

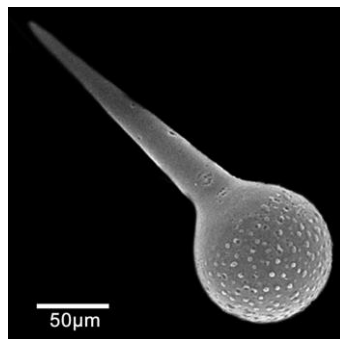
Ellipticity of Tektite-like, High SiO₂ Spherules from the Ross Sea

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High SiO₂ spherules have been found in abundance in Antarctic Ross Sea cores at subbottom depths of 10 to 800 cm. Their morphology is variable, ranging from round to ovoid. Many spherules resemble tektites, featuring aerodynamic shapes, such as dumbbells and spheroids with short tails (1). However, many Ross Sea spherules display characteristics that have not been observed in tektites, including pimpled surfaces and long tails. While these spherules are often >90% SiO₂, they are composed of alternating layers of C and SiO₂, and these layers often exfoliate along their contact surface. Additionally, many Ross Sea spherules feature long ablation tracks on their surfaces. Some researchers have proposed a cyclic model of formation for Ross Sea spherules, wherein seasonal ice melts increase salinity of the Ross Sea, leading to greater silica precipitation (2). Others have proposed a biological origin (3). These hypotheses are unsatisfying, as the aerodynamic shapes observed in Ross Sea Spherules would not be produced by simple precipitation. Moreover, neither the geochemical composition nor new SEM images are indicative of a biological origin. Ross Sea Core NBP9501-39KC has been previously dated (4). The age model for this core indicates an age of circa 10-13 ka BP. Sixty-eight *Orbulina Universa* were picked and digitally analyzed against 89 Ross Sea Spherules for ellipticity. Ross Sea Spherules are morphologically distinct (ellipticity of 0.201 ± 0.027) from *Orbulina Universa* (ellipticity of $.068 \pm .006$), precluding a biological mechanism of formation.

Figure 1: SEM image of high SiO₂ Ross Sea spherule with a long tail and pimpled surface.



1. O'Keefe, John Aloysius. 1976; 2. Perry, Pamela, 1999. Louisiana State University; 3. Weiterman, SD and Russell, MD, 1986. Antarctic Journal of the United States, Volume 21, Issues 1-5. Pp. 159; 4. Cunningham et al., 1999, The Holocene, v. 9, p. 129-139.

