

m observations. The best estimates for n and $1/K$ are the medians of the individual intersection co-ordinates, since the median as the non-parametric analogue of the arithmetic mean does not require accurate knowledge of the appropriate weights of the experimental deviations from the expectation value⁹.

The graphical analysis of binding data by the 'direct linear plot' is compared with the 'SCATCHARD plot': In Figure 1 a single binding class with $n_1 = 2$ and $K_1 = 6$ was assumed. Data without variance due to experimental error (Figure 1a) lie on a straight line in the 'SCATCHARD plot' and give lines with only one common intersection in the 'direct linear plot'. When the observations are subject to error, for instance in the measurement of r (Figure 1b), the points deviate from the straight line in the 'SCATCHARD plot', whereas the 'direct linear plot' yields different intersections for each pair of observation lines and the median of the individual intersection co-ordinates is adopted as an unbiased estimate for the binding parameters.

The assumption of a second class of binding sites ($n_2 = 10$, $K_2 = 0.3$) and data without experimental error (Figure 2a) leads to a curvilinear regression line in the 'SCATCHARD plot' and to a scatter of the intersections in the 'direct linear plot'. The co-ordinates of the intersection median (6.7 for n and 0.58 for $1/K$) are somewhere between the values of n_1 and n_2 and of $1/K_1$ and $1/K_2$, respectively. The individual binding parameters cannot be derived from the intersection co-ordinates, since the binding equation (1) for two classes of binding sites cannot be transformed into the general form (3).

In addition to the disadvantage that the binding parameters of more than one class of binding sites cannot be estimated from the 'direct linear plot', this procedure does not even provide information whether the experimental data may be described by a model consisting of only one or more binding classes, when data with the usual experimental variance are used (Figure 2b). The scatter of intersections in the case of one class of binding sites (Figure 1b) and in that of two classes of binding sites (Figure 2b) is similar and the two situations cannot be distinguished from each other, while the 'SCATCHARD plot' displays clearly by non-linearity the deviation from the simple case of only one binding class in a non-cooperative system.

Therefore, the 'direct linear plot' may be useful for estimation of binding parameters in the limited number of cases, where only one class of binding sites exists, but it is not suitable to decide whether the scatter of intersections is brought about by poor precision of data or by existence of more than one class of binding sites. In contrast, the 'SCATCHARD plot' differentiates between drug binding to only one and that to more than one class of binding sites and permits the estimation of binding parameters in both cases.

⁹ A. CORNISH-BOWDEN and R. EISENTHAL, *Biochem. J.* 139, 721 (1974).

IN MEMORIAM

Leopold Ruzicka

(1887–1976)

One of the co-founders and long-time editor of *Experientia*, the Nobel Prize winner for Chemistry 1939, Professor Dr. Leopold Ruzicka, died on the 26th of September in his 90th year by the Lake of Constance. Inspired by the Paracelsus Medal which he received, Ruzicka gave our journal its name 'Scientia est Experientia'. 'Assumptions in science which extend beyond the field of actual experience are deceptive', he wrote 30 years ago to the redactor in one of his incisive reviews. Leopold Ruzicka propagated, with great decisiveness and passion, a world-wide and supra-national treatment of science, and thus formed very definitely the basic concept of *Experientia*. H.M.