

**SAS Honors Seminar 256:  
Extraterrestrial Life**

**9/6/2011**

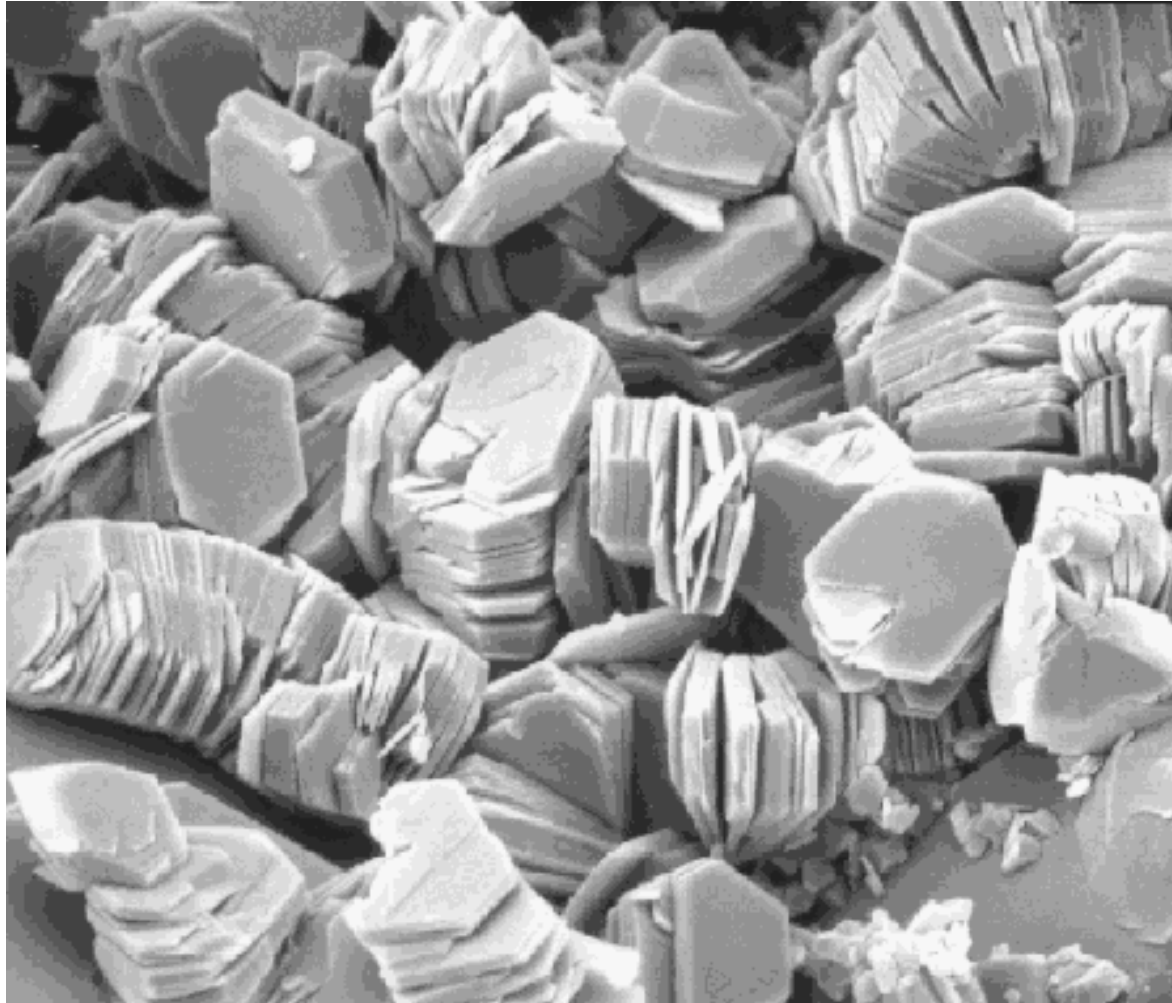
# Is clay alive?



Photo Credit: Rob Fensome, Geological Survey of Canada

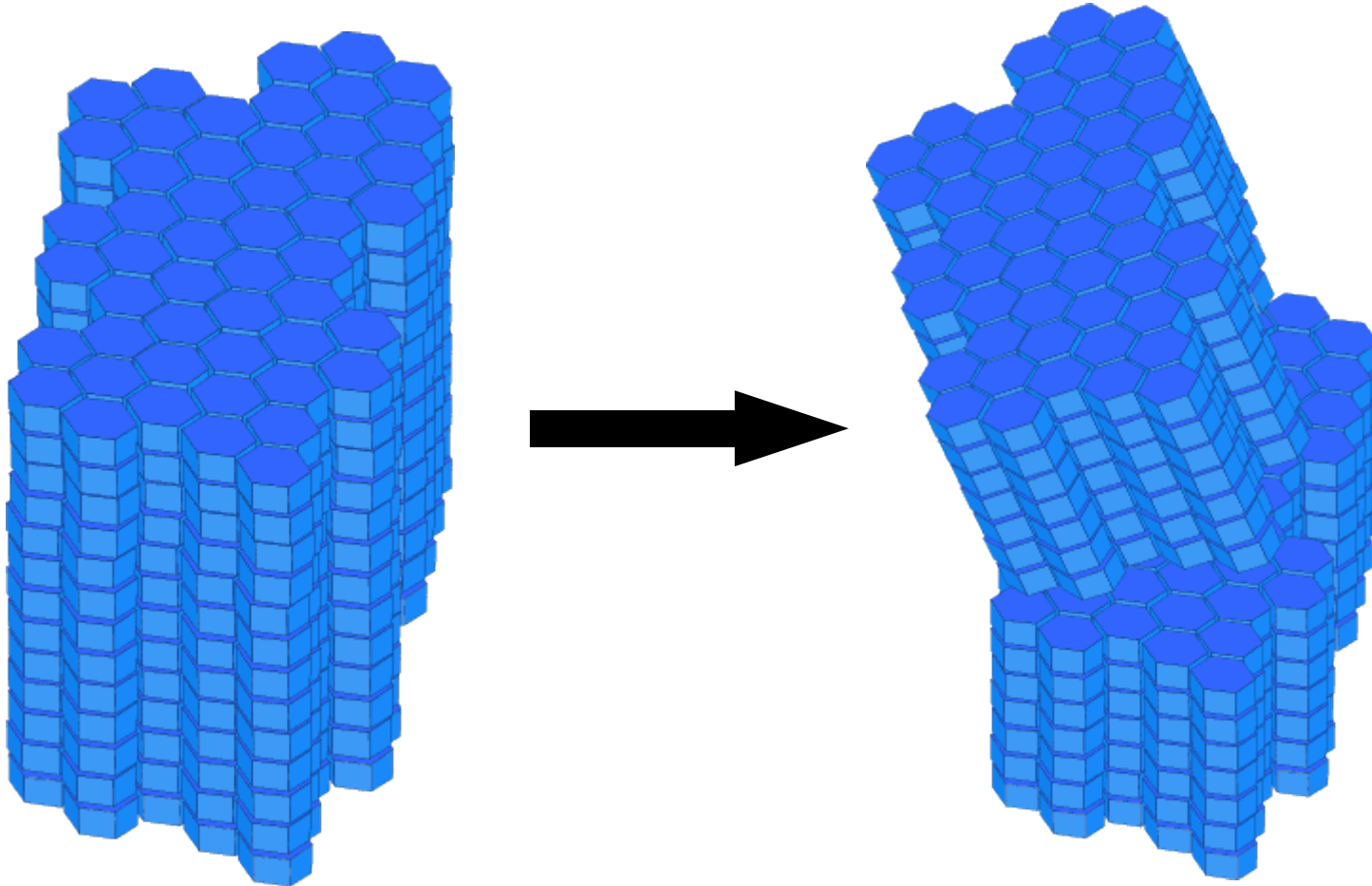
$\text{Al}_2\text{Si}_2\text{O}_5(\text{OH})_4$  (kaolinite) bed, Canada

# Under the microscope...



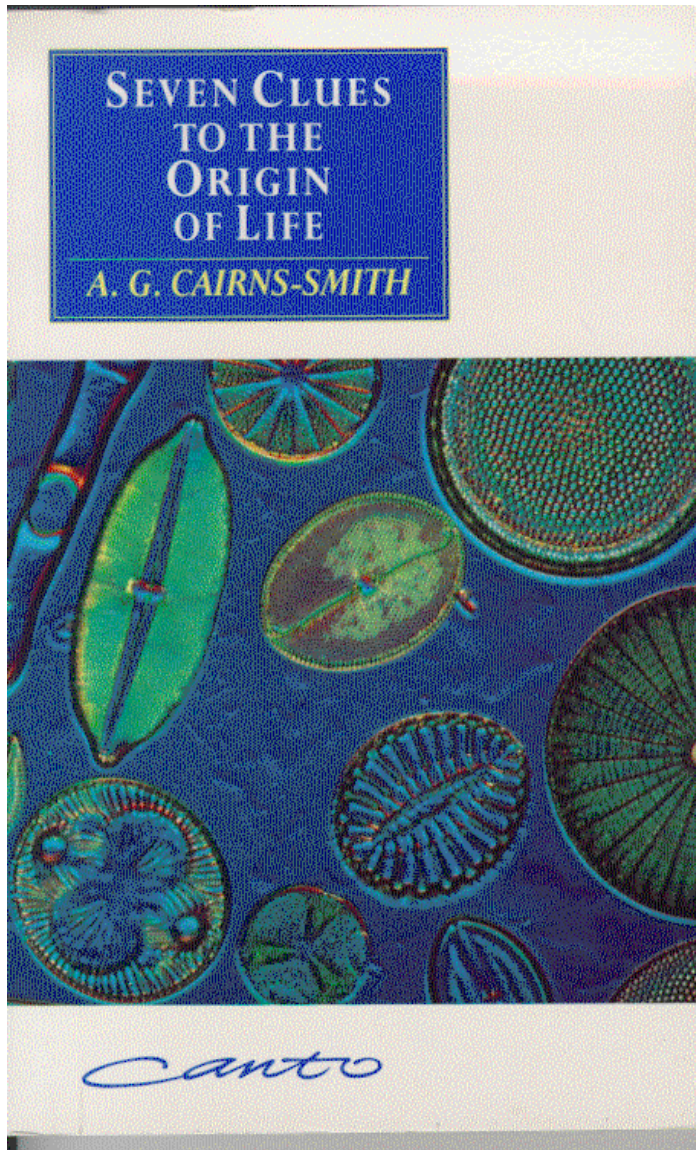
**kaolinite crystals imaged with an electron microscope**

# Growth, order, and reproduction?



schematic from <http://originoflife.net/>

# Mineral life first?



**A. G. Cairns-Smith (Scottish chemist):** posited that the first replicator was a clay mineral, and that nucleic acids “took over” as replicators after their formation was catalyzed by crystal surfaces.

**Not widely believed, but intriguing...**

# Reading for Thursday (9/8)

**None. No class!**

# Reading for Tuesday (9/13)

**Bennett & Shostak 5.3-5.4 – background on terran life**

**Benner et al. (2004) – a more technical article**

**Schulze-Makuch & Irwin (2005) – a more technical review**

**(building on Benner et al. 2004); read all **except** pages  
167-169**

**Web site features a cheat sheet for latter two articles**

**(a mixture of questions and technical terms).**

# Key question for next class

**Must all life everywhere be based on DNA and the same biochemistry (water as solvent, etc.) as on earth?**



**An analogous question: is every sheep white?**



# Response paper for Tuesday (9/13)

**The British scientist James Lovelock has proposed that Earth's living organisms, in conjunction with its physical components (atmosphere, oceans, etc.), can be considered together as the equivalent of a single “superorganism”.**

**Do you feel that such an entity (dubbed “Gaia” by Lovelock) can satisfy all, some, or none of the definitions of “life” that we have discussed in this class? Write a statement explaining and justifying your answer to this question.**



# Reading for Thursday (9/15)



**Bennett & Shostak 4.2, 6.1, 6.3**

**– history of terran life**

**Sagan (1967)**

**– revolutionized biology**

**– read abstract and sections**

**1, 2.1-2.3, 2.6, 3.1-3.3, 3.6,  
3.8, and 4 (see cheat sheet)**

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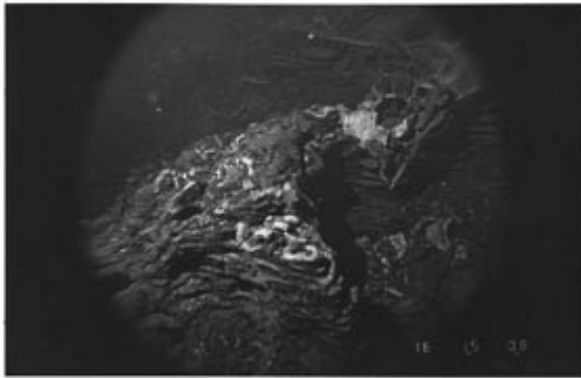
# Upcoming field trip (9/22)

**Deep Sea Microbiology Lab – Prof. Costa Vetriani**

**Institute of Marine & Coastal Sciences**

**Department of Biochemistry and Microbiology**

**<http://marine.rutgers.edu/deep-seamicrobiology/>**



**lava flows and tube worms 2500m below the surface of the Pacific**