

research geologist at Yellowstone National Park, looked in the thermal effluents from geysers and hot springs in Yellowstone. In six thermal springs they found conical and pillar-shaped stromatolites that were oriented not with the flow of water but toward the south, which is the general direction of the sun as viewed from the northern hemisphere.

Awramik, searching in the highly saline Hamelin Pool in Shark Bay, western Australia, met with success as well. At two sites exposed to the tides, he found small tufts inclined to the north, the general direction of the sun as seen from the southern hemisphere. The tufts were not leaning in either the east-west direction of the tidal currents or the general direction of the winds from the south. He also discovered dozens of much larger stromatolite columns in an area permanently submerged below the water's surface. These columns were tilted toward the north; ripples in the sandy bottom again showed that the current moved in an east-west direction. Awramik says that most recently he's also found evidence for heliotropism in millimeter-sized stromatolite tufts in the Caribbean.

"We're not saying that [heliotropism] is a common phenomenon in either ancient or modern stromatolites, but it's probably more common than people previously thought," observes Awramik.

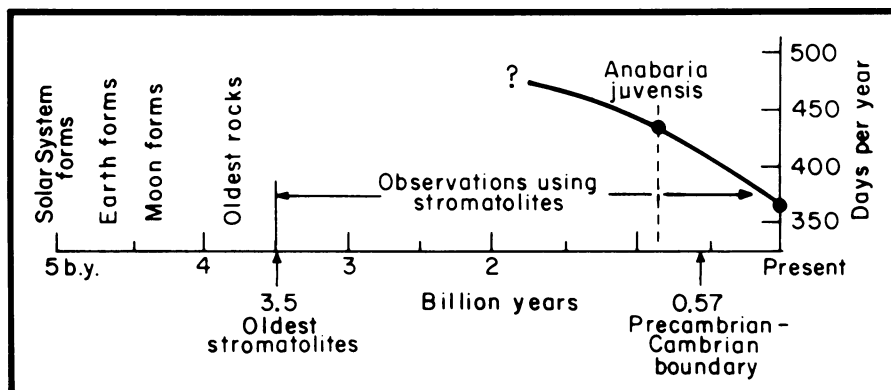
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**Animal Extinctions: What Everyone Should Know** — R. J. Hoage, Ed. This National Zoological Park symposium, held in September 1982, discussed the important issues that surround the elimination of species and habitats. Smithsonian, 1985, 192 p., illus., paper, \$9.95.

**Butterflies of the World** — Valerio Sbordoni and Saverio Forestiero, translated from Italian by Neil Stratton et al. A lavishly illustrated, comprehensive study of one of the most interesting and beautiful of all the insects. Covers the butterfly's evolution, life cycle, geographic distribution, migratory patterns, behavior and strategies for protection against predators. Intended for the general reader. Time Bks, 1985, 312 p., color illus., \$39.95.

**The Encyclopedia of Aquatic Life** — Keith Banister and Andrew Campbell, Eds. Billions of years of evolution in the seas have produced a great diversity of aquatic life, from single-celled animals to the giant squid and monstrous sharks, and from delicate sea anemones, corals and sponges to the grotesque angler fish. This book is divided into three main sections: fishes, aquatic invertebrates and sea mammals. Within each section, major groups of aquatic animals are illustrated and described in terms of distribution, habitat, size, form, anatomy, behavior and life cycles. Facts on File, 1985, 364 p., color/b&w illus., \$35.



Vanyo and Awramik, *Precambrian Research*, 29 © 1985 Elsevier Science Pub. B. V., Amsterdam

Because the stromatolite record spans much more of the earth's history than do skeletal fossils, which go back only 570 million years, it might hold important clues to the past dynamics among the earth, sun and moon. Here, for example, a stromatolite indicates the number of days in a year 850 million years ago.

Vanyo adds that only a few sinusoidal patterns have been found in the stromatolite fossil record, in part because people have not looked for them. "The cost and effort of digging up these things and then cutting the rocks in the correct way to expose the sine waves is huge," he says.

As for modern stromatolites, the researchers are not sure why some structures are heliotropic while others in the same region are not. The architecture of a stromatolite depends on a mosaic of different factors, including temperature, water chemistry, sediment flow and other

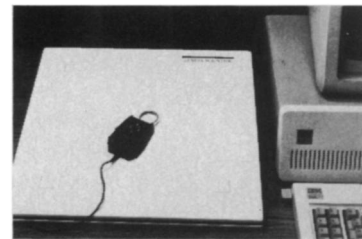
organisms in addition to sunlight, they say. Heliotropism occurs when the influence of these other factors is suppressed in some way. The effects of competing organisms, for example, might be damped in both the Yellowstone National Park and Shark Bay areas, says Awramik, because these environments are stressed by either high water temperatures or salinity, which discourage other species from settling there. The researchers plan to conduct laboratory experiments this year to better understand what controls the blueprint of stromatolite growth. □

**Origins: A Skeptic's Guide to the Creation of Life on Earth** — Robert Shapiro. This readable book begins by pointing up the great diversity of the ideas that have been proposed for the origin of life. Goes on to distinguish mythological and scientific approaches to the problem, focusing on the important criteria that a satisfactory scientific answer must meet. Describes the principal features of life at the cellular and molecular levels and considers the earlier history of life on this planet as deduced from the fossil record and radioactive dating. Current theories of life's origin are considered and compared with the scientific criteria established earlier in the book. Provides speculative suggestions concerning the origin and development of life and suggests studies that may lead to the answers. S&S, 1986, 332 p., \$17.95.

**The Planets** — Byron Preiss, Ed. Essays by scientists closely associated with planetary exploration present for the general reader the up-to-date discoveries and knowledge about each planet in the solar system. Following each scientific piece is a science fiction story set on the planet just described. These stories are by authors outstanding in the science fiction field. The color illustrations throughout enhance the text. Bantam, 1985, 336 p., color/b&w illus., \$24.95.

**Sharks of the World** — Rodney Steel. Presents the picture of sharks that has emerged from recent research. According to Steel, they are anything but primitive, possessing surprisingly large brains, sensory perception of totally unexpected sensitivity and complex behavior patterns geared to the demands of feeding and reproduction. Well illustrated. Facts on File, 1985, 192 p., color/b&w illus., \$17.95.

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