tus, though Zhokhovskii used manganin manometers calibrated with a free-piston gage for most of his work. The values derived from these investigations are remarkably consistent. The Johnson and Newhall value is 7719 kg/cm^2, with large uncertainties, and 7715 kg/cm^2 in Zhokhovskii's most careful determinations, though some of his other measurements yielded 7719 kg/cm^2. The best value available at present is probably that of Dadson and Greig, whose provisional result is 7723 kg/cm^2, with rather narrower limits of error than those of previous determinations. At the time of writing, there are three independent determinations, or redeterminations, currently in progress, which should further narrow the limits of uncertainty of the 0 C point. Dadson and Greig's provisional value of 7723 kg/cm^2 will be adopted as correct for the discussion to follow. The investigations currently in progress may cause some revision of this value, but if the changes are less than 0.1 percent, or roughly Bridgman's accuracy, their effect upon the corrections discussed in the following will be negligible.

Taking the freezing pressure of mercury at 0 C as 7723 kg/cm^2, one can immediately correct Bridgman's values for several points. Thus Bridgman's value for the CO_2 point is now raised to 3370 bars, which agrees within experimental error with the value of 3372 bars determined by Michels et al. The value of the CCl_4 I-II transition can be corrected to 3310 bars at 20 C. The correction of the water point is a more difficult problem. Adams original determination of this point was some 25 kg/cm^2 higher than Bridgman's value (13). Applying corrections to Bridgman's value raises it to 9700 bars, and correcting Adam's value by Zhokhovskii's mercury values at 20 C, one obtains 9680 bars. This point deserves further investigation.

LINEARITY OF THE 12,000 kg/cm^2 SCALE

The lack of agreement of Bridgman's values with those of other investigators has given rise to the speculation that perhaps the pressure scale of Bridgman is indeed nonlinear to about 1 percent, even over the range of 12,000 kg/cm^2 (14, 15).

In order to compare different pressure scales, it is best to choose measurements of phenomena having sharp, well-defined transition points. Melting is particularly well suited, since the solid phase cannot be appreciably superheated. First-order transitions are also well suited and are often used for comparisons. The substance used for such a comparison should be chemically inert and easily purified to a high degree. Mercury is an almost ideal choice from these considerations. Other substances whose melting curves might also afford comparative checks are nitrogen and argon. Two investigators (16-17) agree with each other and disagree with Bridgman (18) while a fourth (19) agrees with Bridgman on the nitrogen curve. Argon offers a slightly better possibility for a valid comparison. The most recent determinations (20) agree fairly well with Bridgman (18) while disagreeing with earlier measurements (16-17). Apparently significant differences of purity of samples is being encountered, plus perhaps, difficulties with technique.

In order to investigate the linearity of Bridgman's scale, it is instructive to fit an equation to the melting curve of mercury, and compare the fits with those from other workers. The Simon equation (15) fits the data rather well. It may be written:

$$P = a\left((T/T_0)^c - 1 \right)$$

where T_0 is the temperature of the triple point. The value of a in the equation will depend upon the particular units used, but c is unit and should agree, provided the various pressure scales used are compatible. The least-squares fit to the various published data yield: Zhokhovskii, 1.18 $\pm$ 0.02; 1.22 $\pm$ 0.01; and 1.11 $\pm$ 0.09, the last value being over the highest pressure range. Michels' data give 1.20 $\pm$ 0.06, though only over a range of 3000 bars, while that from Bridgman's data is only 1.066 $\pm$ 0.008, which is quite clearly out of line.

A more dramatic way of demonstrating that Bridgman's scale is indeed nonlinear is to fit a curve to Bridgman's data for mercury and then plot the deviations of the various observers' values from this equation. This has been done, and the results shown in Fig.1. Here a second-degree equation is used for simplicity, and Bridgman's and Zhokhovskii's data have been forced to give the value of Dadson and Greig's provisional value for T = 0 C. The maximum contribution of the squared term is under 0.5 deg. The data of Bridgman are distributed normally about the line of no deviations, as they should be. The points of Michels and Zhokhovskii, however, lie on the same curve, which does not agree with Bridgman's. There is some scatter in Zhokhovskii's low-pressure points, and not all of Michel's data are shown, for clarity.

Since the scale has now been shown to be nonlinear, the next question is the extent of the nonlinearity. The curves shown in Fig.1 give a maximum deviation of about 0.2-0.3 percent. Since