LYTIC PHENOMENA IN *THERMOACTINOMYCES VULGARIS*

M. J. KUO
Western Illinois University, Macomb, Illinois

ABSTRACT. — Three types of lysis were observed with *Thermoactinomyces vulgaris* cultures grown in the solid media. Characteristics of colony lysis was described.

Lysis in bacteria are of both practical and academic interest. During studies on amylase production by *Thermoactinomyces vulgaris* strain 5, three types of lysis were noted on surface-inoculated N-Z case starch agar plates (Kuo & Hartman, 1966) incubated at 55 C. Since plates of *T. vulgaris* were used as inocula for subsequent fermentations, lysis of the hyphae and spores presented a serious problem. Similar difficulties may be encountered by other workers engaged in enumeration or use of thermophilic actinomycetes. On the other hand, strain 5 might be extremely useful for the study of lytic phenomena. For these reasons, a culture has been deposited in the collection of the Northern Utilization and Development Division, A.R.S., U.S.D.A., Peoria, Illinois as strain NRRL B-3196, and an account of the lytic phenomena observed is reported here.

In the first type of lysis, the aerial mycelia which developed on the surface of the agar lysed rapidly and uniformly over the entire plate. No aerial mycelia remained 24 hr after inoculation. Further incubation of the culture did not result in outgrowth of resistant colonies. This type of lysis was most commonly observed when an old culture was used as an inoculum, but sometimes occurred when a 48-hr culture was used instead.

The second type of lytic phenomena was marked by lysis of the aerial mycelia only at the central portion of the colony; mycelia at the exterior portions remained unaffected. One or more pinpoint areas of growth often remained at the very center of the colony, surrounded by a circular zone of lysis, which in turn was circumscribed by aerial mycelia (FIG. 1). This kind of lysis could be clearly demonstrated when colonies were discrete. Lysis usually began after incubation for two days or longer.

The third type of lysis was plaque formation on heavily inoculated plates. Small (0.1 to 0.8 mm dia.), circular isolated plaques became visible after 24 to 36 hr of incubation; the entire lawn of mycelia was never completely lysed. The size and plaque characteristics closely resembled those described by Welsch (1959) and Agre (1961).

The cause of lysis of types 1 and 2, described above, was not determined; however, the process appeared different from the auto-inhibition processes described for *T. vulgaris* by Locci (1963).

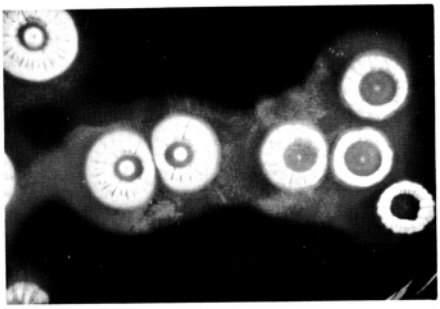

FIGURE 1. — Type 2 lysis in *Thermoactinomyces vulgaris* grown in N-Z case starch agar medium. The culture was incubated at 55 C for 48 hours. I_2-KI solution was applied onto the culture plate which showed the zone of starch hydrolysis around the *T. vulgaris* colonies. Centers of the colonies were lysed and later, mutant cells which were resistant to the actions of lytic factors developed, giving rise to minute colonies at the center of the lysed regions.

Literature Cited

Agre, N. S. 1961. Phage of the thermophilic *Micromonospora vulgaris*. Microbiology 30: 362-364.

Kuo, M. J., and P. A. Hartman. 1966. Isolation of amylolytic strains of *Thermoactinomyces vulgaris* and production of thermophilic actinomycete amylases. J. Bacteriol. 92: 723-726.

Locci, R. 1963. Fenomeni di autoinhibizione in *Thermoactinomyces vulgaris*. Giornale di Microbiol. 11: 183-189.

Welsch, M. 1959. Lysogeny in Streptomycetes. Ann. N. Y. Acad. Sci. 81: 974-993.

Manuscript received February 24, 1967.