



THE shining brass of a trombone might look good, but does it have any effect on the sound produced? If the walls merely define the boundary of the vibrating column of air, one might just as well make trombones from plastic. On the other hand some musicians swear blind by their own favourite alloy. The figure shows the measured vibrations of a trombone bell played at 1,000 Hz (upper) and 630 Hz (lower). (Side-on views, left; end-on views right.) The holographs were recorded at the National Physical Laboratory, near London, as part of a study, by instrument designer Richard Smith, into the relationship between bell shape, material and sound. The contours reveal a distortion of the bell by a wavelength of laser light, about $0.5\mu\text{m}$. The tests show that thinner bells vibrate more, and certain harmonics of some of the notes produced were up to 2 decibels stronger. Material effects were only apparent in thin-walled instruments. Blindfolded professional trombonists, however, were unable to hear the difference, and also were unable to distinguish the instruments in performance if they were adjusted for weight and balance. An electroformed pure-copper bell introduced in the blindfold tests went unnoticed, but mysteriously took on wonderful properties when the blindfolds were removed, copper being a 'superior' material. (Courtesy of Richard Smith, 110 The Vale, London N14 6AY, UK.) □