

Anaphylaxis With Water Soluble Specific Substance from Yeast-Like Fungi.

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Most fungi including yeast-like forms such as *Monilia*, are known to possess slight antigenic power. On the other hand, the clinical symptoms manifested in certain fungous infections suggest that hypersensitivity may play a rôle in such infections. It would, therefore, seem reasonable to assume that the antigenic and sensitizing properties of the fungi may represent 2 different biological faculties not necessarily associated with each other. The present experiment has been conducted to find some evidence in support of this view.

The fungi used were *Monilia psilosis*, *Monilia pinoyi* and *Saccharomyces*. Water soluble specific substances of sufficient activity in precipitation and passive anaphylaxis tests and free from antigenic power were prepared from each strain of organisms using the alkaline method.¹ For active sensitization of guinea pigs heat-killed cultures of the fungi were used. All 3 organisms were grown upon Sabouraud glucose agar for 48 hours, both *monilia* being kept at 37°C. and *Saccharomyces* at room temperature. The growth was then washed off with normal saline, 10 cc. of which was used for each agar slant, and heated to 75°C. for 30 minutes before use for injections. Each dose was equal to 1/10 of an agar slant suspended in 1 cc. of saline and injected intraperitoneally.

In order to determine the number of injections necessary for effective sensitization of guinea pigs, a series of these animals, 4-5 in number, received one, 2 or 3 injections respectively of the heat killed fungus cultures. At the end of 2 weeks all animals were tested for hypersensitivity by giving them intravenous injections of the homologous specific substance from 0.5 to 4 mg. dissolved in one cc. of normal saline.

It was found that both *monilia* cultures produced active sensitization of guinea pigs as evidenced by the typical anaphylactic shock resulting from injection of the specific substance. In those instances in which the shock ended fatally a marked distension of the lung occurred. As shown in Table I the sensitizing capacity of both *monilia* was somewhat different. Successful sensitization with the

¹ Tomesik, J., *PROC. SOC. EXP. BIOL. AND MED.*, 1927, **24**, 810.

TABLE I.
Active Sensitization of Guinea Pigs with Yeast-like Fungi.

Series	Sensitized with	Doses of fungus used	Homologous water soluble specific substance mgm.	Symptoms	Result
1	<i>Monilia pinoyi</i>	1	4 2 1	No symptoms Severe shock No symptoms	Survived " "
2	"	2	2 1 0.5	Severe shock " No symptoms	Dead in 2-4 min. " Survived
3	"	3	2 1 0.5	Severe shock " No symptoms	Dead in 2-4 min. " Survived
4	<i>Monilia psilosis</i>	1	4 2 1.5	" " " " " "	" " "
5	"	2	4 2 1	" " " " " "	" " "
6	"	3	2 2 2	Slight shock Severe shock Moderate shock	" " "

cultures of *Monilia psilosis* was attained only after the administration of at least 3 intraperitoneal injections, whereas a single injection of the *Monilia pinoyi* culture was sufficient to produce sensitization. In this latter case, the shock developed only when 1 or 2 mgm. of the substance were given. It will be noted that the development of the shock was largely dependent upon the amount of the substance given, and this suggests the existence of a certain optimal relationship between the degree of sensitization and anaphylactizing substance.

The attempt to sensitize guinea pigs with heat-killed cultures of the *Saccharomyces* gave completely negative results. Several series of the animals were injected with the cultures of this fungus, the doses ranging from one to 5. Subsequent injection of these animals with the water soluble substance derived from *Saccharomyces* produced no effect whatsoever. This indicates clearly that the particular strain of *Saccharomyces* used in our work has no sensitizing power in active anaphylaxis.

The striking difference in sensitizing capacity between *Monilia* and *Saccharomyces* on the one hand, and that between the *monilias* themselves suggests that this property may in some way be con-

nected with the morphological structures of the organisms studied here. *Monilia* is known to be differentiated from true yeast by the inability of the former fungus to produce asci and by its tendency to grow in a filamentous form, especially when cultivated in liquid media. With the purpose of elucidating this point the following experiment was performed. *Monilia psilosis*, the sensitizing power of which is moderate, as indicated in the previous experiment, was grown in glucose broth for 5 days. During this time the fungus produced abundant mycelial growth. This was centrifuged, washed, suspended in saline and heated. A control suspension of the same organism was prepared using 48-hour agar culture which contained mainly budding cells. The density of both suspensions was then adjusted to an approximately even degree and a series of guinea pigs were sensitized with both suspensions of the monilias respectively. These animals were tested 14 days later for hypersensitivity in a similar manner. It was found that while the suspension prepared from agar growth failed to produce sensitization after 2 injections, a single injection of broth culture was sufficient for this purpose, as shown in Table II.

TABLE II.
Sensitizing Power of Mycelial and Budding Cell Growths of Monilia Psilosis.

Series	Sensitized with <i>Monilia psilosis</i>	Water soluble specific substance mgm.	Symptoms	Result
1	Agar culture 1 dose	2 1	No symptoms " "	Survived "
2	" 2 doses	2 1	" " " "	" "
3	Broth culture 1 dose	2 1	Slight shock No symptoms	" "
4	" 2 doses	2 1	Severe shock Moderate shock	Dead in 5-6 min. Survived

From the experiment it may be concluded that the sensitizing power of the mycelial growth is distinctly higher than that of the budding cell growth of the same fungus. It also explains our finding that *Monilia pinoyi* exhibited higher sensitizing capacity than *Monilia psilosis*; culturally, the former fungus differed from the latter in that its growth even upon solid medium was accompanied by rapid and rich formation of the mycelium.