THE EFFECTS OF DESICCATION ON METHANOGENS UNDER AEROBIC AND ANAEROBIC CONDITIONS. C. Murphy¹ and T. A. Kral²; ¹University of Arkansas, Fayetteville, Arkansas 72701, cmmurphy@uark.edu; ²Department of Biological Sciences, University of Arkansas, Fayetteville, AR 72701, tkral@uark.edu

Introduction: Life on Mars is a largely controversial topic among scientists today. Mars, also known as the Red Planet because of iron oxide on its surface (giving the planet its red appearance), is comparable to Earth in many ways: it rotates on its axis from west to east, has seasons, and a day almost exactly the same length as Earth (1). The atmosphere of Mars contains drastically less oxygen than that of the Earth, with a comparison of 0.13% on the surface of Mars and 21% on the surface of Earth. Carbon dioxide composes most of the gas on Mars’s surface. The possibility of life on Mars’s is quite possible, as Mars almost surely possesses the three main ingredients needed in order to support life: chemical elements like carbon, hydrogen, oxygen, and nitrogen; a source of energy; and water (3). The presence of methane in the atmosphere of Mars may indicate the existence of methanogens there (2). Because methane has a short life expectancy, it would have had to stem from an organic source or an active volcano (although none are active now on the surface of Mars). Data show that water vapor and methane gas are clustered in the same regions of the atmosphere on Mars, and this may be relevant to the possibility of methanogens on Mars (4).

Methods: Four organisms (Methanothermobacter wolfeii, Methanosarcina barkeri, Methanobacterium formicicum, and Methanooccus maripaludis) were inoculated into their respective growth media. Following incubation at ideal growth temperatures for one week, each culture was centrifuged. Cell pellets were suspended in small amounts of sterile buffer. Aliquots of 10 ul of each were placed into sterile microcentrifuge tubes. These tubes were placed into desiccators, one set in the ambient atmosphere, the other set in a Coy anaerobic chamber. At regular time intervals beginning at two weeks, sample tubes were removed from the desiccators. The dried pellets were suspended in sterile media, transferred to anaerobic tubes of growth media, pressurized and incubated. Gas chromatographic measurements of methane were recorded at regular time intervals.

Results: So far, the anaerobic desiccated organisms have shown the most methane production (Figures 1, 2 and 3). M. wolfeii and M. maripaludis have shown substantially more methane production compared to M. barkeri and M. formicicum. On the other hand, the aerobic desiccated organisms have shown barely any methane production at all.

Figure 1. Methane production by Methanothermobacter wolfeii following two weeks of desiccation under anaerobic conditions.

Figure 2. Methane production by Methanooccus maripaludis following two weeks of desiccation under anaerobic conditions.
Figure 3. Methane production by *Methanothermobacter wolfeii* following four weeks of desiccation under anaerobic conditions.

**Conclusion:** The desiccated organisms kept in the anaerobic environment (particularly *M. wolfeii* and *M. maripaludis*) produce more methane than those kept in the aerobic environment.

**References:**