Bulimia's binges linked to hormone

Women with bulimia nervosa, an eating disorder characterized by recurrent binge eating, fail to secrete normal amounts of a hormone that induces a sense of satiety or fullness after a meal, new research indicates. The study suggests that a significant biochemical malfunction may lie behind the behavioral abnormality, and hints at the possibility of developing effective drug treatments.

Epidemiologists estimate that in the United States, up to 4 percent of young adult women and a far smaller fraction of men are bulimic. Although clinicians view the disorder as having both biological and psychological components, their failure to identify a biochemical mechanism, and the responsiveness of only some bulimics to antidepressant drugs, have left the disorder largely under the purview of psychotherapists.

"It's very exciting to think about the future of this field," says Thomas D. Geracioti Jr. of the National Institute of Mental Health in Bethesda, Md. He and Rodger A. Liddle of the Duke University Medical Center in Durham, N.C., report in the Sept. 15 NEW ENGLAND JOURNAL OF MEDICINE the impaired secretion of the hormone cholecystokinin (CCK) in a group of 14 bulimics. "Only 10 years ago were some of these substances being discovered in the brain, and already we're doing clinical research with them," Geracioti says. "Probably in our lifetime we'll be able to control appetite [abnormalities] pharmacologically."

Previous research has indicated that CCK plays a role in satiety. It is secreted in the small intestine in response to food intake, and has been found in the brain's hypothalamus with other hormones involved in a range of behaviors, including depression. Geracioti and Liddle, then at the University of California, San Francisco, found equivalent baseline levels of the hormone in bulimics and controls; but bulimics' peak CCK levels after eating a standardized, liquid meal were roughly half those of the controls. The bulimics also reported subjective feelings of being less full. Moreover, a subgroup of five bulimic patients given antidepressant drugs for eight weeks showed normal CCK responses after eating. The researchers offer no explanation for the drugs' effects on CCK secretion.

No single chemical is likely to control such a complex behavior as appetite, Geracioti and others warn, noting that further research may show that abnormalities in CCK secretion are as much a result as a cause of a vicious cycle of insatiability. And because hormone secretion can be influenced by psychological factors, they say, psychotherapy will remain useful as well. — *R. Weiss*

Plant calorimeter may pick top crops

A new, speedy device that measures a plant's metabolic rate may improve on today's time-consuming methods for developing hardier crops. The machine, a novel form of calorimeter, can provide information in an hour for predicting a tree's growth rate over the next 40 years, say scientists who adapted the instrument for such studies. In addition, they say, the calorimeter can indicate a young plant's ability to withstand acid rain, herbicides and other hardships.

Currently, plant breeders seeking strong crops must watch and wait during the early stages of plant growth, selecting the fastest-growing plants and those holding up best to frost or heat. This task is eased by the calorimeter, which measures heat produced during metabolic activity, say Richard Criddle of the University of California, Davis, Lee Hansen of Brigham Young University in Provo, Utah, and their colleagues. Calorimeters built over the past few years can precisely measure the heat of crumb-size samples of cells and tissues under varying environmental conditions. Criddle and his colleagues hold that metabolic rate determines a plant's growth rate — a debatable point among plant biologists, who have traditionally correlated photosynthetic rate with growth.

To test the value of calorimetry for predicting growth, Criddle's group recorded the metabolism of pieces of carrots, tomatoes and other plants, as well as samples from several types of trees. They then compared those readings with the intact plants' known growth rates. The calorimetric recordings for the samples, they say, correlated with the growth rates of the intact plants. Their findings on tomatoes and carrots are scheduled to appear in PLANT, CELL AND ENVIRONMENT.

As for hardiness, the researchers say plants whose metabolic rates remain stable when subjected to stresses in the lab will similarly tolerate those conditions in the field. So far, they have identified several varieties of barley that thrive in highly salty environments, a common product of irrigation.

Before farmers and foresters base agricultural decisions on calorimetry readings, they will need to see further tests of the new device. "The technique has potential for being a very valuable tool," says Donald Fowler of the Canadian Forestry Service in Fredericton, New Brunswick, who supplied samples of trees for the studies, "but I find it surprising that a single measure would provide enough information for strain selection." — *M. Hendricks*

A swirl on the sun's blotchy face

The Earth has its hurricanes and tornadoes; Jupiter has its Great Red Spot and other swirling features. Now solar scientists report detecting a strong whirlpool in an otherwise quiet region of the sun's atmosphere. About 5,000 kilometers across, this recently observed solar vortex would be large enough to swallow up much of the Earth yet represents only a tiny fraction of the sun's 1.4-million-kilometer diameter.

"We believe this is the first report of a stable vortex structure in the turbulent convection of the solar atmosphere," say researchers from the Lockheed Palo Alto (Calif.) Research Laboratory and their colleagues in Sweden and West Germany. The group reports its findings in the Sept. 15 NATURE.

The researchers found the vortex by observing the motion of solar granules, light-colored patches that give the sun a blotchy appearance. These granules, each one typically 1,000 kilometers across, indicate the presence of hotter fluid forced up by convection near the sun's surface. Behaving somewhat like corks bobbing in a stream, the granules — as they appear, move and disappear — mark the vortex's position.

Normally, the Earth's atmosphere blurs the details of such granule motions, as seen by Earth-based observers. However, the combination of extraordinarily clear skies above the new Swedish Solar Observatory in the Canary Islands and sophisticated image-processing technology allowed the researchers to track the motion of a cluster of granules in one portion of the solar atmosphere. Although individual granules appeared and disappeared on the scale of minutes, the vortex itself persisted for at least 1.5 hours, the length of time over which the granules were observed.

Further investigations are needed to determine how often such vortices appear and how long they last, the scientists say. Their observation of a vortex within a small field of view already suggests that vortices are likely to occur frequently.

Convection of hot gases in the sun's atmosphere plays an important role in distorting and shifting the sun's magnetic field. In principle, swirling motions can twist magnetic fields and induce electric currents that can heat up solar gases. If such vortices turn out to be a common feature of the sun's convection zone, they may provide an important mechanism for heating the outer atmosphere, or corona, to high temperatures. — *I. Peterson*