hypothesised mode of action of narcotic antagonists. A recent report on the naloxone antagonism of analgesia produced by brain stimulation[14] supports this possibility of the direct action of naloxone.

The practical importance of this finding is related to the use of narcotic antagonists in the therapy of narcotic addiction. The current rationale behind the use of narcotic antagonists in the treatment of heroin addicts is that treatment with these drugs will result in the extinction of heroin consumption because of the blockade of the 'high' sought from agonistic effects of illicit heroin. Our data suggest that narcotic antagonists may also be valuable in extinguishing heroin habit associated with the conditional placebo effects of heroin-seeking behaviour. These effects have been considered to be major factors in relapse to the addiction in humans[1].

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Survival of Common Bacteria in Liquid Culture under Carbon Dioxide at High Temperatures

MOLTON *et al.*[1] have reported that bacteria in liquid cultures survived exposure to normally lethal temperatures when heated in a high pressure CO_2 atmosphere. Because these results could influence planetary quarantine constraints, particularly for the planet Venus, and because no protection against thermal death by CO_2 has been reported previously, an attempt was made to verify their results.

In addition to the same strains of *Escherichia coli, Aerobacter aerogenes, Serratia marcescens,* and *Bacillus subtilis* used by Molton *et al.*[1], a thermophilic bacillus (YTG-2 S^r) and two genetically marked *E. coli* strains were tested. Initial experiments followed the methods for bacterial cultivation, CO_2 pressurisation, heating, and depressurisation described by Molton *et al.*[1], with the exception that YTG-2 S^r was grown at 65° C. Viability assays differed only in that dilutions beyond 10^{-6} were not used and duplicate rather than triplicate platings were made.

Stationary and log-phase cultures of *E. coli* B, *E. coli* K 12 S^r, *A. aerogenes,* YTG-2 S^r, *S. marcescens,* and *B. subtilis* were exposed to 160° C for periods of 3.5 to 22 h under 19.7 atm CO_2. No survivors were obtained. A less severe exposure to heat was also examined using stationary and log-phase cultures of *E. coli* B, *E. coli* B T-Pr-, and *B. subtilis.* No survivors were obtained with any of the three strains after exposure to 125° C for either 5 or 18 h under 9.5 atm CO_2 pressure.

Table 1 Effect of High Pressure CO_2 on the Survival of *E. coli* and *B. subtilis*

Organism	Pressure (atm)	Temperature ° C	Time (h)	Initial (Viable counts ml^{-1})	Final	Survival (%)
E. coli B	9.5	22	1	2.7×10^9	3.4×10^9	125.9
E. coli B	19.7	22	1	2.7×10^9	3.3×10^9	122.2
E. coli B	19.7	15	18	2.7×10^9	3.1×10^9	114.8
B. subtilis	9.5	22	1	1.1×10^8	1.2×10^7	10.9
B. subtilis	9.5	22	1	1.4×10^8	4.7×10^7	33.6
B. subtilis	19.7	22	1	1.1×10^8	3.5×10^3	0.0032
B. subtilis	19.7	22	1	1.4×10^8	1.9×10^6	1.4
B. subtilis	19.7	15	18	1.1×10^8	0	0

Microscopic observation of *E. coli* B, YTG-2 S^r, *A. aerogenes,* and *S. marcesens* subjected to a high pressure CO_2 atmosphere heated at 125° or 160° C revealed that nearly 100% lysis had occurred with heating periods as short as 6 h. Cells of *B. subtilis,* however, did not lyse. The 30 min exhaust time used by Molton *et al.* (personal communication) was extended to 1 to 1.5 h in an attempt to reduce lysis. The slower exhaust rate neither increased survival nor reduced lysis significantly.

Since no survival was obtained at high temperatures and as the physical condition of heated cells did not improve with a very slow depressurisation rate, the effect of pressurisation and depressurisation without heating was examined. Cultures of *E. coli* B did not lyse or lose viability when exposed at room temperature (22° C) for 1 h at 9.5 or 19.7 atm CO_2 (Table 1). Exposure for 18 h at 15° C under 19.7 atm CO_2 did not decrease the viability of an *E. coli* B culture either. These results suggest that the pressurisation with CO_2 and subsequent depressurisation were not sufficient to kill unheated cells of *E. coli* B. In two separate experiments with late log-phase cultures of *B. subtilis,* survival decreased to 10.9% and 33.6% after 1 h exposure to 9.5 atm CO_2 at 22° C. At 19.7 atm CO_2, a 1 h exposure of *B. subtilis* cells at 22° C resulted in 0.0032% and 1.4% survival. No survivors were obtained when *B. subtilis* cultures were exposed to 19.7 atm CO_2 for 18 h at 15° C. Thus, with *B. subtilis,* high CO_2 pressure without heating was quite lethal.

In summary, we were unable to reproduce the results reported by Molton *et al.*[1] and suggest that additional studies are needed before conclusions can be reached regarding the thermal protection of bacteria by carbon dioxide at high pressures.

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Production of Bladder Stones by Human T Mycoplasmas

SINCE the first isolation of human T mycoplasmas[1], their pathogenic role has remained controversial. These organisms, present in the urogenital tract of men and women, are unique among mycoplasmas in possessing urease[2]. They have recently been isolated from other mammals[3–5]. Bovine strains have