

with the quartz-mercury arc gave high coefficients, while with others the correlation was low.

That an inverse relation exists in man is evident from the results obtained by McKellips, De Young and Bloor,² who found in the blood of normal infants a low lipoid phosphorus and a high inorganic phosphorus; in the blood of adults, a high lipoid phosphorus and a low inorganic phosphorus. McCluskey³ found the same inverse relationship in tuberculous patients.

It is also of interest to note that Zucker and Gutman⁴ report that in experimental rickets the inorganic phosphorus is decreased while the organic phosphorus is practically constant.

These results show that in the rabbit there is an intimate relation between the inorganic and lipoid phosphorus of the blood, and that the maintenance of this relation is influenced in a very striking manner by ultra-violet light. The conditions found suggest a reversible reaction which is subject to the influence of light. There is the further suggestion that the mechanism concerned in the maintenance of a normal equilibrium between inorganic and lipoid phosphorus in the blood may prove to be an important factor in diseases such as rickets, as it appears that the low inorganic phosphorus in the blood is not necessarily associated with a decrease in other forms of phosphorus or is not due to a phosphorus starvation.

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The Experimental Transmission of Leukemia in Mice.

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The only report in the literature of the successful transmission of leukemia in mammals, is that of Snijders,¹ who succeeded in trans-

² McKellips, De Young, and Bloor, *J. Biol. Chem.*, 1921, **xlvi**, 53.

³ McCluskey, K. Lucille, *J. Lab. and Clin. Med.*, 1925, **x**, 466.

⁴ Zucker, T. F., and Gutman, M., *Proc. Soc. Exp. Biol. and Med.*, 1922, **xx**, 372.

¹ Snijders, E. P., *Nederl Tijdschr. v. Geneesk.*, 1926, **lxx**, 1256. Transmissible leukemia in the fowl was first described by Ellermann and Bang in 1908. For a comprehensive review of this and other experimental work on leukemia, with bibliography, see Opie, E. L., *Medicine*, 1928, **vii**, 31.

mitting the disease by the inoculation of emulsions of tissues from spontaneously affected guinea pigs into normal animals of the same species. Unsuccessful attempts to transmit leukemia in mice were made by Haaland² and Tyzzer.³

In a strain of mice designated hereafter as C58, which has been inbred by brother-sister matings since 1921, it was observed that a considerable number of those that lived more than 8 months had enlargements of their spleens and lymph nodes. Microscopic examination by Dr. Alwin M. Pappenheimer in 1926 disclosed that these enlargements were due to lymphatic leukemia.

The present cooperative investigation was undertaken early in 1928, at which time the number of matings in this strain was increased.

Of 42 mice in the 16th and 17th generations that lived more than 8 months,⁴ 29 have had splenomegaly. Of these, 19 have been diagnosed as leukemia by microscopic examination, 2 presented the gross anatomical lesions of leukemia and are awaiting microscopic diagnosis, 2 had the gross lesions of leukemia but are not available for microscopic study, and 6 are still alive. Four mice died or were killed at about 10 months of age, but were not leukemic. Nine mice are still living and at present do not have leukemic symptoms.

Tumors other than those occurring as part of the leukemic syndrome are uncommon in this strain.

Saline emulsions of spleens from 6 mice spontaneously affected with lymphatic leukemia were inoculated intraperitoneally and subcutaneously into non-leukemic mice from the same and also from other strains. The non-leukemic mice were young animals of both sexes, from 1 to 2 months old. Following inoculation there appeared, in each of the 6 experiments, animals with enlarged lymph nodes and spleens, and with masses or nodules of lymphoid tissue in the abdominal cavity, sometimes forming large tumor-like growths in the mesentery, around the kidneys, or along the genital tract. Subcutaneous nodules, enlargement of superficial lymph nodes, mediastinal growths, and fluid in the peritoneal or pleural cavities were also frequently observed.

Microscopically, these growths consist of lymphoid cells in a delicate stroma. Many cells are in mitosis and there is infiltration of surrounding structures. Infiltration of the liver, pancreas, or lung is common.

² Haaland, M., 1911, *Fourth Sc. Rept. Imperial Cancer Res. Fund.*

³ Tyzzer, E. E., *J. Med. Res.*, 1907, xvii, 137.

⁴ Slye reports that leukemic cases under 8 months of age have not appeared in her stock of mice. Slye, M., *J. Med. Res.*, 1915, xxxii, 159.

In some of the inoculated mice there was a striking increase in the number of circulating white corpuscles. The highest count recorded in the experiments was 262,000 per cm., about 3 weeks after inoculation. The increase in cells was due to an absolute and relative increase in the number of lymphocytes, many of which were immature. In some instances, small numbers of abnormal cells were observed in the blood even when the total white count was normal.

Similar changes have resulted from the inoculation of emulsions of these experimentally produced lymphoid enlargements, and the condition has been successfully transmitted through several experimental passages. One line has now reached the sixth transfer.

Of 110 mice of strain C 58 that lived more than 10 days after inoculation, 36 are still alive, and 74 have died or been killed. Of the latter, transmission was successful in 56, unsuccessful in 10. Diagnosis is not yet complete in 8.

Fourteen animals of other strains which lived more than 4 days after inoculation with the same material, have had neither lymphatic enlargements nor leukemic blood pictures. Thirteen are still alive. One died but presented no lesions resembling leukemia.

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.Gram Structure of Cocci.

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It has been shown¹ that when *B. anthracis* is exposed, in aqueous suspension, to certain dyes (Gentian Violet, Acriviolet, etc.) its Gram reaction is reversed; and that this reversal is accompanied by diminution in size and loss of weight of the bacterial bodies, together with increase in weight of the supernatant fluid. The existence of an outer Gram-positive cortex and inner Gram-negative medulla seemed thus to be proven. Gram-positive cocci could not be similarly changed by exposure to these dyes and it was, therefore, assumed that the Gram reaction of cocci might rest on a different mechanism from that of *B. anthracis*.

Experimental study running over the last 18 months, has shown, however, that exactly the same result as that produced in *B. anthracis* by exposure to certain dyes, may be produced in certain of

¹ Churchman, J. W., *J. Exp. Med.*, 1927, xlv, 1007.