length and body length in male competition for mates, and that this may have led to the evolution of higher allometric ratios in pupal mating species.

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Organolead in wine

SIR — Reports on the use of the polar ice-cap archives to trace global atmospheric pollution by lead[1,2] stimulated our interest in the use of old wine vintages for a similar purpose (but on a local scale). Toxic effects of lead in wine are well known[3], but hardly any attention has hitherto been paid to organically bound lead, despite its far greater toxicity[4]. To distinguish between organolead species from automotive sources and from soil minerals added during the processing or storage of grapes, the use of species-selective and sensitive analytical techniques is essential.

We have analysed 19 vintages of a renowned French wine, Châteauneuf-du-Pape, made of grapes collected in precisely the same area for 40 years. We used a custom-designed procedure to discriminate between Pb^{2+} and particular organolead (nonpolar and ionic) species[5]. The vineyard of origin is at the junction of two heavily-used French autoroutes (A7 and A9), and thus is subject to intensive automotive pollution. Variations of the two most abundant compounds, trimethyllead and triethyllead, the direct degradation products of tetramethyllead and tetraethyllead which are used as antiknock additives in petrol, are shown in the figure.

The concentration of organolead in the wines undergoes considerable variation with vintage. The values measured are 10–100 times higher than those in drinking water[6]; at the maximum they reach levels up to 0.5 μg l^{-1}, which is relevant to health concerns. The pattern of trimethyllead variation follows the consumption of leaded gasoline in western Europe (ref. 7 and R. Fiat, personal communication). No methyllead was found in the 1950 vintage, since this compound was first introduced only in 1960 (ref. 8); apparently no natural biomethylation of inorganic lead occurs in wine.

The introduction of regulatory measures to reduce the lead level in petrol at the beginning of the 1980s is reflected by a sharp decrease in the contamination of wine. On the other hand, triethyllead is
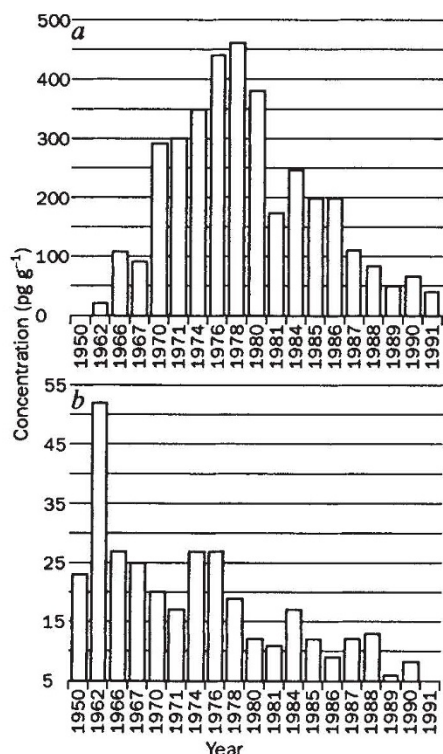
Changes in the concentration of a, trimethyllead; and b, triethyllead as a function of vintage.

already present in the oldest vintage investigated (1950). Its concentration triples in 1962, drops sharply in the mid-1960s as a consequence of a sudden increase in the fraction of methyllead used and then slowly decreases throughout the 1980s owing to the decrease of leaded petrol consumption.

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Global change detection

SIR — Considerable effort is being focused on the detection of an anthropogenic climatic change signal in short (10–15-year) satellite-derived datasets, such as lower tropospheric temperatures from the microwave sounding units (MSUs)[1] or sea-surface temperatures (SSTs) derived from the advanced very-high-resolution radiometers or the current and future along-track scanning radiometers (ATSRs).

J.R.C. and R.T.McN. reported an apparent warming trend in the MSU temperature record, after correcting for the effects of El Niño and volcanic aerosols[2]. To place this result in perspective, we need to evaluate the probability that it occurred by chance. Applying ordinary least squares (o.l.s.) regression to the corrected MSU record from January 1979 to March 1994 (183 months), we find a warming trend of 0.069 °C per decade (the discrepancy with ref. 2 is due to the inclusion of additional data and an adjustment required for the NOAA-11 instrument). If we assume that the decadal trend measured by the MSUs represents the true trend to within ±0.03 °C per decade in 98% of cases[1], o.l.s. regression indicates that this trend is significantly different from zero at the 99% level.

Significance estimates based on o.l.s. regression assume, however, that monthly global temperature anomalies, T', after the effects of El Niño, volcanoes and any trend have been removed, are not self-correlated in time. This is unlikely, as T' is a naturally integrated quantity. Suppose we can identify a timescale, δt, beyond which heating anomalies, Q', are not self-correlated. To first order, short-term fluctuations in T' may then be represented by the AR(1) model[3]:

$$T'(t + \delta t) = T'(t)\, e^{-\delta t\, \tau} + \frac{Q'(t)\delta t}{c}$$

where τ is the characteristic relaxation timescale for temperature anomalies, and c is the heat capacity of the system. Provided $\tau \neq 0$, T' will be self-correlated. Thus, although the real climate clearly involves more than one heat capacity and relaxation timescale, the AR(1) model is a natural approximation which turns out to be a surprisingly good description of the behaviour of the global mean temperature on less than 40-year timescales[4].

The standard Durbin–Watson test[5] indicates that the o.l.s. residuals from the corrected MSU record are indeed self-correlated at a very high confidence level. We therefore have both theoretical and empirical reasons to distrust o.l.s. results. We can take this self-correlation into