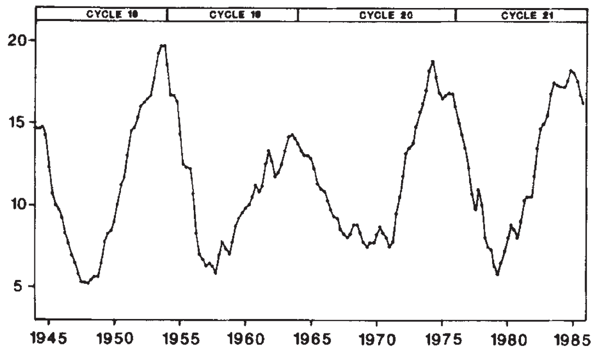

Fig. 1 Variation of annual number of AQDs (n) in solar cycles 18–21.

before the end of the cycle, as in several previous cycles.

Prediction is based on the good linear relationship between the annual mean maximum sunspot number of a cycle Ra_{max} and the increase (Δn) in n over the declining phase of the preceding cycle. A regression line based on cycles 13–20 can be found in ref. 10. Subsequent analysis for cycle 21 shows that the method led to an accurate prediction for this cycle. Assuming an uncertainty of $\pm$ 20 % in estimating Δn, the peak sunspot number of each cycle has been successfully mirrored by this parameter determined near the preceding sunspot minimum. The value of Δn available from Fig. 1 as the precursor to cycle 22 leads to the prediction that for cycle 22 $Ra_{max} \approx 174 \pm 35$.

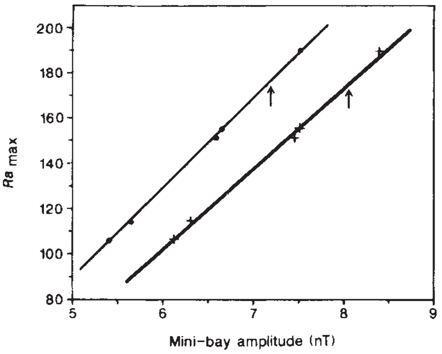

Fig. 2 Linear relation between average mini-bay amplitude near sunspot minimum and the magnitude of the following annual mean sunspot maximum. Amplitudes measured from a base level given by the average of the five values on either side of zero hour (circles) or from a base level given by the average of the four values on either side of $\pm$ 1 h (crosses). Arrows, corresponding amplitudes which anticipate cycle 22.

It has been established[11] that one of the main causes of an AQD is the imposition of a short-lived southward magnetic field, somewhat like that associated with a substorm, but of much smaller magnitude. My collaborators and I refer to the phenomenon as a 'mini-bay' because it resembles a long-duration negative bay of very small amplitude (typically 5–6 nT only).

We have previously shown[8] that the main factor in explaining the ability of AQD occurrence to predict solar-cycle amplitudes is that the average magnitude of mini-bay amplitude on AQDs near a sunspot minimum relates to the size of the next sunspot maximum. On this basis, the AQD count transcribes into an index measuring the extent of mini-bay activity, and hence the average AQD mini-bay amplitude joins the AQD count as a precursor, consistent with the dynamo theory of the production of a solar cycle.

Figure 2 shows the relation between the average mini-bay amplitude on AQDs, determined for the years around each sunspot minimum for the last five cycles, and the subsequent value of Ra_{max}. The two lines use data based on different criteria for the choice of zero for the amplitude scale, and both are remarkably linear. The vertical arrows show the mini-bay amplitudes estimated for the current solar minimum epoch (1985–87) using the same two zero criteria, and it is evident that the prediction does not depend critically on the base level selected for the measurement of mini-bay amplitude, since both give identical predictions of $Ra_{max} \approx 175 \pm 35$. It seems likely that cycle 22 could be second only to cycle 19 as the largest cycle on record.

GEOFFREY M. BROWN
Department of Physics,
University College of Wales,
Aberystwyth SY23 3BZ, UK

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Erratum

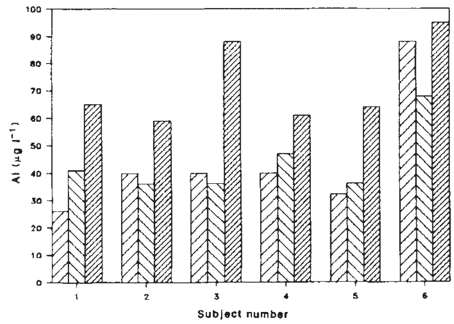
IN the letter "Evidence for global warming in the past decade" by P. D. Jones *et al.* (*Nature* **332**, 790; 1988), part of a sentence in the second paragraph was inadvertently omitted. The correct version should read "Increases of CO_2 and other radiatively active trace gases . . . are expected to raise global mean temperatures. Increases of between 1.5 and 4.5 °C are expected from equilibrium general circulation models[1] for doubling of atmospheric CO_2." □

Increased urinary excretion of Al after drinking tea

SIR—It is well known that urinary aluminium excretion increases after ingestion of aluminium-containing antacid preparations[1]. Discussion about the dietary intake of aluminium from tea[2-4] would be helped by data on the bioavailability of Al known to be present in tea leaves.

We determined the aluminium content of dry, commercially available tea leaves and found it to be in the range 555–1,009 µg Al per g dry weight. In agreement with Fairweather-Tait *et al.*[4], we find typical tea infusions (2 g tea per 150 ml tap water) contain 4.5–6.0 µg Al per ml. In contrast, typical coffee infusions contain 0.04–0.30 µg Al per ml.

To assess the bioavailability of aluminium when large quantities of tea are consumed, we monitored the urinary excretion of aluminium in six healthy male volunteers after drinking equal volumes (1.2 litres) of tea, coffee or tap water on separate days. On each day participants consumed standardized meals together with either tea, coffee or tap water (300 ml) at set times. All urine passed in the 12-hour period was collected separately and assayed for aluminium by graphite furnace atomic absorption spectroscopy.



Urinary aluminium levels of 6 male volunteers collected after consuming tap water (left-hand column of each set), coffee (middle columns) and tea (right-hand columns) over 12 hours.

The figure shows that in every case the amount of aluminium excreted over the 12-hour period increased on the day when tea was taken. These results indicate that at least some of the aluminium present in tea is absorbed and that tea consumption must be considered in any assessment of the total dietary intake of aluminium in human beings.

KLAUS R. KOCH
M.A. BRUNO POUGNET
STEPHANIE DE VILLIERS
Department of Analytical Science,
FELIX MONTEAGUDO
Department of Pharmacology,
University of Cape Town,
Rondebosch, Cape Town 7700,
South Africa

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