vaccine. One out of five cattle inoculated with adjuvant 'non-phase I' vaccine survived comparable challenge. Animals with naturally acquired immunity were detected and eliminated from the experiments by a serum agglutination test using 'phase I' cells as the agglutinating suspension. Every one of twenty control unvaccinated cattle and buffaloes used in these experiments succumbed to the challenge dose of live culture. Experiments are continuing on a larger scale to test the duration of immunity and its effectiveness under field conditions. Details of the experiments mentioned above are being reported in full elsewhere.

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[1] Roberts, R. S., *J. Comp. Path.*, 57, 261 (1947).

Sodium : Potassium Ratio in the Hypophysis

It was observed in 1947 [1] that the thyroid gland of the mouse specifically accumulates intravenously injected uranin (sodium-fluoresceinate); large concentrations of sodium are known to be present in the thyroid colloid. Similarly, we observed the appearance of uranin upon intravenous injection of its 5 per cent solution in high amounts in the hypophysis of mice, particularly in the posterior lobe of this gland[2].

The affinity of elements of the 'extracellular' group in general for the pituitary is suggested by the specific accumulation of radioactive iodine in its posterior lobe[3,4]. It parallels the high molecular concentration of calcium and aluminium in the thyroid gland[5] and of electropositive organic bromine compounds in the pituitary[6].

Assuming a parallelism between the high sodium-levels and uranin accumulation, we determined by flame photometry the sodium and potassium content of the posterior and anterior lobes of the pituitary in large animals.

The organs were obtained at the slaughter house and placed in a deep-freeze box within 50–60 min. after death. We analysed glands from calf, cow, ox and steer; in the case of lambs' glands, the size of the glands available did not permit us to analyse the lobes separately. Weighed amounts of 0·8–1·5 gm. were heated to ash in a platinum crucible. The ash was taken up in a few drops of concentrated hydrochloric acid and again reduced to ash at red heat. The residue was then made up to 10 ml. with water and the appropriate dilutions were analysed in the flame photometer (apparatus of Process and Instrument Co., Brooklyn).

The moisture content, determined by drying at 105°, of the posterior lobe was, with a single exception, within the range of 71·5–75 per cent, the ash content 1·12–1·48 per cent. The corresponding figures for the anterior lobe were: moisture 76–81 per cent, ash 0·68–1·05 per cent.

The accompanying table summarizes the results, giving the concentration of the elements in milli-equivalent values/100 gm. of tissue and also the molar quotients K/Na. Except for the posterior lobes in Nos. 1 and 3, the anterior lobe in No. 5 and the whole gland in No. 9, there is a consistent prevalence of sodium over potassium.

The predominance of sodium, and possibly of the entire 'extracellular' group of elements, seems to be particularly pronounced in the steer. The lowest potassium values were shown in the anterior lobe of the calf. We believe that the prevalence of sodium is a characteristic feature of the hypophysis throughout the mammals.

Sodium and Potassium Concentrations in the Hypophysis

No.	Animal	Posterior lobe: Milli-equivalents per 100 gm. K	Posterior lobe: Milli-equivalents per 100 gm. Na	Posterior lobe: K/Na	Anterior lobe: Milli-equivalents per 100 gm. K	Anterior lobe: Milli-equivalents per 100 gm. Na	Anterior lobe: K/Na
1	Calf	5·34	3·49	1·53	1·18	1·22	0·96
2	,,	4·46	5·74	0·78	1·34	4·04	0·33
3	Cow	5·16	5·04	1·02	2·27	3·25	0·70
4	,,	5·10	5·70	0·89	3·87	4·18	0·93
5	Ox	4·55	5·05	0·90	6·80	5·10	1·35
6	Steer	5·66	7·55	0·75	4·44	5·12	0·87
7	,,	5·10	7·38	0·69	3·31	5·28	0·63
8	,,	4·94	6·07	0·81	2·78	4·82	0·58
9	Lamb (whole organ)	7·65	4·54	1·68			
10	,,	4·06	6·80	0·60			

Comparisons of potassium and sodium content of animal organs[7] show predominance of potassium in most of the internal organs and the highest values in the musculature and the erythrocytes. The lowest K/Na quotients, on the other hand, are shown by blood plasma, bone and skin. Like the thyroid the pituitary gland belongs, according to our determinations, to this latter group of organs. The prevalence of sodium over potassium is shared in most cases by the posterior and anterior lobes.

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[1] Keller, R., *Exp. Med. and Surg.*, 5, 163 (1947).
[2] Keller, R. (unpublished observations, 1951).
[3] Courrier, R., Horeau, A., Marois, M., and Morel, F., *C.R. Acad. Sci., Paris*, 232, 776 (1951).
[4] Jensen, J. M., and Clark, D. E., *J. Lab. Clin. Med.*, 38, 663 (1951).
[5] Underhill, F. P., and Peterson, F. I., *Amer. J. Physiol.*, 90, 1 (1929).
[6] Daudel, P., Apelgot, S., Buu-Hoi, N. P., Costerousse, O., and Lacassagne, A., *Bull. Soc. Chim. Biol.*, 32, 264 (1950).
[7] Shohl, A. T., "Mineral Metabolism" (Reinhold Publishing Co., New York, 1939).

Diabetogenic Action of Pancreatic Glucagon

In previous experiments it has been shown that pancreatic glucagon, produced in the *A* cells of the pancreatic islets[1], significantly increases the blood-sugar-level and the urine glucose of intact rats, forcibly fed on a high carbohydrate diet; in these conditions glucagon also augmented the diabetogenic effect of pituitary somatotropic and corticotropic hormones as well as of cortisone. Combined treatment with glucagon and cortisone was the most effective in provoking a temporary diabetic condition[2].

We have now carried out experiments on intact, normally fed rats with either cortisone or glucagon alone and with combined treatment, in order to investigate further the possible role of glucagon in the disturbances of the carbohydrate metabolism.

Fifty-four male adult rats, weighing $118 \pm 2 \cdot 3$ gm. at the start of the experiment, were fed on a synthetic diet containing 25 per cent proteins, 63 per cent