Gene influence tied to sexual orientation

Genes play an important role in shaping the sexual preferences of males, according to a controversial new study of homosexual men and their brothers.

"Our research shows that male sexual orientation is substantially genetic," report psychologist J. Michael Bailey of Northwestern University in Evanston, Ill., and psychiatrist Richard C. Pillard of the Boston University School of Medicine, writing in the December ARCHIVES OF GENERAL PSYCHIATRY.

The investigators acknowledge that their statistical estimate of genetic influence sheds no light on specific genes involved in sexual orientation or how they might work. Other researchers question Bailey and Pillard's interpretation, arguing that such calculations prove impossible to tie to any genetic trait, including sexual orientation, and can change drastically from one study to another, depending on the experimenters' methods.

From 1988 to 1990, Bailey and Pillard used advertisements in homosexual-oriented publications to recruit adult male homosexuals with a twin or adopted brother. Eleven of the recruits described themselves as bisexual.

The final group included 56 pairs of identical twins (who share the same genes), 54 pairs of fraternal twins (who share half the same genes) and 57 pairs of adoptive brothers with no common genetic heritage. Bailey and Pillard identified the sexual orientation of each pair member, mainly through interviews with the initial recruits. In previous studies, homosexual men proved highly accurate in rating the sexual preferences of their brothers, the researchers note.

Homosexuality occurred among both brothers in 29 pairs (52 percent) of the identical twins. Among fraternal twins, only six pairs of brothers (22 percent) shared a preference for homosexuality; among adoptive brothers, this shared preference further dipped to just three pairs, or 11 percent.

Based on varying estimates of homosexuality rates in the general population and the degree to which study participants represented all men in the United States, the researchers estimated that genes may account for 31 to 74 percent of the male sexual orientation in their sample.

Triggered by some kind of prenatal influence on the brain, a group of genes may predispose an individual to homosexuality, Bailey suggests. The way in which such genes might operate remains unknown, although he speculates that they might affect the functioning of a small inner-brain structure recently implicated in homosexuality (SN: 8/31/91, p.134).

Extensive research has yielded no evidence that social factors, including a parent's homosexuality, affect a child's sexual orientation, Bailey argues. And the suggestion that some genes code for homosexuality creates an "evolutionary paradox," Bailey points out, since the process of natural selection works against genes that decrease a species' reproductive success. No good explanation currently exists for the evolution of genes for homosexuality, he says.

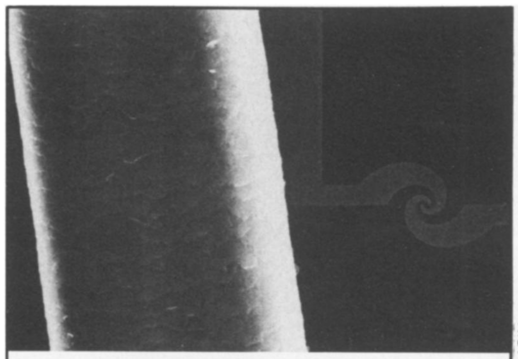
"This study leaves lots of questions unanswered, but it provides a strong indication that genes somehow play a role in homosexuality," says psychologist John C. Loehlin of the University of Texas at Austin.

However, some psychologists view heritability estimates with considerable skepticism (SN: 12/7/91, p.376). For instance, Bailey and Pillard's calculation could change drastically if they recruited study participants differently or rephrased interview questions about sexual preferences, asserts psychologist J.J. McArdle of the University of Virginia in Charlottesville.

The new heritability calculation could also reflect any number of genetically influenced traits, McArdle contends. He observes that the estimate might describe genes that influence anything from male sexual orientation in general to homosexuality in particular (either in men alone or in both sexes), general personality or attitude profiles linked to different sexual orientations, or some trait with less obvious connections to sexual orientation. *— B. Bower*

Miniature rabbit ears for infrared sensors

From the telescoping rabbit ears of television sets to giant dishes capable of receiving faint radio signals emanating from distant galaxies, antennas play key roles in the detection of long-wavelength electromagnetic radiation. Scientists at the National Institute of Standards and Technology (NIST) in Boulder, Colo., have now fabricated tiny antennas that effectively capture infrared radiation, thereby extending antenna technology to shorter wavelengths.



NIST

Image of a highly magnified, spiral microantenna (right) shown next to a human hair.

"Our work on small antennas is part of a larger effort to move microwave-like technology toward shorter wavelengths, and this work represents the shortest wavelength to which it has been pushed so far," says Donald G. McDonald, a member of the NIST team. He and his co-workers describe their novel infrared antennas in the Dec. 16 APPLIED PHYSICS LETTERS.

Each "microantenna," about the size of a grain of sand, consists of a thin gold film deposited in a spiral pattern on a niobium surface. The gold layer captures and, in effect, channels infrared radiation toward the underlying niobium detector. NIST tests show that such an antenna efficiently responds at room temperature to infrared radiation at wavelengths from 3 to 30 microns.

Conventional infrared detectors operate without antennas. These detectors consist of specially fabricated materials that simply absorb infrared radiation at their surfaces to generate an electrical signal. The addition of microantennas permits the use of detectors much smaller in size than the wavelength of the detected radiation, McDonald says. In principle, arrays of such antennas coupled to tiny detectors could produce finely detailed infrared images of objects.

The NIST antenna work is part of a larger program aimed at the development of sensitive infrared detectors based on superconducting materials. Although the researchers initially made all their measurements on the new antennas at room temperature, they chose niobium as their detector because it becomes a superconductor at temperatures below 9 kelvins.

"Our work emphasizes low-temperature operation," McDonald says. "We've already built [low-temperature detectors], and they're working."

However, even at room temperature, a device consisting of a gold antenna coupled to a niobium detector already serves as a sensitive detector of blackbody radiation. "With some refinement, we believe that [our device] would be better than any other present-day, commercial detector," McDonald says.

The NIST work also supports the notion that certain miniature structures found in insects may similarly act as nonmetallic antennas, or waveguides, for infrared radiation. "This is fascinating but highly speculative," McDonald admits. "With insects, it's very difficult to tell precisely the function of any such structure." *— I. Peterson*