Keeping sex under control

When is a hormone not a hormone? When it looks like an important sex-related hormone but is biologically impotent, say the first scientists to report finding such a substance in human blood. These "antihormones" may play a role in the timing of puberty, as well as in changes in sex-organ function during aging. The discovery could also have implications for future contraceptives, treatments for hormonal dysfunction and methods to pinpoint ovulation, say the scientists.

Researchers at the University of California at San Diego reported results last week from a study where women with below-normal ovarian function were given an "antagonist" of gonadotropin-releasing hormone (GnRH). This regulatory hormone prompts secretion of gonadotropins, hormones that affect functions like gonadal (sex organ) growth and the release of other sex-related hormones. Treating women with a GnRH antagonist—which closely mimics GnRH but lacks its gonad-stimulating activity—is a standard clinical protocol to help evaluate different segments of an individual's complex hormone-release cycles.

Of particular interest to the researchers was the gonadotropin called follicle-stimulating hormone (FSH). "There's a feedback loop [involved in hormone-secretion cycles]," says Aaron J.W. Hsueh, who helped conduct the study. "However, if the ovaries or testes are removed or are not functioning normally, the FSH levels are very high because the feedback mechanism is lost." As reported in the Jan. 1 SCIENCE, Hsueh, Kristine D. Dahl and Thomas A. Bicsak—dissatisfied with current commercial assays for FSH—developed more sensitive methods capable of separating several chemical forms of FSH and then tested blood from the GnRH-antagonist-treated women.

What they found was "something very strange," according to Hsueh, who says the results are the first proof that "antihormones" circulate naturally in the body. Other scientists had reported that when sugars are experimentally removed from purified FSH in the laboratory, the gonadotropin still binds to its receptors on gonadal cells but loses its bioactivity: It no longer stimulates estrogen production, for example.

But the new data go beyond the laboratory situation, showing that FSH-like molecules without biological activity also circulate through the body. The researchers confirmed this lack of biological activity, says Hsueh, by adding the newly discovered FSH-like substance to cultured ovary cells, which failed to secrete estrogen.

By binding to gonadal cells, these antagonistic antihormones block activity by well-known forms of FSH, thereby disrupting normal hormone secretion. Whether they occur in the general population has not been determined, says Hsueh. To answer that question, the scientists are now studying a group of older men. During aging, the FSH levels are relatively high, but the biological activity of the gonadotropin is low, says Hsueh, adding that circulating antihormones could explain the discrepancy. Antihormones also may be active in children, "just to make sure puberty comes at the right time," says Hsueh.

In another study underway, Dahl is using the new FSH assays on urine samples, including specimens from killer whales and endangered species like the gorilla. Better timing of the animals' sexual cycles could improve success in zoo breeding, says Hsueh. —*D.D. Edwards*

HIV infects researcher

Scientists reported last week that a research laboratory worker apparently was infected with the AIDS-causing human immunodeficiency virus (HIV) during experiments with virus cultures, making this case the first reported example of laboratory-acquired HIV infection unrelated to contaminated blood or to accidental needle sticks. In summarizing a study screening 265 lab workers and support personnel for HIV infection, the scientists recommended that laboratories doing HIV research carefully review their employee training programs, as well as their safety procedures involving potentially dangerous biological materials.

Results of the study, published in the Jan. 1 SCIENCE, suggest that the unidentified researcher's gloves may have been contaminated during the handling of concentrated virus cultures. The authors, who include NIH scientists and other federal and private researchers, say the lab worker and another worker infected by needle stick had been careful. But the study's conclusion that the two were not "fully conversant with or [had not] strictly adhered to biosafety guidelines . . . at all times" means that "further refinement" of safety procedures could be necessary, they say.

Such procedures are the crux of a lawsuit filed last month in U.S. District Court by the Washington, D.C.-based Foundation on Economic Trends. Filed against the Department of Health and Human Services and the NIH, the suit asks that the laboratory containment of hazardous biological materials be reviewed under the environmental impact statement process. It also asks that several research projects involving the growth of HIV in cell cultures be suspended. □

Swallows keep eggs in several baskets

Call it nature's version of a baby left on a doorstep. Biologists have discovered that adult cliff-dwelling swallows sometimes carry one of their own eggs into the nest of an unwitting neighboring swallow, and then fly away minus the egg — a sneaky maneuver called reproductive parasitism that may increase the chance of the egg's survival.

Birdwatchers have long known about another form of reproductive parasitism whereby birds *lay* their eggs in the temporarily vacant nest of another bird. Some, like various species of swallows, starlings and ducks, keep the eggs within their own species, while cuckoos are known for filling the nests of birds of another feather. But this is the first time scientists have witnessed the transfer of already-laid eggs, report Yale University biologists Charles R. Brown and Mary Bomberger Brown in the Jan. 7 NATURE.

The researchers observed this transfer while studying a community of swallows in Nebraska. They monitored the birds both by sight and by recording the movements of marked eggs between nests. Transferred eggs showed up in 6 percent of the nests. But they add that their estimate of transfer frequency is "undoubtedly an underestimate."

In one instance, a swallow transferred its egg into a nearby nest under the very beak of the nest's occupant. "A fight ensued when the intruder entered with the egg. The intruder was evicted from the nest within 10 seconds, but the egg remained in the nest," according to the researchers. Previous studies have shown that swallows cannot recognize eggs as foreign.

The biological significance of this practice is still unknown. But the researchers suggest it is related to survival. In the general swallow community, roughly a quarter of all eggs fail to hatch. However, only 10 percent of transferred eggs failed, leading the biologists to theorize that when a swallow transfers an egg, it chooses superior incubators as the surrogate parents.

The transfer behavior may have developed in the ancestral swallow nesting grounds of cliffs and canyons, which are the site of frequent rockfalls, say the investigators. Individual swallows may protect against losing an entire clutch to a rockfall by spreading the eggs around.

But in a comment on the report, Cambridge (England) University zoologist N.B. Davies suggests that reproductive parasitism may be more a matter of avian economics. "A more likely explanation perhaps," he says, "is that parasites increase their lifetime reproductive success by reducing the costs of parental care." —*R. Monastersky*