MEDICINE

Illness and the arts

Students in the arts report more illnesses linked to stress than do students in the sciences, medicine or law, and social science students are in between, according to a survey of students at the University of Edinburgh. The results are reported in the JOURNAL OF PSYCHOSOMATIC RESEARCH (Vol. 20, No. 1), by Peter Sheldrake and his co-workers at the Research Unit on Intellectual Development in Edinburgh.

The illnesses that art students reported more often included nervous tension, exhaustion, insomnia and migraine headaches. Only children, regardless of their area of study, also reported more stress-related conditions than did students with siblings. "These findings," Sheldrake and his colleagues conclude, "suggest a greater incidence of various illnesses as reported by students whose intellectual preference lies in areas concerned with expression and communication and equally, students whose birth position is one where they may have been more reliant on communication with adults."

In other words, art students, and to a lesser degree, social science students, may be more vocal about reporting stress-related conditions than are science, medical or law students, just as only children may be more vocal about reporting than are students with siblings. On the other hand, there may be something in the mental or physical makeup of art and social science students and only children that really makes them more susceptible to stress-related illnesses.

The consequences of tea drinking

Although the tea-drinking ritual is important to millions of people, especially in the Far East and British Commonwealth countries, drinking four to six cups of tea daily can create a vitamin deficiency. So warns Sandi B. Buhr and Doris M. Hilker of the University of Hawaii at the recent annual meeting of the Federation of American Societies for Experimental Biology.

Inspired by research in Thailand suggesting that tea can create a vitamin B_1 deficiency, Buhr and Hilker set out to confirm it. First they found that subjects drinking a liter of tea daily for a week experienced mild symptoms of vitamin B_1 deficiency—fatigue, nervousness and loss of appetite. Then they found that the amount of vitamin B_1 in their bodies fell off after the week of tea drinking, even though they were consuming standard amounts of the vitamin in their diets.

So it looks as if tea somehow interferes with the body's use of vitamin B_1. Tannin, a component of tea known to bind the vitamin irreversibly, may be the culprit.

Trace elements and heart disease

A number of links have been made between "soft" water and deaths from heart disease. But what is it about such water that might actually precipitate heart disease? An excess of certain trace elements? A deficiency of others? An imbalance? And how about the pH (acidity or alkalinity) of the water? Cheong C. Chah and his colleagues at the University of Georgia decided to find out.

They analyzed water drunk by heart patients and by healthy subjects. And as they reported at the recent FASEB meeting, the patients consumed, on the average, significantly higher amounts of phosphorus, cobalt and iron, but lower amounts of cadmium than did the healthy subjects. There were essentially no differences in the pH of the water drunk by the patients and the healthy subjects.

The scientists also discovered that the trace element content of food items may be more crucial than those in drinking water in influencing the course of heart disease.

PHYSICAL SCIENCES

From our reporter at the meeting of the American Physical Society in Washington, D.C.

New solar neutrino experiment

For several years now, Raymond Davis Jr. of Brookhaven National Laboratory and his collaborators have been searching for an expected flux of neutrinos from the sun. To the consternation of theorists they have been unable to find the expected amount of solar neutrinos. Discussing his work at the meeting, Davis announced that his group is now planning a second experiment with greater sensitivity, which will check on the findings of the first one. A result of such great significance as this should not depend on a single experiment, he believes.

The group's present experiment uses a tank of perchloroethylene in a mine in South Dakota to record neutrinos. An incoming neutrino may react with a chlorine nucleus in the fluid to form an argon nucleus, and the argon nuclei are then counted.

The new experiment will use gallium as a detector. The process in this case involves a neutrino interacting with a gallium 71 nucleus to produce a germanium 71 nucleus. Study of this reaction has progressed to the point that Davis believes by the end of the year his group will know how to do the experiment and will be able to design it. He estimates it will take about 20 tons of gallium, which is "sort of the world's supply." Gallium is a rare element, but it is a by-product of aluminum refining, and aluminum companies can supply it. It will take about two years to amass 20 tons of gallium, Davis figures, but "I don't know how many years to get the money."

We are the ashes of defunct stars

After hydrogen and helium, carbon and oxygen are the most abundant elements in the universe. They are also the basic elements in the compounds that make up living matter.

It has long been believed that carbon and oxygen are produced in helium-burning stars. Sam M. Austin of Michigan State University reported that work at the university's cyclotron laboratory confirms the process by which astrophysicists believe the carbon is made. Taken together with work done elsewhere by other scientists, this information can be used to calculate abundances of carbon and oxygen made by these stars.

Helium burning is the second stage in a star's life. A star begins by fusing hydrogen nuclei to make helium. When its hydrogen is all used up, the star undergoes a certain amount of collapse under its own gravitation. The collapse generates heat that eventually ignites helium burning.

The carbon is produced by a complicated reaction that fuses three helium nuclei into a carbon 12 nucleus. The process yields a carbon nucleus with 7.6 million electron-volts more energy than the lowest energy state of carbon 12. One of the crucial discoveries (confirming an assumption on which the astrophysical theory hung) is that this state does, in fact, exist and that it can lose its excess energy, decaying to a stable state so that the carbon stays around. The next step is for the carbon to pick up another helium nucleus to make oxygen 16. Ultimately the star uses up all its helium and undergoes a supernova explosion that throws its fusion products into space.

The reaction rates indicate that carbon is the main product in the stars. Yet the abundance ratio in the solar system is three carbon to five oxygen. Since the sun is a hydrogen-burning star, heavy elements in the solar system must have come from the debris of older stars. The discrepancy in the abundance ratios is something of a mystery, says Austin, but it may indicate that some of the carbon is further processed inside the stars, making small amounts of even heavier elements.