to NIH now," he says. Very few do.

Opposition to the nursing institute in the Senate also focuses on the procedural issue of whether major legislation ought to be passed, with no hearings, by a floor amendment and voice vote. According to congressional aides, neither Senator Orrin G. Hatch (R–Utah), chairman of the Senate's health committee, nor Senator Edward M. Kennedy (D–Mass.), the ranking committee Democrat, is likely to go along with the nursing institute now.

House staffers argue that the Institute of Medicine's nursing study obviated the need for public hearings. As one told *Science*, "It made the case." Seldom is a single study accorded such clout. In fact, the IOM report explicitly notes that its committee was divided on the question of a nursing institute at NIH. Because the IOM at present is conducting a major study of the organizational structure of NIH itself (*Science*, 21 October, p. 306), the final decision was not to recommend another institute at NIH.

In truth, the nursing institute moved through the House with remarkable alacrity by political standards. Despite the fact that some nursing groups have been pushing for greater status in the federal government for some time, the institute's passage took people by surprise.

Equal success in the Senate appears unlikely right now. As one aide said, "We're willing to hold hearings but not to have this thing sail through on the wings of the gender gap."

Whatever the outcome this round, thanks to Madigan, nurses have won Congress's attention as never before.

—**BARBARA J. CULLITON**

Math Genius May Have Hormonal Basis

During the past several years, Norman Geschwind, a neurologist at Harvard Medical School, has proposed that left-handedness and immune system disorders might occur together and that they will frequently be linked either to serious abnormalities such as autism, dyslexia, or stuttering or to certain kinds of giftedness, particularly artistic, musical, or mathematical talent (*Science*, 9 July 1982, p. 141). "There's been—understandably—an enormous degree of skepticism," says Geschwind, but his idea has also stimulated some scientists to look again at their own data.

The most recent researchers to look again are Camilla Benbow and Julian Stanley of Johns Hopkins University who study mathematically precocious youth. To their surprise and delight, they find that Geschwind's predictions hold up beautifully in their group. Moreover, they believe that Geschwind's proposal might explain why the most mathematically gifted students are almost entirely male.

Geschwind proposes that excess testosterone or unusual sensitivity to testosterone during fetal life can alter brain anatomy so that the right hemisphere of the brain becomes dominant for language-related abilities and the person is left-handed. The association with the immune system arises, Geschwind suggests, because testosterone production, sensitivity to testosterone, and the activity of the immune system are genetically linked.

The link with mathematical genius occurs because mathematical ability is generally thought to be a right brain function. "If you get the mechanism adjusted just right you get superior right hemisphere talents, such as artistic, musical, or mathematical talent. But the mechanism is a bit treacherous. If you overdo it, you're going to get into trouble," Geschwind says. "It's a funny mechanism. At first, it looks like you have to deliberately produce damage to produce giftedness."

When Benbow and Stanley at Johns Hopkins learned of Geschwind's hypothesis they were intrigued. They had data from nationwide talent searches for mathematically gifted seventh graders (*Science*, 2 December, p. 1031). To find these students, they looked at scores on the mathematics section of the Scholastic Aptitude Test, a test designed for 11th and 12th graders. The very best students are those who score above 700. Benbow and Stanley estimate that these seventh graders are the top one in 10,000 in their age group. They decided to contact these students to see if they are left-handed and have immune system disorders.

Twenty percent of these mathematically talented students, Benbow reports, are left-handed, making them more than twice as likely to be left-handed than the general population. Sixty percent of them have immune system disorders, which is five times the incidence in the general population. These disorders, Benbow says, are generally "symptomatic atopic disease," better known as allergies and asthma. They also asked about myopia and learned that 70 percent of the high scorers are nearsighted. (Geschwind says that there is a correlation between intelligence and myopia, which he is now investigating.)

When the Hopkins researchers moved down the list of high scorers to students who were not so gifted, they found that the students were less likely to be left-handed, have immune disorders, or to be myopic. When they got down to the students who scored not much better than chance on the SAT math test, they found that the incidence of these conditions is about the same as those in the general population.

If testosterone during fetal life does all that Geschwind believes it does, it might be expected that boys, who are exposed to more testosterone in utero, would be more likely than girls to be affected. Males are more likely than females to be left-handed, to have immune system disorders, to stutter, to be dyslectic, to have autism, and, according to Benbow and Stanley's work, to have high scores on the math portion of the SAT. Among the nearly 50,000 seventh graders who took the test, they found 260 boys but only 20 girls who scored over 700—a ratio of 13 to 1. But in a similar search for verbally talented youth, there were equal numbers of boys and girls among the high scorers. Once again, Geschwind is not surprised, saying that his theories do not provide "a mechanism for giftedness in verbal areas."

But if Geschwind is correct in his predictions and if the Johns Hopkins group really is detecting inborn mathematical precociousness, boys are going to be a very variable group. They can be geniuses or they can have severe learning problems. "I think that if you look at the group of people who are very bad in math there will be an excess of males there too," says Geschwind. But the data so far on the precocious students, he remarks, "Fit in perfectly, to put it bluntly."—**GINA KOLATA**