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Active Bacterial Anaphylaxis in Relation to Antibody Production.

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The conception of anaphylaxis as an antibody-antigen reaction is generally admitted but the existence of a special anaphylactic antibody has never been conclusively demonstrated. The experiment of Doerr and Russ¹ indicated that a very definite quantitative relationship between precipitin content of the blood and its sensitizing power existed. The hypothesis of the essential identity of anaphylactic antibody and precipitin remained unchallenged until further light was thrown upon the subject by subsequent investigations. Manwaring and others² have shown that in dogs the sensitizing potency of the serum is probably different from its immune power. Spain and Grove³ have also found that precipitin and anaphylactic reactions in rat might possibly represent 2 different immunological phenomena. Our previous experiment⁴ on active sensitization of guinea pigs with certain strains of the yeast-like fungi has also resulted in a finding indicating that the sensitizing power of closely related species of these organisms is distinctly different.

It seems of interest to determine whether a correlation between sensitizing and antigenic properties of different moniliae could be found. For the present experiment, *Monilia pinoyi* and *Monilia psilosis* have been selected. The biological difference between these 2 species consists mainly in the fact that the former fungus exhibits a considerably higher sensitizing power than the latter. Specific polysaccharids were prepared from each monilia strain, using a similar method. The serological tests performed with each polysaccharid showed that their specific activities in precipitin and complement fixation reactions when set up against homologous rabbit antiserum gave similar readings. In cross precipitin reactions both polysaccharids also showed identical titres.

Active sensitization of guinea pigs was performed through the use

¹ Doerr, R., and Russ, V. K., *Z. f. Immunitätsforsch.*, 1909, **3**, 181.

² Manwaring, W. H., Shumaker, P. W., Wright, P. W., Reeves, D. L., and Moy, H. B., *J. Immunol.*, 1927, **13**, 59.

³ Spain, W. C., and Grove, E. F., *J. Immunol.*, 1925, **10**, 433.

⁴ Kurotchkin, T. J., and Lim, C. E., *Proc. Soc. Exp. Biol. and Med.*, 1930, **28**, 223.

of 48 hour Sabouraud agar cultures suspended in normal saline to an equal density and killed by exposure to 75°C. for 45 minutes. A series of young and approximately equal weight guinea pigs was divided into 4 groups, each receiving 1 to 4 doses respectively, each dose consisting of 1 cc. of the respective monilia suspension, administered intraperitoneally at 3-day intervals. Two weeks after the last injection each animal was bled through heart puncture, following which it received the intravenous injection of a dose of the homologous polysaccharid dissolved in 1 cc. of saline. The blood collected was then tested for precipitin and complement fixing antibodies against various dilutions of the polysaccharid. The anaphy-

TABLE I. Antibody Content and Active Anaphylaxis of Guinea Pigs Sensitized with									
Doses of Monilia Injected	Precipitin Titres	Complement Fixation Titres	Intravenous dose of Specific Car- bohydrate in mg.	Monilia pinoyi		Monilia psilosis		Positive	Negative
				Anaphylactic Response	Anaphylactic Response	Anaphylactic Response	Anaphylactic Response		
1	—	—	4	—	2	—	2	—	2
			2	4	1	—	2	—	2
			1	1	4	—	3	—	3
2	—	—	2	2	—	—	1	—	1
			1.5	2	1	—	3	—	3
			1	5	—	—	3	—	3
			0.5	—	2	—	1	—	1
3	1:100- 1:10,000	1:250	2	2	—	2	—	2	—
			1.5	2	—	3	—	2	—
			1	4	1	3	—	2	—
			0.5	—	2	—	2	—	2
4	1:500- 1:10,000	1:250	4	—	2	—	—	—	—
			2	3	—	3	—	2	—
			1	3	—	2	—	—	—
			0.5	—	2	—	—	—	2

lactic response of each animal and the antibody content of its blood were recorded.

Results. As seen from Table I, the sensitization of guinea pigs with dead cultures of the *Monilia pinoyi* showed that irrespective of the number of the monilia injections, positive anaphylactic response has been secured in each group of animals. Fatal shock was generally produced in those animals which received 1-2 mg. injection of the polysaccharid. The determination of the precipitin and complement fixing antibodies in the blood of animals sensitized with the *Monilia pinoyi* showed that after 2 intraperitoneal injections of the fungous culture, no demonstrable antibodies were present. Positive reaction both in precipitin and complement fixation test occurred only in the blood of those animals which received at least 3 monilia injections. Positive precipitin reaction was observed with dilutions of the specific polysaccharid ranging from 1:100 to 1:10,000. On the other hand, the complement fixation test gave a considerably lower titre, being positive only with dilutions not exceeding 1:250 of the polysaccharid.

Sensitization of guinea pigs with the culture of the *Monilia psilosis* and subsequent determination of the antibody content in the blood of these animals gave results precisely similar to that found in animals sensitized with the *Monilia pinoyi*.

The anaphylactic response of animals sensitized with the *Monilia psilosis* was, however, quite different from that obtained from *Monilia pinoyi*. Animals receiving one or 2 injections of the monilia suspensions and showing no antibodies in their blood, responded to the injection of the polysaccharid negatively. Positive anaphylactic shock occurred in those animals which received more than 2 injections of the monilia culture and showed demonstrable antibodies in their blood.

Conclusion. In an attempt to determine the relationship between anaphylactic response and antibody content in guinea pigs actively sensitized with different strains of yeast-like fungi, it was found that in case of *Monilia pinoyi* sensitization appeared before the precipitin or complement fixing antibodies could be demonstrated. A similar experiment with the *Monilia psilosis* showed that anaphylactic response was produced in guinea pigs only in the presence of demonstrable precipitin. The experiment indicates also that, so far as guinea pigs are concerned, the reaction of precipitation is considerably more sensitive than that of complement-fixation. The findings presented here may suggest that in certain species of yeast-like fungi, the highly developed sensitizing power constitutes the differential biological characteristic of the fungus.