

## A third hormone that can induce mating

A few years ago, endocrinologists isolated and synthesized a little-known hormone found in the brain's hypothalamus that controls the release of luteinizing hormone (LH), hence its name luteinizing release factor (LRF). LH causes the secretion of estrogen and progesterone and the onset of ovulation. It has been shown that the combination of estrogen and progesterone affects sexual behavior in subprimate female mammals.

Now scientists in Dallas have made a further step forward in understanding the many roles hormones play in sexual behavior. They have found that if LRF replaces progesterone, in the estrogen-progesterone combination, mating behavior is induced in female rats whose ovaries have been removed.

Physiologists S. M. (Don) McCann and Robert L. Moss of the University of Texas' Southwestern Medical School performed experiments on ovariectomized female rats to determine whether the preovulatory discharges, LRF, FSH (follicle-stimulating) and LH might also be involved in the induction of mating behavior.

Eighteen such rats were injected with low dosages of estrogen and placed in one of six experimental groups. Groups consisted of rats with estrogen only, rats with estrogen and progesterone and rats with estrogen and one of

four other hormones: LRF, LH, FSH and TRF (thyrotropin-releasing factor).

Those injected with estrogen alone, estrogen and FSH, estrogen and LH and estrogen and TRF showed little response to the presence of a male. As expected, all animals treated with estrogen and progesterone displayed sexual behavior 48 hours after injection.

The most dramatic results were obtained in the females treated with estrogen and LRF. Two hours after injection, signs of female sexual behavior began. Male rats could induce coitus behavior in females for at least six hours.

"The results are of extreme interest," says Moss in the July 13 *SCIENCE*, "since they indicate that another hormone in addition to estrogen and progesterone can induce mating behavior in the female rat. Particularly intriguing is the fact that this hormone is normally found in that area of the nervous system which is involved in mediating mating. It will be of extreme interest to determine if LRF can enhance mating behavior in males as well as in females. . . ."

The results of the experiments may prove to be even more important if further experimentation shows LRF can affect copulation in humans. LRF may be helpful in the treatment of impotence in males where no organic defect can be found. It may also become useful as a cure for frigidity and infertility in women. LRF is non-toxic in humans and has already been used to increase LH production. □



U.S. Geological Survey

*Eruption of Nicaragua's Cerro Negro.*

## Volcano forecasting: Imprecise but improving

The awesome forces of nature are dramatically expressed by volcanoes. Active volcanoes in Mexico and Central America are major geologic features in those regions, and their eruptions tend to be highly explosive. What are the chances of forecasting the eruptions?

"The state of the art of volcano forecasting is far from precise," Robert

## United States: A study of 140,000 births emphasizes prenatal care

children already, being unwed or without male support. Medical risks include diabetes, high blood pressure or toxemia of pregnancy.

If women were at neither social nor medical risk and received adequate care during pregnancy, deaths among their newborns, the study found, were 13 per thousand. This rate approaches that of the Scandinavian countries, which is among the lowest in the world. If women received adequate care but were at either medical or social risk, deaths among their babies were 24 per thousand, about twice as high. If women received adequate care but were at both medical and social risk, deaths among their offspring were 36 per thousand, or three times as high. If women were at no risk but received poor care, deaths were 30 per thousand. If women were at social risk and received poor care, deaths were 46.4 per thousand. And if women were at both social and medical risk and received poor care, deaths were

55.1 per thousand.

Seventy percent of the women with risks received poor care. Sixty percent of the women without risks received adequate care.

Most of the women at risk and getting bad care were black and Puerto Rican. Of some 22,000 black and Puerto Rican mothers at social risk, 98 percent received inadequate care. By contrast, white mothers were generally without risk and received adequate care. White women with no risks and good care had death rates of nine per thousand.

The most surprising result of the study, in Kessner's view, is the impact of prenatal care on infant survival. Because infant deaths were highest among blacks, Puerto Ricans and other people in the inner city, the report addresses its recommendations largely to health care centers in the inner city. These include some 75 neighborhood health centers, formerly under the Office of Economic Opportunity and now under Health, Education and Welfare, plus family

health centers at teaching hospitals in various cities.

The prime recommendation is that women be screened for social and medical risks on their first visit to a center. Says Kessner, "Ninety-five percent of all the women we studied had risks that could have been identified at the first prenatal visit." Then those women with identified risks should receive special attention throughout their pregnancies. Their newborns should also be put in neonatal intensive care units.

The report also recommends that the American College of Obstetricians and Gynecologists establish guidelines for maternal health care appropriate to risk categories, and that minimum-care standards be incorporated in existing Federal, state and local programs for maternal health care.

If all the women in the New York City study had received adequate care, infant deaths could have been reduced a third—from 21.9 per thousand to 14.7.

W. Decker of Dartmouth College told the Science and Man in the Americas meeting in Mexico City. Decker emphasizes the word "forecasting" as in probabilistic weather forecasting—rather than prediction—"to convey this same sense of useful though uncertain predictions of events which lie in the future."

"No single predictive index appears to be the master key to volcano forecasting," Decker notes. Volcanologists try to combine evidence from past history, geology, seismicity, surface deformation, magnetic and electric phenomena, and geochemistry. With the present state of the art, he says, strict zoning can probably save more lives than prediction.

"However, the situation is not hopeless." Useful though not precise forecasting is currently being practiced at Asama in Japan, at Taal in the Philippines, at Besymianny in Kamchatka, at Kilauea in Hawaii and at a few other volcanoes under continuous observation. "The only master key is better understanding of volcanic processes."

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A paper relating volcano eruptions and earth tides, reported in SCIENCE NEWS last October (10/21/72, p. 261), is published this week in the JOURNAL OF GEOPHYSICAL RESEARCH, along with another paper reporting similar findings by Wayne L. Hamilton of Ohio State University. Hamilton has found that the frequency, intensity and latitude of occurrence of volcanic eruptions vary

systematically within the well-known tide cycles. Eruptions are favored in months in which earth tides are large at the latitude of the volcano. He found that the eruptions of two volcanoes, Pelee and Soufriere, occur when two types of wave forms from the tides nearly synchronized.

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Several volcanologists are pointing

## Desert shrubs called 'the neglected resource'

Their names carry the flavor of the Western desert country: sagebrush, saltbush, creosote bush, burro sage, mesquite, cholla. Hardy, tough, enduring, these and other shrubs of the arid lands survive difficult conditions through superior adaptability.

Shrubs are the dominant vegetation of arid and semiarid regions, but they are among the most misunderstood, most neglected and least used plant forms in the world. So says Cyrus M. McKell, professor of range science and director of the environment and man program at Utah State University. They are, says McKell, a hidden resource.

Desert shrubs need someone to champion their cause, and McKell has taken on that task. In a paper delivered at the Science and Man in the Americas meeting in Mexico City, he lists six popular misconceptions about shrubs:

- Shrubs are worthless invaders. Shrubs that appear worthless to persons unfamiliar with a region may frequently be useful for grazing and other purposes, he says. "The worth of a so-

called invader shrubs can only be determined by an overview of its total ecosystem relationships." Sometimes shrubs make farming possible in areas where nomadism would otherwise be the only agricultural activity.

- Shrubs are generally unpalatable to all livestock except goats. "In reality, a significant proportion of the herbage removed by grazing animals comes from shrubs. . . . Not only is the herbage from shrubs palatable to most animals but it may also be crucial to achieving a balance in the nutrient intake . . . ."
- Large areas of valuable land are occupied by worthless shrubs. This involves relative values, McKell points out. "Existing 'worthless' shrubs might have useful properties that are simply unknown or undeveloped." He mentions the liquid wax from the jojoba (see p. 26), high-protein fodder from *Atriplex*, latex from the guayule, and other species high in fatty acids, protein, essential oils. "Some of these could be very useful as 'crops' for arid lands. Under such conditions, many 'worthless' shrubs would have to be reevaluated!"
- Shrubs are low in feed value. "Shrubs are high in digestible protein, phosphorus and carotene."
- Shrubs are spiny and harsh and are therefore a menace. "Not all shrubs are harsh and spiny." Some species "may look formidable, but the net effect is generally not a deterrent to their use."
- Shrub eradication is an essential and an important step in any range improvement program. This is "the most serious and erroneous misconception." At times complete control of shrubs has been a goal of range management. "To manage arid lands wisely requires that we work positively regarding the various advantages of individual shrub species rather than use a shotgun approach designed at indiscriminate control of shrubs per se."

What are the ways arid-land shrubs are useful to man? McKell is not at a loss for answers. They can be used for livestock and animal feed ("existing use of shrubs for domestic animal feed falls far short of the possible potential"). They can lead to commercial products ("many opportunities"). They

## Are the continents propelled by elastic energy?

A major objection to the geophysical theory of plate tectonics or continental drift, to use its older name, is that there doesn't seem to be a sufficient source of energy in the outer layers of the earth to move such heavy things around.

A possible answer to that objection is provided in the June 25 NATURE PHYSICAL SCIENCE by David Pines and Jacob Shaham of the University of Illinois at Champaign-Urbana. They propose that elastic energy stored in the crust and mantle of the earth is sufficient for the purpose.

The elastic energy is generated by stresses set up as a result of deformations caused by forces acting on the earth. Pines and Shaham figure the stored energy to be about  $10^{82}$  ergs at present. They figure that continental drift and seismic activity each release about  $10^{25}$  ergs per year, or about one ten-millionth of the present reserve.

Pines and Shaham propose a theory whereby such motions as continental drift, earthquakes and polar wandering tend always to reduce the energy stored in this elastic "reservoir." This, they say, explains the westerly direction of polar wandering and the drift of continents toward the equator, both of which are observed.

Pines and Shaham propose an "elastic epoch" dating from a cataclysmic event or series of events a hundred million to a billion years ago. They figure this is the best way to get the distortion and the energy storage since it is difficult to see how it could happen otherwise on an earth that is gradually spinning down. They surmise that such a cataclysm might have been the capture of the moon. They suggest then that scenarios could be devised starting from a particular lithospheric configuration at that time, say a supercontinent, and coming down to the present by energy-dissipating motions.