From our experiments, values are given for the corticotrophin content of blood from two patients with Cushing's syndrome and from normal and hypertensive subjects.

Corticotrophin was extracted from large volumes of blood (500–1,000 ml.), collected between 10 and 11 a.m. The blood was run directly into glacial acetic acid to prevent possible enzymic destruction of the hormone[3]. In order to concentrate it for bioassay the corticotrophin was extracted by adsorption on oxycellulose followed by elution with 0·1 *N* hydrochloric acid by Astwood's method[4] as modified for blood by Sydnor and Sayers[5]. The latter obtained an 85 per cent recovery of corticotrophin added to hypophysectomized rat blood. In our experiments, the eluate was stirred with moist 'De-acidite *FF*' resin (carbonate form), sufficient being added to bring the *p*H to 2·7. The solution was then freeze-dried, stored dry over phosphorus pentoxide at 4° C. and was re-dissolved in 0·9 per cent saline, acidified with a trace of 0·01 *N* hydrochloric acid, for intravenous injection into rats.

The blood concentrates were assayed by their action in depleting adrenal ascorbic acid in hydrocortisone-treated rats[6–8]. Our assays involved the use of 30 rats and compared the effect of three dose-levels of the blood concentrates with three dose-levels (0·13, 0·40, 1·2 mU.) [1 milliunit (1 mU.) = 1/1,000 I.U.] of the 2nd International Standard for corticotrophin. The highest dose of the concentrate was equivalent to at least 50 ml. of blood. The accuracy was satisfactory for a bioassay method, average limits of error calculated at the 5 per cent level being 58–165 per cent. Results are given in Table 1.

Table 1. Corticotrophin Content of Human Blood

Type of patient	Sex and age (yr.)	Volume of blood concentrated (ml.)	Potency of blood concentrate in rat assay	Limits of error expressed as percentage of the potency†	Blood corticotrophin mU.‡/100 ml. blood
Normal* I	1 *M* 30 1 *F* 34 1 *F* 37	1,080	0·77	43–131	0·71
Normal* II	1 *M* 35 1 *M* 40	1,000	0·58	43–232	0·71
Hypertensive	*M* 51	1,000	0·59	55–183	0·72
Cushing's case 1	*F* 38	750	1·31	74–135	2·16
Cushing's case 2	*M* 44	450	0·81	74–136	1·80

* Blood was pooled from 3 and 2 individuals.
† Calculated at 5 per cent level.
‡ 1 mU. = 1/1,000 I.U.

In normal subjects, Sydnor *et al.*[9] and Paris *et al.*[10] believed from their experimental work that the corticotrophin content of blood was less than 0·5 mU./100 ml. Levels of 30–200 mU./100 ml. reported by Bornstein *et al.*[11] have been criticized by Loraine[1], who suggested that these levels would have been accompanied by clinical features of adrenocortical hyperfunction.

It seems unlikely that the high values for our two Cushing's patients are caused by hypertension (see Table 1). Clearly more cases should be studied in greater detail, with values before and after treatment correlated with the pathology of the adrenal and pituitary glands.

This research programme has been supported by a grant to one of us (A. R. C.) from the Scottish Hospital Endowments Research Trust.

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RADIOBIOLOGY

A Sexual Difference in the Concentration of Iodine-131 by the Submaxillary Gland of Mice

A sexual dimorphism in the submaxillary gland of mice has been described by Lacassagne[1]. In the male the secretory tubuli are more developed than in the female. This difference has since been reported as depending on endocrine glands[2–4].

Human saliva concentrates iodine-131 (ref. 5). Since this demonstration, experiments have been carried out on the iodine-concentrating capacity of salivary glands. Logothetopoulos and Myant[6] established this fact for the submaxillary gland of mice and it was shown that the degree of concentration is related to the strain of the animals[7]. Radioautographic studies[8] led to the conclusion that the secretory tubuli are the structures of the gland which concentrate iodine.

Table 1

$\frac{\text{Total iodine-131 per mgm. of submaxillary tissue}}{\text{Total iodine-131 per mgm. of blood}}$				
Males		Females		*P*
No. of animals	Mean ± *S.E.*	No. of animals	Mean ± *S.E.*	
61	5·25 ± 0·31	40	3·89 ± 0·32	< 0·01

In the present communication we report our findings on the sexual difference in the iodine-concentrating capacity of submaxillary glands of mice.

Sixty-one male and forty female *C3H* mice were injected intraperitoneally with 5 μc. of carrier-free solution of iodine-131. 1 hr. later the submaxillary gland was removed and blood collected under ether anæsthesia. The glands and blood were weighed and radioactivity measured in a well counter. The ratio:

$$\frac{\text{total } ^{131}\text{I per mgm. submaxillary tissue}}{\text{total } ^{131}\text{I per mgm. blood}}$$

was taken as a measure of the degree to which submaxillary tissue is able to concentrate iodine.

The results are given in Table 1.

These results show that there is a sexual difference in the capacity to concentrate iodine by the submaxillary gland of mice.

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Uptake of Magnesium-28 by the Skeleton of a Sheep

In order to find the cause of hypomagnesæmia in adult ruminants, it is necessary to have a better understanding of the mechanism controlling magnesium-levels in blood and particularly the relationship between bone and blood magnesium. Bone from cows suffering from hypomagnesæmia showed no depletion of magnesium[1], and this has led to the theory that the lability of bone magnesium is much reduced in adult animals[2]. There are no figures in the literature, however, for either the amount or the rate of mobilization of skeletal magnesium in adult ruminants, but such data can be obtained from work on the uptake of radioactive magnesium by bone. Because of the short half-life of magnesium-28, only that part of the bone magnesium which is rapidly exchanged with the magnesium of plasma and other body fluids can be measured.

After six days on a constant diet of grass nuts containing 1·2 gm. of magnesium, a five-year-old Greyface wether, weighing about 65 kgm., was given 40–60 μc. carrier-free magnesium-28 as the chloride into the jugular vein. 10 hr. later, immediately after sampling the blood, the sheep was killed by exsanguination under nembutal anæsthesia, and duplicate samples of bone, free so far as possible from blood and bone marrow, were taken from various parts of the skeleton and their radioactivity determined the same day in a well-type scintillation counter.

The values obtained for the calcium–magnesium ratio and specific activity of the samples of selected bones are given in Table 1. The specific activities are expressed both as the percentage of dose × 10^2 per mgm. of total magnesium and as the percentage of the specific activity of the plasma, the latter being a measure of the proportion of bone magnesium which has exchanged with the magnesium of body fluids during the 10-hr. period.

A marked variation in specific activity from bone to bone was observed and was greater in regions of rapid bone metabolism than in compact bone. Thus

Table 1. Ratio of Calcium to Magnesium in the Selected Bones and their Uptake of Magnesium-28 at 10 hr. after Intravenous Administration

Bone	Calcium/magnesium	Specific activity (percentage of dose) (× 10^2 per mgm. magnesium)	Specific activity (as percentages of specific activity of plasma)
Femur shaft	57	0·048	0·86
Femur epiphysis	52	0·130	2·3
Rib shaft	56	0·079	1·4
Rib sternal end	46	0·129	2·3
Lumbar vertebra	46	0·099	1·7

the sternal end of the rib and the epiphysis of the femur showed the greatest exchange and the femur shaft the lowest.

The over-all percentage of bone magnesium in equilibrium with the magnesium in the body fluids was low; the values for the samples of individual bones ranged from 0·86 to 2·3 per cent. The limiting factor may be the exchange-rate itself or the amount of bone magnesium which is available for exchange. It is interesting to note that the variation in specific activity of individual bones was in the same order as the degree of magnesium depletion in the corresponding bones from magnesium-depleted calves[3].

There are no analytical figures in the literature for the magnesium content of the skeleton of either adult cattle or sheep. Estimates can be made from the calcium content of the skeleton of dairy cows[4] and sheep, and the calcium–magnesium ratio in bone. The calculated values for cows range from 90 to 160 gm. depending on the size of the animal, and for sheep from 8 to 10 gm.; the figures for sheep are based on only three analyses. If the reserves of bone magnesium are assumed to be the same as the percentage of bone magnesium which has later reached equilibrium with the magnesium of body fluids, namely, 2 per cent, the skeleton of dairy cows contains 1·8–3 gm. of magnesium which can be released to satisfy physiological needs, that is, enough for 3–5 gallons of milk. In the case of sheep, the reserves (160–200 mgm.) are equivalent to the endogenous fæcal loss for 1 day[5]. The lactating animal may be more efficient in mobilizing bone magnesium than the non-lactating animal, since the resorption of bone mineral to provide the calcium necessary for lactation will also release magnesium[6]. This effect, however, will be small because of the wide ratio of calcium to magnesium in bone and the fact that the release of calcium from bone is small, for example, less than 20 gm. a day for dairy cows[6].

My thanks are due to Dr. J. R. Greening and Mr. P. Tothill, Department of Medical Physics, University of Edinburgh, for valuable help.

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