

**SPECIAL EXHIBIT ON METEORITES AND MINERALS ASSOCIATED WITH THE ORIGIN OF LIFE ON EARTH OR MARS.** R.B. Bruner<sup>1</sup>, <sup>1</sup>Denver Museum of Nature and Science, 930 S Euclid Way, Denver, CO 80209; bobbruner40@hotmail.com.

#### **Black Smoker-type Hydrothermal Vent Theories**

- Pyrite to represent Wächtershäuser's Iron-Sulfur world
- Sphalerite to represent Mulkiđjanian's Zinc world

#### **Clay Theories**

- Montmorillonite to represent Ferris et al
- Kaolinite to represent Hashizume et al
- Muscovite to represent Hansma et al

#### **Lost City-type Serpentinization Theories**

- Olivine, Pyroxene, Serpentine, Magnetite, Brucite, Molybdenum to represent Russell et al
- Serpentine proven by Nakhla meteorite - Bridges et al

#### **Conditions on Mars**

- Boron and molybdenum indicated by Wulfenite, Tourmaline, and Colemanite - Benner et al

#### **Conditions on Earth and Mars**

- Organic molecules proven by Murchison meteorite- Kvenvolden et al
- Organic molecules and CAI's proven by Allende meteorite- Clarke et al
- Organic molecules proven by Tissint meteorite- Steele et al
- Organic molecules proven by Orgueil meteorite(cometary fragment)- Gardinier et al
- Other clay minerals (nontronite, saponite, halloysite, illite, chlorite) proving water-Ehlmann et al
- Water contribution from asteroids like Vesta (Camel Donga meteorite) - Alexander et al

#### **Phosphorus proven by**

- apatite and Tambo Quemado meteorite- Pasek et al

#### **Life Materials Going from Mars to Earth - Dated by Zircon (CHNOPS)**

- Black Beauty Mars Meteorite NWA 7034 (and its cousins)