

Correspondence

Milk Secretion

SIR.—Professor Patton (*Nature*, 228, 97; 1970) seems to think it absurd that we should have reported that we had detected pieces of secretory cell cytoplasm in goats' milk (Wooding, Peaker and Linzell, *Nature*, 226, 762; 1970) because the quantity is so tiny that it could have no bearing on theories of cellular mechanisms involved in milk secretion. According to this view only the major component, water, is worthy of study! I think our finding is of biological significance because:

(1) It settled a controversy. Bargmann, one of the first to examine mammary tissue with the electron microscope, specifically rejected the old idea of classical histologists that some cytoplasm is shed (apocrine secretion) although he proposed that fat globules are pinched off with cell membrane around them. Patton published impressive chemical evidence purporting to support this, and theoretical calculations of London-van der Waals forces to show why the cell membrane only would be expected to be shed with the fat. These views were widely accepted, by myself as well, until, in reviewing the subject, we found four papers on mammary ultrastructure supporting apocrine secretion. These papers have not been quoted by Patton's group. We also were doubtful and to decide whether pieces of cytoplasm were undoubtedly detached from the cell we examined milk in the electron microscope and found a small proportion of fat globules had sizable pieces of cytoplasm attached to them ("signets"), confirming Kurosumi's view that mammary secretion is partly apocrine. However, most unexpectedly we found a very few much larger pieces of cytoplasm, which were packed with active organelles, but lacked a nucleus. These could have been produced by cell decapitation as the apocrine theory predicted. I agree that the bulk of milk is unlikely to be derived from shed cytoplasm, but Professor Patton's protest reminds me of the nurse in *Midshipman Easy* (F. Marryatt, 1836) who, excusing her illegitimate baby, said, "If you please ma'am, it was a very little one".

(2) It should change attitudes. One must now be cautious in entirely discrediting the apocrine mechanism. Although the numbers are small the "signets" can hardly be dismissed as debris, as Professor Patton does. We have now found them in the milk fat of all species examined (cow, sheep, guinea-pig, rabbit and most abundantly in the wallaby), although there were interesting variations in the number of free cytoplasmic fragments, which were frequent in the goat but few in the cow, and whole secretory cells were found in the guinea-pig. The fact that wallaby milk was rich in "signets" may suggest that in more primitive mammals the apocrine mechanism was the basic one, which was later superseded during evolution by the mechanism producing the aqueous phase of milk. The mechanism involved in milk secretion is also relevant to another controversy, whether mammary glands evolved from sweat or sebaceous glands, because apocrine processes are also involved in sweat production.

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Radiation from Ball Lightning

SIR.—In a recent communication (*Nature*, 228, 545; 1970) Altschuler and his colleagues suggest that the phenomenon of ball lightning may be due to formation of the short-lived radioactive nuclides ^{15}O and ^{17}F within a localized plasma capable of yielding radioactive decay energy of the order of 10^7 J . It can readily be shown that the mean γ -ray absorbed dose-rate in a human body at 2 m distance from such a radiation source, if unshielded, would be about 175 rad s^{-1} for ^{15}O or 325 rad s^{-1} for ^{17}F . With dose-rates of this magnitude it would be surprising if there had not been reports of close observers developing signs of radiation sickness. Some may even have received lethal exposures. It is therefore suggested that medical evidence of radiation effects should be sought in persons who have witnessed ball lightning at close quarters. As an alternative approach to testing the proposed theory, however, it would seem profitable to examine, for evidence of high radiation dose, the thermoluminescent properties of any ceramic or other appropriate mineral material in the vicinity of a suspected ball lightning strike.

Yours faithfully,

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Uranium Supplies

SIR.—The figures quoted from the ENEA report on uranium resources (*Nature*, 228, 306; 1970) are much the same as those circulated by various sources in 1967.

The need for exploration and development of new reserves was also widely stressed in 1967–68. However, the last two paragraphs of your item really underline how dated is the ENEA report.

Elliot Lake suffered several years of decline in the early 60s, when two-thirds of the houses and other buildings were empty. In 1968, however, all accommodation (except for a few houses under repair) was occupied again, and additional houses were being moved from dead areas into Elliot Lake.

Denison Mines spent some \$2.9 million in 1967 on mine and mill improvements; similarly Rio Algom were reactivating old workings and developing new areas. Other operators were also preparing for additional output to meet anticipated demand.

The Canadian mining industry has been calling for years for an intelligent approach by such bodies as the USAEC and the US power authorities to the problems involved in providing a steady supply of uranium, including advance buying and long-term contracts. If the nuclear generating forecasts are accurate, there can be little doubt that there will be a shortage of uranium by 1980.

Yours faithfully,

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