ultimate or intrinsic scientific value of these fossils; the data are at present inadequate to make such an evaluation. The point is that questions of taxonomic attribution, phylogenetic position and, ultimately, scientific importance must follow upon careful comparative studies and complete anatomical and metrical evaluation. Such a reversal of priorities, with its consequent and inevitable de-emphasis on necessary laboratory procedures is completely inconsistent with current scientific method and theory.

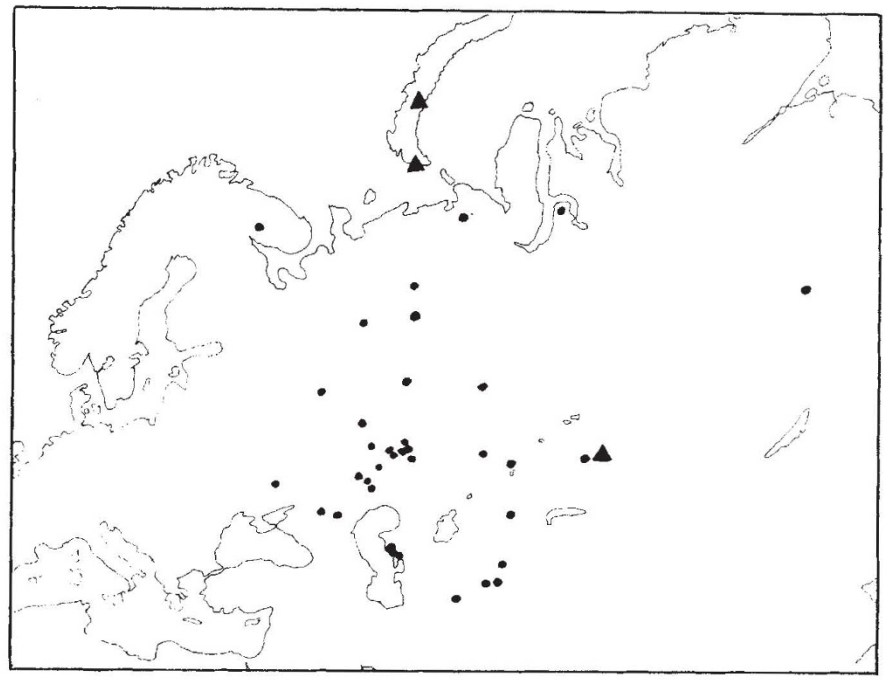
# Stagger to deceive

*by David Davies*

THE problem of detecting and identifying underground nuclear weapons tests has been around for nearly twenty years. In 1958 there were high hopes that seismic techniques would prove adequate to monitor tests down to a few kilotons without any territorial intrusion. A year later these hopes were dashed when the big-hole theory was wheeled out by the American weapons laboratories—fire an explosion in large enough a cavity and its seismic signal is almost negligible. In the early sixties hopes rose and fell as the Americans, British and Russians played, inconclusively, with numbers of on-site inspections and black boxes. In the late sixties hopes began to rise as seismic methods improved and a new technique was developed based on the relative excitation of surface and body waves. In the early seventies hopes rose to a peak when there was talk on an underground test ban but there was widespread disillusion when the nature of the ban (on explosions above 150 kilotons from a date in 1976) became clear.

Now a new problem emerges. In this week's *Nature* (page 242) Kolar and Pruvost report for the first time in the open literature on techniques that could be adapted by a country wishing to evade a strict ban.

It has been widely accepted for many years that a test fired while the Earth was ringing from a really major earthquake (of the sort that occurs only once or twice a year) would be impossible to detect. This presents a rather risky prospect to the determined evader; a more measured scenario in which the evader fired at a time of his own choosing would obviously be more desirable. Yet to do this some way had to be found to increase the excitation of surface waves relative to body waves. This could be done, argue Kolar and Pruvost, by firing a multiplicity of shots, one of which would be the device under test.



The dots are the locations of presumed 'Plowshare' explosions. The triangles are Soviet test sites.

The relative excitation of surface and body waves is not actually changed by this technique, but since the techniques for measuring the excitations are relatively crude (necessarily; signal-to-noise ratio is frequently no greater than unity) it is possible to deceive the measuring process. The dominant period of a body wave is 1 second and the rules for determining excitation specify a measuring interval of three or four seconds so the apparent magnitude from a string of explosions over many seconds is of necessity low. On the other hand surface waves have a dominant period of 20 seconds, so provided the time delay from first to last explosion is kept smaller than about 10 seconds, all surface waves add in phase. Thus the apparent enhancement.

Many other precautions will have to be taken to avoid satellite and ground monitoring, but Kolar and Pruvost believe that these can be satisfied and thus that there will be serious doubt if not complete misreading in the monitoring country.

Should such ideas for deception be surfaced, revealing a mistrust of Soviet intentions? Most certainly; they have been around in the grey area between secrecy and openness for several years, and it is now necessary to take them seriously so that in any future debate on test-ban technology there will be no surprises. It will not escape the reader that the authors work for a laboratory charged with research into nuclear weapons and therefore presumably with a certain interest in forestalling any total ban on weapons testing. But no doubt many seismologists elsewhere with a different point of view will now try to crack this new problem.

● In a related field, the figure shows the enormous extent of Soviet 'Plowshare' nuclear explosive activity. Each point represents an event reported in the open seismic listings which can reasonably be taken to be an explosion for some peaceful purpose. Yields vary from a kiloton or less to more than 100 kilotons, and the sparse literature from the Soviet Union suggests uses ranging from canal-building to oil field engineering.

# Sizing the RNA tumour virus genome

*from Benjamin Lewin*

WHEN RNA is extracted from the C-type RNA tumour viruses, the major components sediment at 60–70S and 4–5S. After denaturation by heating or by treatment with DMSO, 60–70S RNA sediments in neutral gradients at 30–40S. The apparent $10–12 \times 10^6$ daltons of the 60–70S RNA thus seem to comprise subunits of about $3 \times 10^6$ daltons; given the uncertainty inherent in this determination of molecular weights, there might be two, three, or four subunits in the 60–70S complex. A question that has remained unaltered for some time is whether the subunits in a virion all are identical (so the genome would be polyploid) or whether they carry different sequences (giving a haploid genome). The genetic

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