The agglutinating activity of the extracts disappears rather rapidly on standing and this property in itself differentiates the active substance from serum agglutinins, an inference probable also for other reasons. The agglutination phenomenon is shown also by Rous tumors.

Recently Mueller[2] described experiments which showed that the active principle of the Rous sarcoma deteriorates quickly on account of oxidation and that it can be preserved by the addition of cysteine and protection from the air. These results suggested similar experiments with the agglutinating extract of tumors. It was found that the deterioration of the agglutinating activity of tumor extracts (mouse sarcoma and Rous tumor) is also very markedly delayed when cysteine (1:500) is added to the solution and still more when the latter is covered with a layer of liquid paraffin. Thus the action is obviously different from agglutination by serum. A distinct agglutinating action, less intense than that of the tumors, was found in extracts of mouse embryos and mouse placenta.

Saline extracts of normal organs, as stated previously, did not show the agglutination phenomenon. Experiments are being made, using cysteine, in order to investigate whether a similar, though weaker, agglutinating action can be detected also in extracts of normal organs.

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Penetration of Alkaloids Into Vacuoles of Living Cells.

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The rate of penetration of brucine (from a solution of brucine sulphate) into the vacuole of a living cell of *Nitella* is much greater with the external solution at pH 9.3 than at pH 5.5. At pH 9.3 brucine accumulates in the sap and becomes more concentrated than in the external solution. As brucine penetrates, the pH value of the sap in the vacuole in increased. (The brucine is tested with nitric acid and the pH value with indicators.)

When cells exposed to brucine sulphate solution are transferred to a buffer solution containing no brucine the rate of exit of brucine from the vacuole is greater when the buffer solution is at pH 5.5

[2] Mueller, J. H., *J. Exp. Med.*, 1928, xlviii, 343.

than at pH 9.3. The difference in the rate caused by the variation in the external pH value is less marked with exit than with penetration.

As brucine comes out of the vacuole the pH value of the sap is decreased.

The same result is obtained with penetration of brucine into the "vacuole" of an artificial system consisting of a layer of chloroform placed between the brucine sulphate solution and the sap in a U-tube.

The results indicate that brucine goes in and out of the vacuole of a living cell primarily in form of free base, but the mechanism of penetration is somewhat different from that of the exit, just as was shown previously with cresyl blue.[1] The accumulation of brucine is chiefly caused by the transformation of free base into the salt by the sap, but in some cases is due partly to the formation of a very slightly soluble compound of brucine with some constituent of the sap. The results support the multiple partition coefficient theory[2] which states that the cell controls the rate of penetration and exit of a substance as it would if it were made up of a non-aqueous layer lying between the external solution and the vacuolar sap, the rate of diffusion of a substance being partly dependent on its partition coefficient at each phase boundary.

The same results were obtained with codeine hydrochloride.

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Adrenalin and Fatiguability of Muscle of Adrenalectomized Rats.

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A series of adrenalectomized rats was given subcutaneously 1 cc. of 1:50,000 adrenalin chloride (Parke Davis & Company) daily for periods of 7 days to 14 weeks. The animals were then urethanized and a fatigue curve of a gastrocnemius muscle obtained by a modification of the Gans and Miley method.[1]

The results are shown in Table I.

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[1] Irwin, M., *J. Gen. Physiol.*, 1926-27, x, 75.

[2] Irwin, M., PROC. SOC. EXP. BIOL. AND MED., 1927, xxv, 127.

[1] Gans, H. M., and Miley, H. H., *Am. J. Physiol.*, 1927, lxxxii, 1.