

Genetic basis for narcolepsy

In sleep disorder research, an area quickly gaining interest (SN: 3/26/77, p. 204), one of the most baffling phenomena is narcolepsy. This little-understood disease affects about 250,000 Americans, males and females equally. Sometimes called "sleep epilepsy," the disorder is characterized by uncontrollable, recurring and sudden periods of daytime sleep, often accompanied by cataplexy—a rapid loss of voluntary muscle control that frequently leads to complete body collapse, lasting a few seconds to several minutes.

Though no cause is yet known, recent evidence strongly suggests that narcolepsy is hereditary. Researchers at the Stanford Sleep Research Center in California have successfully mated a pair of narcoleptic Doberman pinschers and produced a litter of pups, all of which exhibit "unequivocal signs of the disease," William C. Dement, director of the center, told SCIENCE NEWS. Dement said the offspring represent "solid evidence of the genetic origin of the disease," and provide a reliably reproducing animal model for further research.

A genetic basis for the disease has been suspected. A familial tendency toward narcolepsy has been noted in humans; based on family tree studies, an individual's chance of having the disease is about

50 times higher if other family members have it. After finding that narcoleptic poodles mated with normal dogs all produced normal offspring, Dement and co-workers hypothesized that the disorder is due to one or more recessive genes and that it occurs only in pure homozygous recessive individuals—the offspring of parents both carrying the recessive gene or genes for the trait. The narcoleptic Doberman puppies are the first successful support for the hypothesis. Dement plans to further test the theory by backcrossing a normal son with his narcoleptic mother. If the trait is truly recessive, about half the offspring should be narcoleptic.

Canine narcolepsy was initially noted in 1972; the center obtained its first dog for study in 1973 and since has conducted a nationwide survey for similarly afflicted dogs. The disease apparently occurs in all breeds of dogs and also may afflict bulls and other animals. Dement says the canine disease is "phenomenologically and physiologically" identical to that in humans.

A neurochemical defect related to REM sleep (a sleep stage characterized by rapid eye movement) may be at fault in narcolepsy, Dement says. The disease, sometimes called "an intrusion of REM into the waking state," is characterized by the immediate onset of REM, which normally occurs about 90 minutes after falling asleep. With the development of a genetically pure colony, Dement says the biochemical work which may uncover the underlying cause of narcolepsy is now possible. □

Physical anomalies predict hyperactivity

Possible genetic or early biological contributors to hyperactivity in youngsters have been detected by researchers from the National Institute of Mental Health and the University of Virginia and the University of Georgia. The findings, say the investigators, demonstrate that hyperactivity at age 3 can be predicted at birth in some cases "from a 5- to 10-minute newborn examination."

Hyperactivity, defined in this experiment as a combination of short attention span, peer aggression and impulsiveness, is sometimes, but not always, accompanied by a learning disability problem. Causes of the syndrome have been linked to a number of environmental conditions, nutrition (primarily food additives) and other factors. But research has been conflicting—highlighted most recently by University of Wisconsin results that essentially contradict the food additive theory (SN: 6/25/77, p. 406). And a report in late 1977 indicates that the problems of hyperactive youngsters can linger on into their teenage years (SN: 12/10/77, p. 389).

However, the NIMH, et. al., study reported in the Feb. 3 SCIENCE, identifies a

constellation of physical abnormalities—some subtle and some more apparent—that could signal the later development of hyperactivity. The set of 17 "minor physical abnormalities" are best known for their occurrence in Down's syndrome. However, the average person in the general population has two to four of these 17 slight abnormalities, according to the researchers. The list of anomalies includes head circumference out of normal range, malformed, lowset or asymmetrical ears, high, steeped palate and toe abnormalities.

Such physical properties might be genetically-transmitted developmental deviations, some scientists have suggested, or they might result from "some insult in early pregnancy that mimics genetic transmission," say the researchers. And even though not truly genetic in nature, such an occurrence in early pregnancy could influence the development of the physical anomalies as well as trigger a deviation in the central nervous system that could be responsible for later hyperactive behaviors, they say.

In the study, 30 male newborns were examined at birth for the presence of any of the physical abnormalities. Three years later, 23 of them were followed up while attending a research nursery school. In addition, 36 other 3-year-old boys (hyperactivity is far more prevalent among males) were studied, although they had not been seen at birth. In a variety of observations and analyses, each child was evaluated for short attention span, peer aggression and impulsiveness while at school.

The findings show that hyperactivity was significantly related to an unusually high occurrence of physical abnormalities discovered at birth (or found at age 3, in the case of the 36 additions to the study).

Generally, those newborn males with "more than four" of the 17 anomalies "have a better than average chance of becoming hyperactive," NIMH child psychologist Mary F. Waldrop told SCIENCE NEWS. "Of course there are other... environmental... reasons for hyperactivity," she cautioned. Not every child with an above-four score will become hyperactive, and some within the "average" anomaly range will develop hyperactivity, she said.

Nevertheless, Waldrop says, the results have "some implications" for predicting hyperactivity and for possibly utilizing early, pre-school intervention programs. (Previous studies have linked pre-school to elementary school hyperactivity.) A not-to-be-overlooked benefit, however, is that the findings "might help relieve some guilt on the parents' part" about being responsible for their child's problems, she adds. Also participating in the study were Richard Q. Bell of the University of Virginia's psychology department, Brian McLaughlin of NIMH and Charles F. Halverson Jr. of the University of Georgia's College of Home Economics. □



Narcolepsy strikes: Doberman puppies awake one minute, sound asleep the next.