate beginning, a factual middle, but an unpractical ending. Perhaps I may comment on your suggestions for future progress, for while it is true that there are some successful laboratory systems and that there are file-handling procedures available for several minicomputers, it does not follow from these that we can stop where we are.

On the hardware side progress in development is enormously rapid; we cannot ignore or fail to examine these developments. There are wide variations in the capabilities of system software and in the availability of high-level languages on different minicomputers. Thus the filing systems in Phoenix[1] and in *all* of its derivatives are different, and a variety of languages are being tried. If we accept your view that it was only the introduction of a manufacturer-written filing system which made Phoenix possible, then it is still necessary to demonstrate that Phoenix-like systems are possible with the variety of different filing systems actually available. This is particularly so since comparable hardware differs in price, with Modular One notably expensive.

There is another vital but experimental requirement in laboratory computing; this is the initial commitment by the designers to make and deliver systems which can be used by laboratories without specialist computer knowledge. This implies a coherent policy at least at regional level, with common equipment-purchasing and programming support. Only in this way can we avoid putting computer staff into every laboratory, where such staff can have little or no career prospects and where the laboratory will be too vulnerable when staff leave. In any one region there will be 10 to 12 laboratories which could benefit from a local minicomputer to be shared between specialties. At current prices a regional health authority could therefore be facing a bill of upwards of half a million pounds to equip them all, and it does not make sense to phase a comprehensive plan over too long a period.

At present, the Phoenix concept is being tested in a number of derivatives. These are diverging from the original along several mutually exclusive dimensions. These dimensions include hardware, language, the ability to undertake simultaneous development and production, and the initial intention to deliver the working system suitable for many departments and sites. Some information along these lines is shown in the table below.

Finally, the next important target in laboratory computing is the use of distributed networks of microcomputers accessing a single minicomputer or mainframe for their major filing requirements. Using such a network, each laboratory would be much less susceptible to temporary failure of the central computer, and I have previously shown that the network solution is inherently much cheaper.[2]

M D BUCKLEY-SHARP
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[1] Abson, J, Prall, A, and Wootton, I D P, *Annals of Clinical Biochemistry*, 1977, **14**, 307.
[2] Buckley-Sharp, M D, *Data Processing and Computers in Clinical Pathology*. Department of Research and Service in Education, Middlesex Hospital Medical School, 1973.
[3] Technical Analysis Corporation, Atlanta, Georgia

SIR,—Your leading article (18 February, p 387) asks why we continue to reinvent the wheel, with varying success. You suggest that there might be advantages in transferring successful systems from one laboratory to another.

Phoenix is already being transferred from the Hammersmith Hospital to this hospital. This project (Phoenix/Delphi) is being carried out by a multidisciplinary team from the North-western Regional Health Authority and the Lancaster District, supported and encouraged by the Department of Health and Social Security and assisted by Professor Wootton and his team.

The difficulties involved have probably been

Some characteristics of the Phoenix system and its derivatives

Site	Hardware	Language	Simultaneous production + development	Initial multi-site commitment
Hammersmith (Phoenix)	Modular One	Coral	Yes	No
N-W Thames (Achilles)	Nova 3	TAC-basic[3]	Yes	Yes
Stoke	Nova 830	Fortran	No	No
Oxford	pdp11/34	Coral	?	No
St Thomas's	Prime 300	Coral	Yes	No
UCH (Socrates)	Modular One	Coral	Yes	No
Lancaster	Argus	Coral	Yes	Yes