to the predicted value of ⅔ and hence seems to bear out the theory.

In making the plot, only the totals for the body-weight classes up to 198 lb were used because the athletes in these classes are usually trained down to the listed body weight and hence carry very little excess weight. It is interesting to note that the present world-record heavyweight total of about 1130 lb should be within the ability of a lifter of 232-lb body-weight, whereas the present record holder, Anderson, weighs about 350 lb. The existence of the linear relationship also suggests that it might be desirable to break down the present heavyweight class into at least two classes to prevent lifters who weigh over 300 lb from competing with those in, for example, the 220- to 250-lb range.

It should be emphasized that the totals plotted are in no sense "ultimates" but will continue slowly to be improved. However, the slope of the line drawn through the points plotted on a log-log basis should continue to be approximately ⅔. Also, the log-log plot can be used to determine the best weight lifter at any time, since his total will fall the farthest above the line drawn by the method of least squares through all the records. At the present time, the total for the 148-lb body class falls the farthest above the line. Hence the Soviet athlete, Kostilev, who holds the record, appears to be at present the world's best weight lifter.

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Reference

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28 May 1956

Surface Studies Using Ion-Exchange Autochromatography

The heterogeneous exchange between the ions on the surface of an ionic crystal and the ions in a solution has been widely used as the basis for a radioactive method for determining the "active" surface area of finely divided solids (for recent summaries, see Paneth, *1,* and Wahl and Bonner, *2*). Tracers isotopic with either the cation or the anion of the crystals may be used and should, on the basis of simple theory, yield the same calculated surface area. This is, indeed, the case in experiments in which labeled, saturated $PbSO_4$ solutions are shaken with $PbSO_4$ precipitates, but is not the case when saturated solutions containing $Sr^{90}S^{35}O_4$ are shaken with $SrSO_4$ precipitates (*3*). For the latter, the apparent areas, as determined using Sr^{90} ion and $S^{35}O_4^{--}$, are in the ratio of about 2/1. This difference is somewhat unexpected and seems large enough to warrant further study.

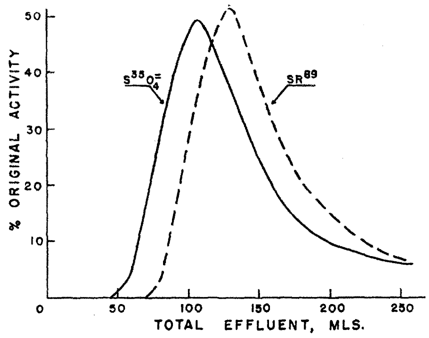

Fig. 1. Elution curve for Sr^{++} and SO_4^{--} using a $SrSO_4$ column at 25°C.

For this purpose a new method has been developed, the method of *ion-exchange autochromatography*. In a typical experiment, a Pyrex glass column of 1.2-cm inside diameter and 30 cm in length, contained 17.9 g of $SrSO_4$ precipitate in a length of 11 cm. The free volume was 8.75 ml. Fifty milliliters of $SrSO_4$ solution, saturated at 25°C and labeled with both Sr^{89} ion and $S^{35}O_4^{--}$ was added to the column. The column was then eluted with approximately 200 ml of saturated $SrSO_4$, and 50 successive 5-ml fractions of the effluent were collected. Suitable rates were obtained by applying suction to the bottom of the column. The column was jacketed and maintained at constant temperature.

The relative radioactivity of each sample was measured for both Sr^{89} ion and $S^{35}O_4^{--}$. Figure 1 is a typical elution curve obtained in this work for 25°C. It will be noted that the Sr^{++} and SO_4^{--} curves are separated and that the SO_4^{--} comes out ahead of the Sr^{++}. If a sufficiently long column were used, the two curves could be sufficiently displaced to make possible a reasonably complete separation of the Sr^{89} and $S^{35}O_4^{--}$ activities. Thus, when the chromatographic-column technique is applied, small differences in surface behavior can be accentuated (as compared with a single-batch experiment) and studied in detail. Further experiments varying the rate of flow of fluid, column length, temperature, and so on are in progress, and it is thought that the application of this sensitive new method will throw light on surface-exchange phenomena that are little understood at present.

By using two separately measurable isotopes, isotopic effects in surface exchange could also be studied and might be expected to be of considerable theoretical (and possibly practical) importance.

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25 June 1956

Influence of Invasiveness, Hormones, and Amphenone on Steroids in Adrenal Carcinoma

The study reported here (*1*) dealt with serial quantitative isolation of individual steroid hormone metabolites during the localized and metastatic phases of a functional adrenocortical carcinoma. It has been established that steroid production by the metastases is unequivocally increased by adrenocorticotrophic hormone (ACTH), probably decreased by exogenous cortisone, and markedly diminished by Amphenone [1,2-bis(*p*-aminophenyl) 2-methyl propanone-1 dihydrochloride] (*2*). This response is in contrast to the relative independence from extrinsic influence generally assumed to be characteristic of this form of malignancy.

In 1951, a 42-year-old woman was observed at Montefiore Hospital, with findings suggestive of adrenal hyperactivity, including amenorrhea, hirsutism, and hypertension. Isolation of urinary steroids (*3*) revealed (Fig. 1) normal levels of dehydroisoandrosterone (D) and androsterone (A), but etiocholanolone (E) and the three major 11-oxygenated steroids (11 = OE, OH-E, and OH-A) were greatly elevated, demonstrating considerably increased adrenocortical hormone production. At surgical exploration, the left adrenal, containing an encapsulated tumor that weighed 140 g, was removed. The tumor showed bizarre cells and increased mitotic activity in focal areas. Postoperatively (Fig. 1), steroid isolation revealed a low level of hormone production, with the individual metabolites in the usual proportion, which was consistent with the clinical evidence of transient adrenal hypofunction.

In 1955, pronounced clinical evidence of adrenal hyperactivity emerged, and biopsy of intra-abdominal metastatic lesions showed adrenocortical carcinoma. At postmortem examination later, the right adrenal gland was normal. The urinary steroids were grossly altered compared with the localized phase (Fig. 1). The 11-oxygenated steroids were elevated to approximately 10 times normal levels, and the 11-desoxysteroids had changed even more strikingly. Androsterone had increased ten fold; etiocholanolone was approximately 30 times the normal level and, most striking of all, dehydroisoandrosterone (87 mg/day) had