

earth-based monitoring of the resulting "rotational signature" in the emissions that enabled researchers to determine the true length of a Jovian day, which could only be estimated from the latitudinally varying drift rates of visible features in the cloud tops.) The instrument's sensitivity enables it to pick up emissions as weak as 10^{-24} watts per square meter per Hertz, which, says Warwick, is about 100 times better than most of the other available devices.

Building such an instrument essentially for one planet (it will also be used in solar studies, and Warwick thinks it might be able to pick up the weaker emissions from Saturn) is not nearly so extreme a notion as it would be to do the same with a large optical telescope. If the general rule of thumb holds true, Warwick says, the 8,000-square-meter antenna array would cost no more than the associated electronic equipment, or than the necessary software and data displays. □

Detecting cystic fibrosis carriers

Although cystic fibrosis is the most common lethal inherited disease among whites in the United States, there has been no test to determine which four or five percent of the population are at risk of having an affected child. Now such an assay may have been found, according to a report in the Jan. 1 *NEW ENGLAND JOURNAL OF MEDICINE* by Jan L. Breslow, Joseph McPherson and J. Epstein of Harvard Medical School. The prospective test is based on the discovery that cultured skin cells called fibroblasts exhibit significantly less sodium transport if they are from carriers of the cystic fibrosis gene than from healthy persons.

Breslow and colleagues took fibroblast cells from 13 healthy persons, eight cystic fibrosis patients, eight parents of children with cystic fibrosis (who have to be carriers) and three healthy siblings of cystic fibrosis patients (who have a two-thirds chance of being carriers). The investigators cultured each batch of fibroblasts, exposed them to a drug called ouabain and studied each batch's ability to accumulate sodium. They found that the fibroblasts from all cystic fibrosis patients, from all parents of cystic fibrosis patients and from all three siblings had a significantly diminished ability to accumulate sodium in the presence of ouabain than did the fibroblasts from healthy persons. Thus, all three siblings appeared to be carriers of the cystic fibrosis gene.

"Our results," Breslow and co-workers conclude, "suggest that carriers of cystic fibrosis can reliably be distinguished from normal persons by means of the fibroblast assay present in this report," and while the "assay is probably too cumbersome to apply in mass screening of the population for the cystic fibrosis gene... it should be clinically useful in studies of relatives of patients with cystic fibrosis to identify carriers of the CF gene."

In an accompanying editorial, John W. Littlefield of Johns Hopkins Hospital in Baltimore contends that the National Institutes of Health or the Cystic Fibrosis Foundation, or both, should further explore the assay's ability to detect cystic fibrosis carriers. He cautions that skin fibroblasts might not always accurately identify cystic fibrosis carriers because fibroblasts from persons of different ages could act differently in tissue culture.

The discovery of Breslow and colleagues does shed further light on the nature of cystic fibrosis because a deficient sodium transport in fibroblasts undoubtedly bears some relation to the elevated level of salt in the perspiration of cystic fibrosis patients — a discovery made about 30 years ago. Salty perspiration, in fact, has been the most reliable aid in the diagnosis of cystic fibrosis. □

Jet contrails appear to alter weather

Contrails — those white cloud-like swaths written across the sky by high-flying aircraft — are being implicated in weather changes, at least throughout the Midwest in regions that experience heavy jet traffic. Their suspected legacy includes a local increase in cloud cover and a diminishing average difference between daily high and low temperatures. If research proves these suspicions true, jet traffic could be crafting subtle climatological changes affecting crop production and energy use.

Stanley Changnon, Richard Semonin and Wayne Wendland at the Illinois State Water Survey in Champaign correlated trends in increasing jet traffic against weather reports dating back to the turn of the century. Readings for several bands cutting across northern Illinois were studied because flight records identified them as paths that experience the heaviest air traffic. Weather changes over these areas were contrasted against those for regions in Wisconsin, Minnesota and southern Illinois where records reported relatively little jet traffic.

The Illinois team found that since the late 1960s — and a commercial reliance on jet transport — there has been a notable shift toward cloudier days and less extreme monthly ground-air temperatures along jet alleys. Cloud cover increased 10

percentage points since 1955 "at many or all stations with jet traffic that were studied," Wendland said. Autumn, typically having the least cloud cover, showed the greatest seasonal increase in clouds.

This is important because clouds have two principal effects. During the day, they block the sun to hold ground-level temperatures down. At night, they tend to prevent warm air near the ground from escaping into the upper atmosphere. As such, clouds contribute to a general leveling off in diurnal temperature extremes. The apparent trend toward increasing cloud cover in jet-traffic zones could translate into warmer winter nights and cooler summer days if carried over seasons, thereby reducing costly home heating and cooling requirements in some regions. It could also translate into lengthened growing seasons for the Farm Belt.

Subtle weather changes have even been associated with contrails that formed on otherwise cloudless days. Wendland said his team monitored 12 such days last year, and in eight, "temperature and relative humidity were clearly affected." Air temperature at ground level normally rises each day between 8 a.m. and noon while relative humidity falls, the climatologist explained. But the researchers found that the presence of contrails temporarily halted the normal morning temperature incline and humidity decline. For contrails lasting half an hour, temperature and humidity leveling off persisted a full hour.

How and why contrails form is not precisely understood. It's assumed that water vapor from jet exhaust crystallizes in the upper atmosphere — above 20,000 feet — forming cirrus-like ice clouds. But whether unburned hydrocarbons and gases in the exhaust make contrails materially different from regular clouds is not known. Wendland says it's not even known why contrails appear to spread over time. The vapor trails may simply diffuse laterally, but it's also possible that they actually seed the surrounding atmosphere, spawning new clouds in adjacent regions.

Next year the Illinois team hopes to conduct contrail-formation studies from planes and even to measure the filtering effect of jet trails on solar radiation using airborne monitors above and below newly formed contrails. □



Jet exhaust leaves its mark: contrails.