

Clouds of this kind are believed to be the places where new stars form. These studies indicate that the clouds are held together by the mutual gravitational attraction of the gas molecules and dust particles that make them up, and that goes to support the belief that they are the birthplaces of stars. The formation of a star is supposed to begin with a collapse under mutual gravitation of this sort.

However, the age of the clouds determined by this study, which is 100 million years, indicates that something is slowing the collapse of the clouds, and therefore possibly inhibiting star formation. On the other hand, this figure, which is ten times the previous age estimates, is an aid to understanding the chemistry of the clouds.

These clouds are so tenuous that encounters between molecules in them have to be astronomically rare. This means that the formation of complex molecules is an extremely slow process. At the same time, the clouds are irradiated with ultraviolet light from nearby stars, which tends to dissociate complex molecules. The dust particles in the clouds shade the complex molecules partly but not completely from the ultraviolet. The balance among formation, protection and dissociation must add up in such a way as to build up the observed concentrations of various molecules in the clouds. It was hard to see how that could happen if the clouds were only 10 million years old. At 100 million years it's much easier to figure. □

Now it's in the Scotch

Beer enthusiasts recently pushed aside their mugs upon hearing that small amounts of nitrosamines had been found in their brew. Now Scotch whisky lovers may follow suit. Nitrosamine sleuth David H. Fine has announced the discovery of minute amounts (1.7 to 2.8 micrograms per liter) of nitrosamines in six of seven brands of Scotch: Chivas Regal, Black and White, J&B, Ballantine, Sandy Scot and Cutty Sark. White Label alone remained free of the chemical, which has been implicated in cancer of the esophagus.

Fine and E. Ulku Goff of the New England Institute for Life Sciences in Waltham, Mass., presented the findings in a report prepared for the National Science Foundation. In the screening of liqueurs, wines, whiskies, brandies and beer for nitrosamines, they used a "much simplified" gas chromatograph technique, sensitive to 0.2 micrograms per liter. English dark ale had the highest nitrosamine concentration, at 7 micrograms per liter — yet that was 20 times lower than the minimum level the Department of Agriculture will allow before it will start testing a product for dangerously high levels of nitrosamines. Such a small amount "cannot be considered a possible causative agent in alcohol related cancers," Fine says. □

Down's syndrome and cell division

Although only four percent of the babies born each year are born to women older than 40 years of age, 40 percent of those babies have Down's syndrome, or mongoloidism, a congenital abnormality characterized by mental retardation. The same is true of babies born to women under 17 years of age. In the past, scientists have attributed the syndrome to heredity, to damage to the uterus or to the ovum by radiation, chemicals or disease, and even to changes in sexual behavior. Children with Down's syndrome are marked by their appearance — a sloping forehead, a flat nose, low-set ears, epicanthal folds over the eyes — and by the presence of an extra 21st chromosome. Researchers at the University of Kentucky used the extra chromosome factor in combination with the known decrease in estrogen in women over 30 to provide new evidence for a hormonal explanation of Down's syndrome, as reported in the Aug. 2 NATURE.

Dushyant K. Gulati explains: At birth a female will have all the eggs she will get for reproduction. The eggs are developed only to the prophase stage of cell division until puberty, when the cyclic rise in estrogen triggers one egg, once a month, to ovulate or resume cell division (meiosis). Estrogen controls the rate of meiosis, and as a woman grows older, her estrogen concentration decreases, which decreases the rate of meiosis. The problem arises when the chromosomes line up for cell division — side by side — and are held together at one or more points called chiasmata. The chiasmata hold the chromosomes (which tend to repel each other) together while the chromosomes align so the dividing cell's spindle can form to pull the chromosomes apart into separate cells. The chiasma travels up the length of the chromosomes to the end and "terminalizes". If meiosis is too slow, the spindle does not attach to both ends of the chromosomes by the time the chiasmata have terminalized, and the dividing cells will have unequal numbers of chromosomes. The 21st chromosome is very short and only has one chiasma, making it especially easy to lose. A divided cell with no 21st chromosome will not survive. But one with three can go on to regular fertilization by the sperm, eventually resulting in an offspring with Down's syndrome.

Researchers Philip H. Crowley, Dushyant K. Gulati, Thomas Hayden, Penelope Lopez and Ruth Dyer tested for a correlation between the incidence of Down's syndrome and the changes in estrogen levels as they related to the age of the mother. They found it to be significant.

The hypothesis explains more than the high incidence of Down's syndrome among children of older women. Young women are also producing high numbers

of mongoloid children. Gulati says that the menstrual cycles of young women are not fully stabilized until they are about 20 years old. The higher variability of their hormone levels also affects the rate of meiosis in their eggs. □

California quake autopsy report

So far, there's nothing in the way of precursors from the data preceding the Aug. 6 San Francisco area earthquake to "rush out in the streets and shout about," says Barry Raleigh of the U.S. Geological Survey in Menlo Park, Calif. Even so, USGS scientists are happy — as only geologists can be — about the 5.9 Richter magnitude quake, which caused little damage and no reported injuries.

The quake, which originated near the small towns of Morgan Hill and Gilroy about 70 miles southeast of San Francisco, has had scientists scrambling through the last year or so worth of measurements from tiltmeters, seismographs, magnetometers, creepmeters and strainmeters in the heavily instrumented area. According to Raleigh, "no well defined short-term events" have been found — though radon emissions from the ground changed abruptly in some spots and not others — and data from the long-term are "not clear, though there may be things in the seismicity and tilt." Previous quakes in the area, such as ones near Hollister in 1962 and 1974, showed strong precursory signals.

The researchers' satisfaction, however, comes from "a tremendous wealth" of information from the strong motion instruments near the site — "the best data yet," says Raleigh. Strong motion instruments are triggered by and measure, among other things, the acceleration of the ground during a quake. The acceleration along that particular fault — the Calaveras fault, which branches from the San Andreas fault about 30 miles south of the quake site at Hollister and runs roughly parallel to it and northward — had been predicted by the USGS and used to establish structural requirements for the area. The strong motion measurements recorded near the site confirm the USGS predictions and add "a lot of confidence" about the ability to predict earthquake hazard, says Robert Wesson of the USGS in Reston, Va. (The maximum horizontal accelerations observed were 0.4 g. One g is equal to the acceleration due to gravity [32 ft./sec²]; 0.4 g, therefore, is an acceleration 40 percent that of gravity, but occurring in a horizontal direction.)

In addition, Wesson notes, the observed cracks and displacements follow exactly the predicted fault line mapped by the USGS. "It was just what [was] needed" to confirm the accuracy of the maps, which are used to identify quake-hazardous areas. □