matters arising

Human activity and the erosion of soils on chalk

IN their letter[1] relating to beech bark disease and lynchets, Lonsdale *et al.* refer to the probability of an acid non-calcareous soil overlying the chalk on their site. This type of soil seems to be very widespread in the west Sussex-east Hampshire region, more so than the chalky soil which is generally supposed to be the characteristic one, and is by no means always underlain by Pleistocene or earlier deposits. In fact, on shallow slopes, a highly calcareous soil seems to occur only where human disturbance has facilitated erosion; this usually means in ploughed fields or on the negative aspects of lynchets such as Lonsdale *et al.* have observed. Steep slopes, including the chalk scarp, are, on the other hand, often calcareous. The wood in which Lonsdale *et al.* are working does indeed seem to contain the non-calcareous soil, although not in its most acid form; samples taken from it[2] in 1970, outside the lynchet area, were mostly found on analysis to have a non-calcareous, non-iron, mineral content of ~70%. They are significantly less calcareous than samples from the neighbouring ploughed fields, and this difference has been found in several such areas of old woodland cover and arable, even though the two resemble each other in topographic and other respects.

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1. Lonsdale, D., Pratt, J. E., & Aldsworth, F. G. *Nature* **277**, 414 (1979).
2. Collins, M. A. *History and Soils on the South Downs* Rogate Papers no. 1 (1978).

Aerosol anomalies preceding earthquakes

IN his article on aerosol anomalies preceding earthquakes Tributsch[1] suggests that there is emission of positive ions before an earthquake occurs and that these ions are responsible for the many reports of animal disturbance before the major event itself. We have been investigating electrical phenomena associated with stress and failure in rocks and ceramics and some of our data may be applicable to Tributsch's hypothesis.

For testing, we normally attach connections to the rock via conductive epoxy or hammered-in phonograph needles. These points are connected to one or more electrometers before the specimen is placed in compression or bending. As the load is applied we see a series of pulsed currents that we associate with piezoelectric effects. As the load is increased there is a steady state current of the order of 10^{-10} A that we associate with the stress induced migration of ions[2] or the inception of a continuous series of internal microfractures. In any case the current pattern and areas of highest current can be used to predict areas of high residual stress and the location of ultimate failure.

As the specimen approaches failure we observe the emission of both electrons and positive ions with energies up to 15 eV at current levels of 10^{-11} A. If the experiment is done in a darkened room there are flashes of light as the material begins to fail. These flashes are not observed in a helium environment but are intensified in a water vapour or pure oxygen environment; we suggest that the electrons and ions are exciting water or oxygen molecules that decay by photon emission. This electron and ion emission may well be responsible for the effects discussed by Tributsch as well as the earthquake light phenomena reported by Derr[3].

A full report on this work will be given at the Fourth International Congress on Rock Mechanics in September at Montreux.

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1. Tributsch, H. *Nature* **276**, 606 (1978).
2. Weber, N. & Goldstein, N. *J. chem. Phys.* **41**, 2898–2901 (1964).
3. Derr, J. *Bull. seismol. Soc. Am.* **63**, 2177–2187 (1973).

Historical climatology

WE should like to join Professor H. H. Lamb in clarifying a point in our article on historical climatology[1]. We stated that the correlation between Lamb's English winter severity index values for the decades between AD 1100 and 1400 and Alexandre's decadal indices for winters in Belgium was very low. We attributed this largely to the fact that Alexandre used thoroughly criticised and carefully evaluated historical data, whereas the sources available to Lamb when he pioneered the method were compilations of variable but generally poor quality.

It is necessary to add that in using the indices to reconstruct temperatures, Lamb himself expressly avoided undue emphasis on the decadal values as such, instead relying on half-century mean values derived from them[2]. These smoothed values correlate much better with Alexandre's series. It is important to emphasise Professor Lamb's caution in this respect. Indeed, it was because his caveat evidently required reiteration that we originally chose to highlight the problems inherent in the decadal values.

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1. Ingram, M. J., Underhill, D. J. & Wigley, T. M. L., *Nature* **276**, 329–34 (1978).
2. Lamb, H. H., *Palaeogeogr., Palaeoclimatol., Palaeoecol.* **1**, 13 (1965).

The impossibility of comminuting small particles by compression

KENDALL[1] has given a simple explanation of the impossibility of comminuting and crushing a brittle body by cracking when its size is smaller than a certain critical value. This size effect was demonstrated by applying the classical Griffith[2]

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