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Influence of Solanaceous (Belladonna) Alkaloids on the colorimetric test for the detection of Ergot Alkaloids

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Before undertaking an investigation of the effects of Ergot Alkaloids on bacterial metabolism, the sensitivity of several colorimetric tests for the presence of Ergot Alkaloids was determined.

The colorimetric method, " Van Urk-Smith ", was found to give the best results. (Table I).

TABLE I

Sensitivity of various colorimetric reactions for Ergot Alkaloids.

Method	*Limit of Sensitivity mg.*	*Remarks*
Keller's Iron (III) chloride reaction (1, 2, 6, 7)	0·40	
Wasicky (3)	0·030	Difficulty in reading
Van Urk-Smith (4, 15)	0·020	
Wasicky's Reagent (3)	0·010	Difficulty in reading

When using the Urk-Smith method for pure solutions of the ergot alkaloids and for pharmaceutical preparations containing, in addition, other drugs and alkaloids, it was found that impurities greatly influenced the strength of the colour developed.

The source of this interference was found to be Belladonna Alkaloids. Further investigation established a connection between the strength of the colorimetric reactions for Ergot Alkaloids and the amount of Belladonna alkaloids added. Each weighed addition of alkaloids was checked by titration, and about 250 experiments were done, the average of these being given in the figure and table. The variations in each series were not bigger than $\pm 5\%$. (For technical details see 1, 14). (Table II, Fig. I).

TABLE II

Strength of the reaction for Ergot Alkaloids in relation to the amount of Belladonna Alkaloids added.

Belladonna Alkaloids added calculated as 10^2 μ. *Hyoscyamine*	*Strength of the reaction of Ergot Alkaloids %*
0	100
1	67
3	57
5	50
10	40
20	29
50	25
100	22
250	15

The graph shows a kind of exponential curve, the approximate formula of which was found to be—

$$A = K\ (B + a)^{-}{}_{d}$$

A = Strength of the colorimetric reaction for Ergot Alkaloids (%)
B = Amount of Belladonna Alkaloids added (10^{2} μ, calculated as Hyoscyamine)
a = 18 and K = 2,389, and d = 0,272. On substituting these values, the formula becomes :

$$A = 2{,}389\ (B + 18)^{-0{\cdot}272}$$

This formula was found to be valid in trials with pure Ergot Alkaloids of the polypeptide type of the pyruvic acid group, pure Ergot Alkaloids of the acid amide type of the lysergic acid series as well as with galenicals of Ergot prepared according to the prescriptions of various pharmacopoeias. Due to unavailability of pure Alkaloids of the dimethyl pyruvic acid group and isolysergic acid series, these alkaloids could not be tested (5,14). The formula was not valid when applied to pure solutions of the tartrates of both alkaloids, and tested without extraction with the reagent "van Urk-Smith" (4, 15).

Summary

A relationship between the strength of the colorimetric reaction for Ergot Alkaloids (van Urk-Smith) and the amount of Belladonna Alkaloids present has been established.

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