ephedrine antagonize epinephrine inhibition, but low concentrations as well (1:100,000-1:25,000), and often to a marked degree. Segments of uterus of the rabbit and of the pregnant cat, treated with ergot alkaloids, to produce an inhibitory response to epinephrine, exhibited the antagonism as completely as did the organs whose normal response to epinephrine is one of inhibition or relaxation. The "depressant" action of epinephrine (1:50,000,000-1:1,000,000) on all these organs was opposed by ephedrine, whether applied to the tissues before, or a few seconds after, the application of epinephrine.

"Depression" of segments of rabbit duodenum by a mixture of epinephrine and ephedrine occurred, although the same concentrations applied separately and in sequence, exhibited the usual antagonism. This indicates that there is no chemical action between the 2 drugs outside the tissues. Antagonism of epinephrine "depression" by ephedrine occurred whether ephedrine itself caused contraction, relaxation or no demonstrable effect on the activity of the muscle. This fact, and the fact that low concentrations as well as high concentrations of ephedrine were effective in antagonizing epinephrine do not support the opinion of Nagel[1] that the antagonism is due to a muscle stimulating action of ephedrine. It would seem rather that it is due to some as yet ill-defined action of ephedrine on the sympathetic nerve-muscle connections.

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Action of Ergot Alkaloids on Intestine and Uterus.

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That ergot alkaloids abolish the muscle contracting action of epinephrine has been known for many years.[1] It was only recently that an effect of the alkaloids was demonstrated on the inhibitory action of epinephrine[2] and proposed as a means of bio-assay of ergot preparations[3] by European workers. More recently still, Men-

[1] Dale, H. H., *J. Physiol.*, 1906, xxxiv, 163.

[2] Planelles, *Arch. exp. Path. Pharm.*, 1924-5, cv, 38.

[3] Issekutz, B. von, and Leinzinger, M. von, *Arch. exp. Path. Pharm.*, 1928, cxxviii, 165.

dez[4] reported inability to confirm the findings of previous workers. My results will therefore be of interest, in that they confirm the reports of the European investigators that the intestinal sympathetics can be markedly depressed, if not paralyzed by ergot alkaloids.

The ordinary Magnus strip method, using Tyrode's and Locke's solutions and segments of small intestine of rabbit and cat, and of colon of rabbit, cat and guinea pig, and uterus of rabbit, was employed. Ergotamine tartrate (Sandoz)* and Adrenaline-HCl tablets (Parke-Davis) were the preparations used, the ergotamine in concentrations of 1:250,000 to 1:500,000 and epinephrine in concentrations of 1:10,000,000 to 1:750,000. In all trials upon the small intestine of the rabbit and cat, epinephrine caused relaxation or inhibition before the application of ergotamine, but following ergotamine the action of epinephrine was to a large extent or entirely abolished, as shown in the figure. However, concentrations of

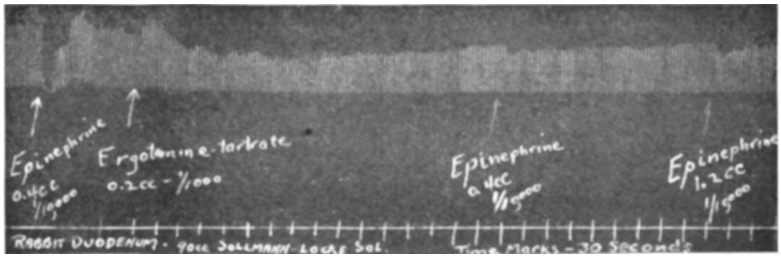

FIG. 1.
Effect of ergotamine tartrate upon the response of rabbit duodenum to epinephrine

ergotamine up to 1:20,000 failed to influence the action of epinephrine upon the colon of the rabbit, cat or guinea pig; it was also impossible to prevent epinephrine inhibition of the uterus of the rabbit by ergotamine (or by ergotoxin or extract or ergot).

The difference in response between the small intestine, and the colon and uterus is interesting, in view of the difference in innervation, activity and physiological stability of the organs of the upper and lower abdominal cavity.

[4] Mendez, R., *J. Pharm. Exp. Therap.*, 1928, xliii, 451.

* Supplied by H. A. Metz Co.