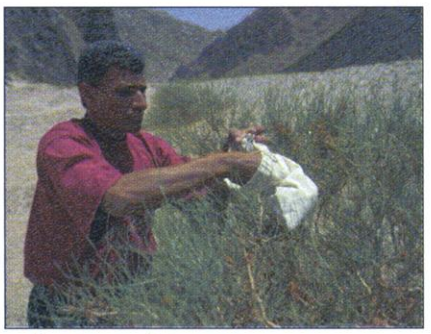
Save Our Seeds

A modern-day Noah's Ark for plant species, the Millennium Seed Bank (MSB) in southern England is ready to embark on a mission to collect and preserve the seeds of about 10% of the world's seed-bearing plants.

In one of the largest international conservation efforts ever undertaken, the Royal Botanic Gardens, Kew, in London has completed a $120 million expansion of its rural outpost in Wakehurst Place to preserve seeds from more than 24,000 species. When the seeds—about 10,000 per species—arrive, they are cleaned by hand, dried, checked out by x-rays, and stored in sealed containers at –20°C. Every 10 years or so, staff members will "test the viability of the seeds by letting them germinate," says MSB cryobiologist Hugh Pritchard. He estimates that most will last for a couple of centuries.



Collecting seeds in Egypt.

The MSB aims to have samples from 10% of the world's quarter-million-plus plant species by 2010. The focus is on drylands (that is, not tropical forests), where desertification and population growth pose the biggest threats, says Pritchard. Plans for the MSB have been germinating since 1992, when Wakehurst's existing seed collection, now comprising 5000 species, reached capacity. In 1995 Kew scientists landed a $45 million expansion grant from the National Lottery's Millennium Commission.

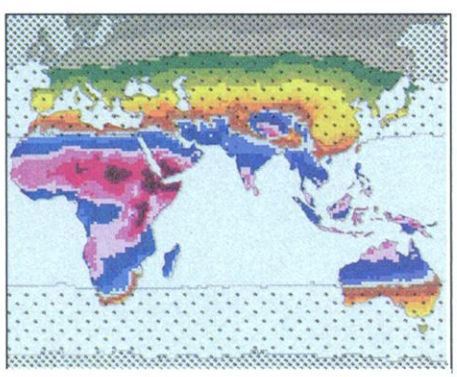
Research in the new facilities, mainly bankrolled by the Wellcome Trust, will focus on improving preservation and germination technologies to increase the longevity of the dried and frozen seed. Pritchard hopes that the MSB "will serve as a catalyst" for similar efforts in other countries.

Selective Power of UV

Scientists have long surmised that as hominids became less hairy, dark skin color evolved as protection against the sun in tropical climes. Then depigmentation occurred as people moved farther from the equator so they could soak up enough sun to synthesize vitamin D.

Now a group at the California Academy of Sciences (CAS) has done the first study that confirms the connection with direct measures of solar radiation. Anthropologists Nina Jablonski and George Chaplin at CAS in San Francisco used data from NASA satellites collected from 1978 to 1993 to compute average annual exposure to ultraviolet (UV) radiation in different areas of the world. They compared the sunlight map with data on skin reflectance—the higher the reflectance, the lighter the skin—from ethnic groups in more than 50 countries.

Increasingly light skin matches up with decreasing UV levels, the authors report in the July issue of the *Journal of Human Evolution*. The correlation "bolsters the case for UV radiation as a link to [skin color] selection," says anthropologist John Relethford of the State University of New York, Oneonta. Dark skin not only affords protection from the sun but also helps prevent the breakdown of folate, which is necessary for embryo development.



Stippled areas show decreasing UV. The lowest skin reflectance (pink) was found among aboriginal Australians; the highest in Holland.

One exception to the pattern, says Jablonski, is indigenous American populations, which are lighter colored than would be predicted from UV levels. That, she says, is "probably because of the relative recency of their migration" and because they had more clothing and shelter than their ancestors.

Training for a Game Brain

Many have no doubt thought of it; now someone's doing it: harnessing video games to biofeedback. Scientists at NASA's Langley Research Center in Hampton, Virginia, and Eastern Virginia Medical School (EVMS) in Norfolk hope to perfect a system for treating today's childhood scourge, attention deficit hyperactivity disorder (ADHD), using electronic toys.

Principal investigator Olafur Palsson, a psychologist at EVMS, says there are three types of brain waves you want to manipulate in ADHD: beta activity, involved in concentration; theta waves, associated with unfocused processes such as daydreaming, and what is called the sensorimotor range (SMR). "When SMR activity increases, you quiet down," says Palsson.

The technology—a spin-off of NASA research measuring the brain activity of pilots in flight simulators—feeds signals from brain sensors to a joystick. When the brain waves are moving in the right direction, the joystick becomes easier to control and game performance is enhanced. Best suited to the system, says Palsson, are races or "action games that involve a lot of forward movement," or adventure-explorer games. Those involving aggression and violence would definitely be counterproductive, he says.

Biofeedback has been used for 15 years to treat ADHD and can be an effective alternative to Ritalin, says Palsson. But taking a child for thrice-weekly sessions is costly and time-consuming. The scientists plan to test their system by comparing it with regular biofeedback in a group of 22 children with ADHD. If it proves effective, they hope to simplify it so that ADHD sufferers can just put on a helmet, turn on the game, and battle their illness while flying around the course in an All-American NASCAR race.

Such a system would be a "huge advantage" over drug treatment, says neuropsychiatrist Daniel Amen, who runs the Amen Clinic for Behavioral Medicine in Fairfield, California. "Psychologically, it's better for them" to be able to control their brains themselves, he says.

CREDITS: (TOP) MSB; (BOTTOM LEFT) JABLONSKI *ET AL.*