SCIENCE NEWS®
The Weekly Newsmagazine of Science
Volume 155, No. 6, February 6, 1999

This Week

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Cover: Scientists who use DNA to probe the evolutionary roots of modern humans have run into a vexing problem: Genetic data support either of two competing perspectives. One traces *Homo sapiens* to a single African source just 200,000 years ago, the other to multiple groups in Africa and elsewhere at least a million years ago. **Page 88** (Illustration: Tim Teebken)

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Letters

Light of our lives

I found Janet Raloff's article "Does Light Have A Dark Side?" (SN: 10/17/98, p. 248) quite intriguing, but I am puzzled by the researchers' interpretation of their results. They reasoned that since eye cells in profoundly blind people were not responsive to light, they could not signal a decrease in nighttime melatonin production.

Recent research, however, has demonstrated that not only the eyes but cells scattered throughout the entire body respond to light and may be responsible for regulating the biological clock. Sighted and nonsighted populations would not differ in this regard. Why, then, should there be any difference in two groups' incidences of light-induced cancer?

Miriam Ruff
Silver Spring, Md.

The work to which you refer, on skin sensors of light, is quite new and has not been successfully replicated. Steven Lockley, one of the sources for this article, attempted such a replication. Lockley's team irradiated the back of the knees of blindfolded men. Yet even 67,500 lux, in 3-hour exposures beginning at midnight, did not suppress melatonin. The researchers argue that these new data, reported in the September JOURNAL OF CLINICAL ENDOCRINOLOGY AND METABOLISM, *"support the established view that intact, uncovered eyes are a prerequisite for light-induced suppression of melatonin in humans."*
—J. Raloff

With regard to your article, I must admit to being very skittish about applying research on nocturnal animals to diurnal ones when it comes to exposure to light. My concern is amplified considerably when I read "5 lux . . . a little more illumination than . . . full moonlight." Full moonlight—moon overhead on a clear night—is at best 0.1 lux. This is one-fiftieth of 5 lux, a minimum recommended level for parking lots. Also, the 0.2 lux referred to in the sidebar is twice full moonlight and far above the "typical moonless night." The above figures are taken from the *Illuminating Engineering Society Handbook.*

Bill F. Jones
Orange, Calif.

Connections between extended light and cancer are not entirely new. In 1956, I reported that in female rats reared and kept lifelong under constant light, puberty was accelerated and estrous cycles soon reverted to permanent estrus (*Endokrinologie* 33: 129-138, 1956). Daily injections of a pineal extract (melatonin was not yet available) prevented permanent estrus and kept estral cyclicity going despite constant exposure to light (*Endokrinologie* 33: 287-295, 1956).

Keeping a strain of mice prone to develop mammary tumors under constant light did not interfere with estral cyclicity but prolonged estrous periods, accelerating occurrence of and death from mammary tumors

CORRECTION

In "Insulin-resistance gene defect identified" (SN: 1/16/99, p. 38), NATURE MEDICINE *was incorrectly cited as the main reference for the article. The correct reference is* NATURE GENETICS.

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better to their underlying assumption—that a prehistoric split of Africans and non-Africans yielded separate breeding populations—or to the alternative possibility that recurrent, low levels of interbreeding have forged genetic ties among widespread human groups.

Genetic surveys and new statistical analyses of DNA trees, reported by Templeton in the November 1998 AMERICAN ANTHROPOLOGIST, indicate that human groups have always interbred to some extent. The most frequent genetic exchanges, predictably, have occurred among populations in closest proximity, he finds. If interbreeding had not occurred in this manner, prehistoric migrations would have yielded especially close genetic links between some far-flung groups.

Templeton has devised a statistical technique for picking out geographic patterns in the spread of genes throughout the branches of evolutionary trees. He says that his method distinguishes between the genetic influences of a sudden expansion of a population into new regions—as in the recent African-origins model—and those of sustained interbreeding that was most common in groups separated by short distances.

Templeton's reanalysis of data from other researchers on both mitochondrial DNA and the paternally inherited Y chromosome shows that genetic differences between populations are generally modest, but they are greatest in those groups that lived furthest from one another. So, for instance, East African pygmies and Melanesians (who live on islands near Australia) look far less alike genetically than either group compared with Europeans. Similarities in facial characteristics and skin tone between Africans and Melanesians probably represent common human adaptations to life in a tropical climate, Templeton says.

In his evolutionary scenario, separate human races with distinctive biological traits have never existed.

Local populations in a few regions might have died out within the past 100,000 years as interbreeding continued elsewhere, Templeton notes. This may explain mitochondrial DNA evidence for Neandertal extinction in Europe by around 30,000 years ago (SN: 7/19/97, p. 37). The fate of the Neandertals remains unsettled until additional prehistoric gene fragments are isolated and analyzed, the St. Louis researcher says.

A statistical analysis directed by Templeton and Michael F. Hammer of the University of Arizona in Tucson finds that modern Y-chromosome diversity probably arose through a number of prehistoric population movements from Africa to Asia, as well as from Asia back into Africa. Males may have moved over long distances throughout much of prehistory more often than females, Templeton suggests.

Other data, such as a mitochondrial DNA study directed by Mark T. Seielstad of the Harvard School of Public Health in Boston and published in the November 1998 NATURE GENETICS, suggest that females have more often moved over short distances than males. The tendency of men in hunter-gatherer groups to travel outside their native villages in search of brides, whom they then bring back home, may partly explain this finding.

Long- and short-distance movements among interbreeding groups facilitate the transfer of genes underlying variable biological traits, Templeton holds. Thus, different patterns of skeletal traits in creatures such as Neandertals do not necessarily banish them from the human species, in his view.

Many anthropologists assume, in contrast, that *H. sapiens* evolved a defining suite of skeletal features, even though no consensus exists on what they are. Absence of these features in creatures such as Neandertals leads to their designation as a separate species.

Templeton's views on human evolution spark heated debate. But reservations about the power of current DNA studies to describe human evolution are not uncommon.

Mountain, who views accumulated genetic evidence as moderately supportive of a recent African origin for humanity, still sees a pressing need for improved analyses of large DNA samples.

"Far too often, anthropological geneticists draw conclusions about human evolutionary history without testing hypotheses or exploring alternate models," Mountain remarks. "In some cases, this is because data are insufficient. In other cases, the immediate impression generated by the data blinds us to alternatives."

Hammer, who remains undecided on how modern humans evolved, suspects that investigators will increasingly experiment with statistical formulas for weighing the contributions of natural selection and other factors to DNA diversity.

"Over the next 10 years, more complex genetic models will emerge," Hammer says. "DNA research has not solved the mystery of human origins." □

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significantly over that of controls kept in 12 hours light–12 hours darkness (*Ann. N.Y. Acad. Sci.*, vol. 117, 88-104, 1964).

Wolfgang Jöchle
Denville, N.J.

Since humans are forever trying to beat the system, what about using a light-blocking mask that covers the eyes? The article's photograph implies that experimentation with masks is being done, but there was no mention of results. If the eyes are truly the primary photosensors affecting the melatonin cycle, it may be much easier to block the light at the eye rather than trying to prevent light, from its many modern-day sources, from entering a room.

David Hattery
Washington, D.C.

In winter, when the nights grow long,
My mind begins to quail and cower.
The only way to stave this off
Is burn the lights at every hour.

This helps a lot to ease the pain
Of what they're lately calling SAD.
Light gets me through the winter months;
But now you tell me that it's bad!

If winter lights cause cancerous growths,
I really don't know what to do.
Should I go wacko in the dark,
Or risk a fatal tumor or two?

I'll likely light the lamps as usual
To keep myself from out the dumps.
But I'll also daily probe my flesh
For any new suspicious lumps.

Thanks for nothing, SCIENCE NEWS.

Matt Hinton
Trinidad, Calif.

Aid for brain deficits?

While the most recent findings on the growth of new brain cells by Fred H. Gage and Peter S. Eriksson lead to speculation about treatment for those with "strokes or who have neurodegenerative illnesses" ("Adult human brains add new cells," SN: 10/31/98, p. 276), this news may eventually also aid the palsied and the retarded/developmentally disabled.

I am led to wonder whether we may now look for a new mechanism with which to aid individuals with brain damage caused at or before birth, whether by trauma or disease or genetics. Could deficit cell areas of the brain be "repaired" or "added to" using this new combined knowledge?

Certainly, the need in the brain-damaged/deficit population is as significant as in the stroke and trauma population, and, perhaps, a true treatment may be near for both.

Irwin Tyler
Spring Valley, N.Y.

Fair warning

In "Is natural pesticide too hard on people?" (SN: 11/7/98, p. 295), *B. cepacia* is proposed for use as natural biological protection for seeds and fruits. Concerns are raised because *B. cepacia* is a potent pathogen in patients with cystic fibrosis. *B. cepacia* is also a major cause of pneumonias in patients with chronic granulomatous disease. If levels of *B. cepacia* on seed, fruits, or cuttings are significantly increased over natural levels by design, then susceptible individuals who come in contact with these products will be at significantly greater risk of infection. Companies contemplating the widespread environmental use of such agents should not discount their liability to provide warnings to protect at-risk individuals.

Harry Malech
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