

## The Earth Above

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# BioScience

**Organisms from Molecules to the Environment**

**American Institute of Biological Sciences**

## The Earth Above

**B**y the time you read this issue of *BioScience*, the California Academy of Sciences should have started moving its collections into one of the more startling architectural creations in North America. The academy's new building in San Francisco, designed by Renzo Piano, features a hummocky, 2.5-acre "living roof" that will eventually be home to 1.7 million native California plants, together with unknown numbers of birds, butterflies, and interested crawlers, burrowers, and clingers. The building and its spectacular roof, depicted on the cover of this month's *BioScience*, grace the eastern end of Golden Gate Park, the steep-sided domes echoing the curves of the surrounding hills.

Besides being an arresting sight and an urban haven for wildlife, this latter-day wonder could boost efforts to spread "green roofs," to use the term Erica Oberndorfer and her colleagues employ in the article that begins on p. 823. Although the academy's roof is not the only green one in the country, it is in many ways the most ambitious. Conceived near the start of the decade, it immediately won the favor of the academy's board of trustees, according to Frank Almeda, senior curator of botany. The board's decision was a brave one, considering that at the time, urban heat islands and wildlife ranked lower as topics of public concern than they do today. Moreover, green roofs are expensive to build, being heavy and needing special protective layers to keep water and roots from penetrating to the building below. Yet the benefits in terms of energy savings and storm-water reduction are substantial, as Oberndorfer and colleagues' article describes. In the case of the California Academy of Sciences, the roof's public viewing terrace will also contribute to the academy's educational mission.

Almeda and his colleagues tested 35 California plants for their ability to survive without fertilizer or irrigation on the 60-degree slopes of the domes. They eventually selected four perennials (seapink, beach strawberry, selfheal, and stonecrop) and five annuals (California poppy, tidy tips, miniature lupin, goldfields, and California plantain). The plants are grown in three inches of soil in biodegradable trays in nearby Carmel Valley, then trucked to the museum and set in three more inches of soil.

Will green roofs sprout across the country in emulation of the academy's experiment with green architecture? Oberndorfer and her colleagues emphasize that much remains to be learned about the strengths of green-roof technology in different situations. Almeda hopes his academy's roof will help provide needed information: it will be the site of several research projects that could benefit similarly imaginative institutions.

The United States lags behind other developed countries in the adoption of green roofs. In Germany, the government provides incentives to build them, and even mandates them for some sites. They are advancing elsewhere in Europe and in Japan. Anyone interested in the urban environment should take heart. And officials who hold the keys to state coffers should think about the advantages of encouraging pioneering green demonstration projects on (under?) their own turf.

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