

Message to the ICS'01

Sir Alan H. Cottrell

*Department of Materials Science and Metallurgy, University of Cambridge, Pembroke Street,
Cambridge, CB2 3QZ, UK*

I congratulate the ICS in arranging this, the next in its brilliant series of conferences, under the chairmanship of Professor Yokobori.

Those of us who, like Professor Yokobori, have worked on the science of fracture can count ourselves exceedingly fortunate to have enjoyed a field of such infinite richness, which extends all the way from atomic physics, through large tracts of metallurgy and materials science, on to large-scale design and structural engineering, right through to issues of major public policy. And its unfathomable scientific richness is shown by its many features which seem to defy commonsense. Thus, metals are strong because they are weak, their weakness in resisting the passage of dislocations giving them the toughness to resist the otherwise far more damaging effects of cracks. Thick chunks of steel sometimes break in a most alarmingly brittle manner, yet small samples then cut from them usually prove to be completely ductile, at the same temperature. That most tough and crack resistant of all materials, used to withstand the worst of all mechanical shocks is totally brittle; it is rubber. And a stress too weak to produce any perceptible damage in any one application can nevertheless break the strongest metal if applied, on and off a sufficient number of times.

It is a great tribute to the scientists of mechanical solids that, as documented in ICS meetings, they have been able to explain these things so convincingly and bring rationality into the whole subject. But many unsolved problems still remain to challenge us and hopefully inspire yet more advances. When are we going to be able to predict the occurrence of earthquakes with any precision? This is a straight scientific challenge for the future.

I hope that you have a most successful conference and I look forward to reading about it, afterwards.