Calculations were made of the lattice constants of these alloys expected on the basis of weighted averages of the binary lattice constants. For example, in the case of $AgAuZn_2$, this meant determining the lattice constants of β-AgZn (48·8 % Zn) and β-AuZn (48·8 % Zn). Most of the constants were obtained from plots of the data found in Pearson (1958); β-AuZn values were taken from a recent unpublished study in this laboratory. Table 2 gives the results and shows the differences between observed and calculated lattice constants. It can be seen that $AgAuCd_2$ and $AgAuZn_2$ contract about 0·2 % while $CuAuZn_2$ expands 0·3 %. Contraction is expected when ordering occurs; the expansion in the case of $CuAuZn_2$ seems unusual. This result is no artifact since it is observed in this work and that of Duggin & Rachinger.

Table 2. *Observed and calculated average lattice constants*

Alloy	a_{obs}	a_{calc}	Δa
$AgAuCd_2$	6·6462	6·6600	−0·014 Å
$AgAuZn_2$	6·2943	6·3097	−0·015
$CuAuZn_2$	6·1273	6·1092	+0·018
$CuAuZn_2$(DR)	6·098	6·080	+0·018

Cold working of $AgAuZn_2$ completely destroys the ternary long range order; this order is restored by long anneals at room temperature or by a brief anneal at a relatively low temperature. Cold-working of $AgAuCd_2$ and $CuAuZn_2$ reduces the ternary order and produces either a face-centered cubic or close-packed hexagonal martensitic phase as well. The martensitic phase is removed and ternary order recovered by mild anneals as above. Quenching is capable of preserving some disorder in only $AgAuZn_2$.

The most striking feature of these alloys is the ordering of Ag–Au in the alloys $AgAuCd_2$ and $AuAgZn_2$ since no long range ordering occurs in the binary AgAu. Rotwarf & Muldawer have suggested that a possible cause for this ternary Ag–Au ordering may be found in an enhancement of the Ag–Au ion core potential difference by the zinc or cadmium 'atmosphere'. The electronegativities of Zn and Cd are such that some ionicity is expected in alloys made up of IB and IIB elements and the amount of the ionicity will very likely be different in β-AgCd and β-AuCd. This could then be the mechanism for producing ternary Ag–Au ordering. A genuine understanding of the silver–gold ordering in these ternaries will probably be found in the more general approach of Harrison & Paskin (1962). In their polar model of order–disorder, they show that there is an oscillating potential with the energy of ordering dependent upon lattice constant and Fermi energy. Thus, a different Ag–Au ordering energy would hold in the case of AgAu relative to $AgAuCd_2$ or $AgAuZn_2$.

The ternary ordering in $CuAuZn_2$ is not surprising since the alloy CuAu exhibits long range order below 410°C. A possible explanation for the expansion of $CuAuZn_2$ over the expected average value may lie in the fact that the 'size' of the gold atoms prevents too great a shrinkage of the Au–Zn distance. The gold and copper 'sizes' are quite different (7 %) while the gold and silver 'sizes' are almost the same.

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Crystal data for triclinic dicyclopentadienyl-lead.

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We have prepared dicyclopentadienyl-lead, $(C_5H_5)_2Pb$, following the Fisher (1956) method, and have obtained two crystalline modifications by sublimation in vacuum.

Form 1 was yellow and form 2 was brown-yellow. Crystals of both forms were unstable in the air. We have examined by X-ray crystallography single crystals of both forms kept under nitrogen in Lindemann glass.

Form 1 proved to be orthorhombic; its structure determination has been completed (Panattoni, Bombieri & Croatto, 1966).

The habit of form 2 is prismatic. The cell-dimensions are:

$a = 8{\cdot}42 \pm 0{\cdot}02$ Å $\alpha = 94°27' \pm 30'$
$b = 10{\cdot}61 \pm 0{\cdot}03$ $\beta = 96\ 58 \pm 30$
$c = 15{\cdot}92 \pm 0{\cdot}02$ $\gamma = 90\ 7 \pm 30$

All the expected reflexions are observed; the space group is triclinic $P1$ or $P\bar{1}$. No further work on this form is contemplated.

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