

describes the strongly studied 'physiological' when we found that the

Germination was minimal at low temperatures whatever the pressure, but at high pressures germination occurred at temperatures well above those that supported germination at 1 atm. pressure (e.g. at 60° and 70°).

In general, those spores most dormant towards nutrient germinants at 1 atm. were

RG ATCC 6051, *B. brevis* at 37° on the surface of and 'cleaning' of spores re stored at 4°, in water, less stated otherwise in

f application of pressure were generated directly to the vessel in which a water bath for control the pressure gauge. es were suspended at a buffer (pH 8.0) unless ee ways. (1) The optical ptometer ('Biochem'; 0 m μ peak transmission amples were examined inated spores appeared res were examined from ese two methods were or so, in which case the n walled glass ampoules or 30 min. The surviving d by poured plate viable

nds were obtained from atories Ltd. (Colnbrook, y (Commercial Solvents ar grade. es was measured in the g D-amino acid oxidase ribed by Jones & Gould

ture and pressure

tion differed at different erature for germination, nts of heat-resistant sur- es' of *Bacillus coagulans*,

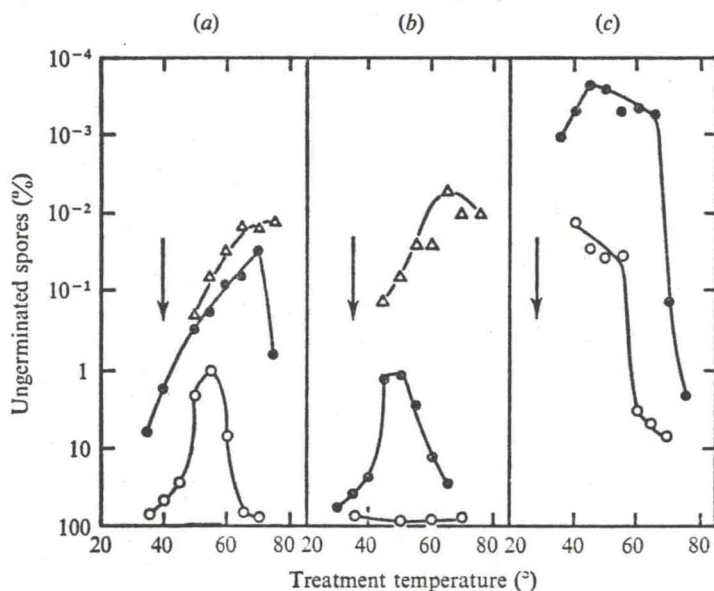


Fig. 1. Pressure germination at different temperatures. Spores of *Bacillus coagulans* (a), *B. subtilis* var. *niger* (syn. *globigii*) (b) and *B. cereus* T (c) were heat activated at 70° for 30 min., then suspended in 0.1 M-sodium phosphate (pH 8.0) and subjected to pressures of 250 atm. (○), 500 atm. (●) and 1000 atm. (△) for 30 min. periods. The germination was measured by heating samples (70°, 30 min.) to kill germinated forms and estimating the numbers of ungerminated survivors by viable counting. The vertical arrows indicate the temperature optima for germination of these spores by L-alanine at 1 atm. pressure.

Table 1. Increase in pressure germination of heat-activated spores

Organism	Pressure (atm.)	Time (min.)	Germination (%)*	
			Unactivated spores	Activated† spores
<i>Bacillus cereus</i> T	250	30	60	95
		5	—	10
	500	15	—	50
		30	75	99
		0.25	20	40
1000	30	>99	>99	
<i>B. subtilis</i> MARBURG	250	30	30	60
<i>B. brevis</i>	250	30	0	99
<i>B. coagulans</i>	1000	30	20	80
<i>B. subtilis</i> var. <i>niger</i> (syn. <i>globigii</i>)	1000	30	60	90
<i>B. pumilis</i> s3	1000	30	80	>99

* Incubation temperature was 25°. Spores were suspended in 0.1 M-sodium phosphate (pH 8.0). Germination was estimated by counting the percentage of phase-dark spores: incubated but not pressurized controls were all less than 5% phase-dark.

† Activation was at 70° for 30 min.