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A Comparative Study of Various Typhoid O Antigens.

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In view of the increasing interest bacteriologists and clinicians have taken in O agglutination in typhoid fever, and the different results[1, 2, 3, 4, 5] reported with the use of various antigens, it seems worth while to report a comparative study of 3 commonly used O antigens in human cases.

Two of the suspensions were prepared from a smooth Rawlings strain of *B. typhosus* culture, one of which was treated with alcohol according to Gardner's modification of Bien's method;[1, *] the other was cultured in 0.1% phenol broth (Braun[6]). The third suspension was a formalized suspension of Ty 901 strain (a non-motile *B. typhosus*) kindly supplied to us by Gardner. The 3 suspensions were not used throughout the study; alcohol and phenol suspensions were used in the first part of the work and alcohol and Ty 901 suspensions in the latter part of the work.

Dreyer's macroscopic agglutination technique was followed in all tests. Incubation was at 56°C. over night. The titre was considered

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[1] Gardner, A. D., *J. Hyg.*, 1929, **28**, 376, and personal communication.

[2] Felix, A., *J. Hyg.*, 1929, **28**, 418.

[3] Whitehead, N. T., *J. R. A. M. C.*, 1930, **55**, 81.

[4] Stuart, G., and Kukorian, K. S., *J. Hyg.*, 1929, **28**, 105.

[5] Pijper, A., *J. Hyg.*, 1929, **29**, 380.

* Suspend an 18-24 hour growth in a small amount of 0.5% carbolized physiological saline. Add an equal volume of absolute alcohol. Stand overnight at 37°C. Add saline to reduce the alcohol concentration to 33%. Shake well and leave standing in a cylinder for a few hours to allow foreign matter, clumps, etc., to deposit. Pour or pipette off the supernatant suspension which is used in the tests.

[6] Braun, H., *Berl. klin. Wchnschr.*, 1918, **55**, 637.

as the highest dilution in which a 2 plus agglutination occurred. All tests resulting in a positive reaction gave a typical granular agglutination. In reporting results only those cases having a titre of 1:160 or above were considered positive.

The results were tabulated into 3 main groups (1) typhoid cases; (2) cases vaccinated with T.A.B., subdivided according to the route of inoculation, subcutaneous or intravenous, since one of us[7] found that this affects the incitement of the O agglutinins, (3) all other cases which served as control. Table I gives the results obtained with 427 cases, 239 of which were tested with the alcohol and phenol suspensions and 188 of which were tested with the alcohol and Ty 901. The 3 suspensions did not act similarly in all

TABLE I.
Specificity of Various O Antigens.

	Typhoid Cases			Vaccinated Cases						Control Cases			Total Cases
				Subcutaneous route			Intravenous route						
Antigen	Total	Pos.	%	Total	Pos.	%	Total	Pos.	%	Total	Pos.	%	
Alcohol	33	17	52	13	1	8	6	2	33	136	2	1	188
Ty 901		21	63		0	0		5	83		0	0	
Alcohol	24	18	75	69	1	1	6	4	67	140	3	2	239
Phenol		21	87		5	7		5	83		5	4	

cases. The Ty 901 suspension was the most specific, as it reacted positively only in cases of typhoid infection and those intravenously inoculated. The alcohol treated suspension gave a lower percentage of positive reactions in typhoid cases than either the Ty 901 or phenol. It was not as specific as Ty 901 as a few of the non-typhoid cases reacted positively with it, but was more specific than the phenol suspension which gave a higher positive percentage among the non-typhoid cases. The phenol suspension although the most sensitive as regards the disease itself, had the disadvantage of being least specific. These results may be an explanation of the conflicting reports in the literature as to the presence of O agglutinins in patients who have had previous subcutaneous inoculations with the T.A.B. vaccine, and it, therefore, seems best to use the Ty 901 antigen as a standard O suspension in the diagnosis of typhoid fever.

[7] Zia, S. H., PROC. SOC. EXP. BIOL. AND MED., 1931, **29**, 253.