News of the week continued from p.39

Making concentrated solar juice affordable

Roughly 10 acres' worth of newly designed solar energy collectors could convert sunlight into electricity efficiently enough to keep lights burning and stereos blaring in a 300-home town with no change in utility bills, according to researchers who designed the collector at Sandia National Laboratories in Albuquerque, N.M.

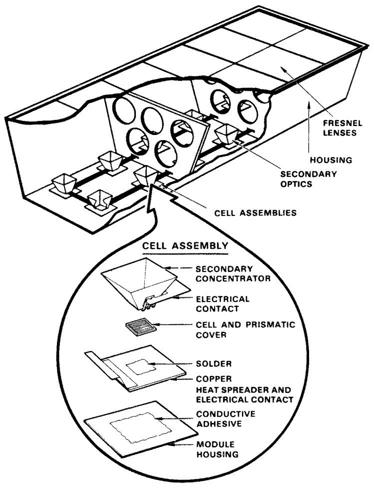
Though scientists differ in their prognoses for the Sandia device, known as a photovoltaic concentrator module, they agree the new collector marks an important step toward commercializing photovoltaic technology for applications such as generating electrical power.

"The fundamental problem in photovoltaic technology is that the cells cost too much," says Eldon C. Boes, supervisor of Sandia's Photovoltaic Technology Division. Sandia researchers now are adapting the module for large-scale production by solar energy companies, some of which already have expressed interest, Boes says.

To reduce the cost of solar-generated electricity, researchers strive both to make photovoltaic cells more efficient and to figure out how to make lots of less efficient cells cheaply. The experimental module, which Boes and his co-workers found converts 20.3 percent of high-noon, sunny-day sunlight into electricity, meets a goal set by the Department of Energy in 1986 for concentrator efficiency. It's also a record for photovoltaic devices of this type.

The module consists of 12 high-efficiency photovoltaic cells, each cell a half-inch-square flake of crystalline silicon with an overlying grid of fine metal "fingers" that tap into the photovoltaic current. To maximize the power output of each cell and minimize the number of cells needed, a parquet of overlying lenses concentrates the sunlight 100-fold. A prismatic cover molded directly to the cells steers light away from the metal fingers, which otherwise would intercept the solar energy before it reached the underlying silicon. Secondary concentrators surrounding each cell compensate for misalignments that occur as a tracking device keeps the modules aimed at the continuously changing position of the sun and as the modules' components contract and expand during season and climate changes.

"This module is important, but it isn't by itself enough," says Kenneth B. Zweibel, a research manager at the federally funded Solar Energy Research Institute in Golden, Colo. Although the Sandia work probably boosts concentrators into the ballpark of other photovoltaic technologies, Zweibel places his long-term bet on thin films of photovoltaic materials whose low cost would outweigh their lesser efficiency. But he and Boes agree that interim, in-hand technologies such as the photovoltaic concentrator module could encourage utility companies and others to look sunward in the near term, priming them to choose improved photovoltaic technology as it becomes available. *—I. Amato*



Sandia

Schematic of Sandia's photovoltaic concentrator module.

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influence said, "Hmmm, those baboons are inbreeding again. Better discourage that!" Inbreeding *results* in diminished reproductive returns, period. We will know why when we thoroughly understand the effect inbreeding has at the DNA level.

Why do so many scientists insist on using words that connote a purposefully directed influence when there is no evidence for it? While it is easier to say that some trait of a species is a "survival strategy," such a description carries with it an implication of something not in evidence. Evolution is really much simpler: That individual member of a species who "happens" to be better adapted to its environment is more likely to survive and pass its adaptions on to its offspring. Evolution does not deal with purposes; it deals with consequences.

Ken Bloom
Hudson, N.H.

Social vs. genetic motives

"Avian Altruism" (SN: 6/10/89, p.364) demonstrates the trend among today's scientists to credit genetic explanations for behavioral phenomena, even when a nongenetic explanation is more powerful. It also illustrates scientists' tendency to interpret data in a way that supports their favored hypothesis, even when it fits more neatly with an alternative explanation. This is especially true when the hypothesis is a socially accepted one, as genetic explanations of behavior currently are.

After five years of apparently well-designed and painstaking research, Stephen T. Emlen and Peter H. Wrege conclude that, among white-fronted African bee eaters, "kinship is an important predictor of which birds will offer... assistance to... breeding pairs." They suggest that this altruistic behavior is genetically determined because it perpetuates genes that the helper bird shares with the breeding pair: "Helpers get the biggest genetic payoff by ensuring the survival of their closest kin." This interpretation adds fuel to sociobiologist E.O. Wilson's contention that "scientists will discover specific genes for human altruism in the near future."

But Emlen and Wrege's results fit with a more cultural or sociological explanation (if one can use those terms to describe bird behavior). They could explain all their data by postulating that birds, like humans, will be most inclined to help those individuals with whom they are most familiar or to whom they feel closest. Is it not possible that genetic relatedness is a surrogate for being raised together and thus having shared numerous life experiences, especially during those most influential early formative years?

In particular, social theory can easily explain the results of the foster hatchling experiment, which presents difficulties to the genetic hypothesis. Hatchlings put into foster nests offered help to foster parents but treated biological parents as nonkin. Emlen and Wrege conclude that this manipulation shows there is no built-in way for bee eaters to recognize genetically related birds. That leaves the question of a genetic recognition mechanism up in the air. But bee eaters would easily be able to recognize the nonrelated birds with whom they were raised and to whom they would be more "emotionally" bonded.

Because reductionistic science has been so successful in unraveling biochemical phenomena, scientists in every discipline have adopted this model. Perhaps, when explaining social behavior, we ought to exercise our uniquely human powers and generate nongenetic ways of explaining animal actions, rather than trivializing humanity by ascribing all activities to genes.

William A. Check
Atlanta, Ga.

Stretching the definition?

How can daminozide (Alar) be identified as a plant-growth regulator and then twice labeled as a pesticide, all in the same article ("Bye-bye Alar," SN: 6/10/89, p.358)? From all that's been reported about Alar, it doesn't seem to be used against plant pests ("pesti-") and it doesn't kill the critters ("-cide").

Richard W. Ikenberry
Kearney, Neb.

EPA calls daminozide a pesticide in its press and background briefing materials. One reason for this, explains EPA spokesman Al Heier, is that daminozide is regulated under the agency's pesticides law. In addition, he says, EPA thinks of the chemical as a pesticide because it protects food crops from "bad" things — namely, premature dropping of fruit from trees. But perhaps the most valid justification for the term is daminozide's antifungal role, primarily in seed-peanut production. By controlling "rank vine growth," it inhibits destructive fungal infections (SN: 9/14/89, p. 169). — J. Raloff