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## Precipitin Reactions of Immune Sera with Simple Chemical Substances.

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It has been shown[1] that specific serological reactions can be obtained with simple chemical substances, consisting of an inhibitory effect upon the precipitation of azoproteins containing corresponding chemical groups. The explanation of these inhibition reactions was obviously that the simple substances combine with the antibodies, thereby preventing the formation of a precipitate with the antigen. Direct evidence of such a combination has been claimed by Klopstock and Selter.[2] Recently, Marrack and Smith[3] have shown that on addition of the corresponding immune serum, less of an azodye made from p-aminobenzene arsinic acid passed through a collodion membrane than when a normal serum was added. The specificity of the phenomenon was checked with another azodye (methyl red).

We have found that it is possible to obtain direct precipitation reactions with substances of simple chemical constitution.* The immune sera used were prepared by injecting azoproteins made from the para-amino derivatives of succinanilic, adipanilic, and suberanilic acids. For the reactions, azodyes were used made by diazotizing the compounds mentioned above, and coupling with resorcinol or tyrosine. The concentration of the test solutions was 1:10,000 and 1:50,000.

In their specificity the reactions, particularly the group reactions of the dyes made from p-amino-adipanilic and p-amino-suberanilic acid, correspond fully to the reactions observed with azoproteins, which will be described in a later communication. There was a further correspondence in that in both cases the reactions could be

[1] Landsteiner, K., *Biochem. Z.*, 1920, **104**, 280; Landsteiner, K., and van der Scheer, J., *J. Exp. Med.*, 1928, **48**, 315; 1929, **50**, 407; 1931, **54**, 295; Klopstock, A., and Selter, G. E., *Z. Immunitätsf.*, 1928, **55**, 118; Avery, O., and Goebel, W. F., *J. Exp. Med.*, 1929, **50**, 521.

[2] Klopstock, A., and Selter, W. F., *Z. Immunitätsf.*, 1928, **57**, 174.

[3] Marrack, J. R., and Smith, F. C., *Nature*, Dec. 26, 1931, p. 1077.

* In this connection mention may be made also of experiments in which the injection of azodyes caused anaphylactic shock, although not regularly, in guinea pigs sensitized with azoproteins (PROC. SOC. EXP. BIOL. AND MED., 1930, **27**, 811, and *J. Exp. Med.*, 1930, **52**, 347.

TABLE

To 0.2 cc. of a solution of the sodium salts of the dyes (prepared with resorcinol) in saline in a concentration of 0.01 or 0.002%, 1 or 2 capillary drops of immune serum were added. Readings were taken after 2 hours at room temperature and after standing over night in the icebox. The intensity of the reactions is indicated as follows: 0, ftr (faint trace), tr (trace), *tr* (strong trace), ±, +, +±, etc.

| Immune sera for azoproteins made from | Reading taken after | Dyes made from: p-amino succinanilic acid 0.01% | p-amino succinanilic acid 0.002% | p-amino adipanilic acid 0.01% | p-amino adipanilic acid 0.002% | p-amino suberanilic acid 0.01% | p-amino suberanilic acid 0.002% |
|---|---|---|---|---|---|---|---|
| p-amino-succinanilic acid 1 drop | 2 hours | tr | + | 0 | 0 | 0 | 0 |
| | Night in icebox | + | ++ | 0 | 0 | 0 | 0 |
| p-amino-adipanilic acid 2 drops | 2 hours | 0 | 0 | *tr* | *tr* | 0 | 0 |
| | Night in icebox | 0 | 0 | +± | + | tr | 0 |
| p-amino-suberanilic acid 1 drop | 2 hours | 0 | 0 | ± | ± | ++ | ++ |
| | Night in icebox | 0 | 0 | +± | +± | +++ | ++± |

inhibited specifically by the addition of the nitroanilic acids. Weak but definite precipitin reactions were also obtained with azodyes prepared from aminotartranilic acid and p-arsanilic acid, and the homologous immune sera.

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## Blood Losses in Experimental Intestinal Strangulations and Their Relationship to Degree of Shock and Death.*

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Most investigators and clinicians believe that death in intestinal strangulation is due to toxemia resulting from absorption of toxic products from the lumen or wall of the strangulated bowel.[1, 2] It was previously observed that the fall in blood pressure was intimately correlated with the type, length (of bowel) and duration of strangulation.[3] In this study the blood losses accompanying varying types of strangulation will be detailed.

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1 VonAlbeck, *Arch. f. klin. Chir.*, 1902, **65**, 569.

2 Murphy, Fred T., and Vincent, Beth, *Boston Med. and Surg. J.*, 1911, **165**, 684.