

ASTRONOMY

Thermometer Takes Temperatures of Stars

► **FEVERISH STARS** will have their temperatures taken with greater accuracy through a photoelectric cell thermometer.

The new temperature-taking device was announced by Dr. Donald A. MacRae of Warner and Swasey Observatory, the Case Institute of Technology, at the meeting of the American Astronomical Society in Amherst, Mass. It is capable of detecting differences in temperature of only a few hundred degrees, a small amount when a star's temperature runs up into thousands and even tens of thousands of degrees Centigrade.

Hot stars are known to have a bluish hue and give off more blue light than cooler, yellow stars like the sun. Thus, temperatures obtained with the new instrument are based on the colors of stars and total amount of heat from the star that reaches the earth.

A prism placed in front of the telescope spreads the star's light out into a spectrum of colors, Dr. MacRae explained. When a narrow slit is moved along the star's spectrum from red to violet, the intensity of the light falling through the slit at any position is measured by a sensitive photoelectric cell. In this way small differences in the relative amounts of light of different colors can be measured accurately.

The photoelectric method of measurement is much more precise than the earlier photographic methods, Dr. MacRae pointed out. With this equipment slight irregularities or peculiarities in certain kinds of stars can be detected.

Science News Letter, January 10, 1953

PEDIATRICS

Eight-Man Team for Cleft Palate Baby

► **THE BABY** born with a cleft palate and, maybe, a harelip can be helped to grow up into a person who "can ask for a job with a smile and a clear voice, without mental reservation," Dr. O. W. Brandhorst, dean of Washington University School of Medicine in St. Louis, declared at the meeting of the American Association for the Advancement of Science in that city.

Team play or cooperation of eight different medical specialists, however, may be needed to fulfill this hope of every cleft palate patient. The eight Dr. Brandhorst listed are: 1. the pediatrician in guiding the health under severe conditions; 2. the surgeon in providing surgery, when needed; 3. the educationist in his educational efforts under trying conditions; 4. the dentist in preserving oral tissues as a foundation for the future; 5. the orthodontist in adjusting tooth position and arch form; 6. the prosthodontist in supplying a dental prosthesis for missing parts and speech aid; 7. the speech pathologist in speech training; 8. and

possibly the psychologist or the psychiatrist, or both, to give reassurance in the field of social adjustment.

All eight or nine may not be needed in every case, but in some they will be, Dr. Brandhorst stated.

The cleft palate patient, he pointed out, has "entered the world handicapped not by loss of tissue necessarily but by a lack of it." In this respect he differs from a person who, through accident, has lost tissues which he had and which functioned normally for him for a time, for example, the cripple who has lost a leg or the soldier who has had part of his jaw shot away. So Dr. Brandhorst thinks one should speak of "habilitation" for the cleft palate patient and "rehabilitation" for those who have lost tissues they once had.

Science News Letter, January 10, 1953

PSYCHOLOGY

Pass Around Tasks To Up Production

► **MORE THAN** one out of four workers in American industry are bored by the repetitive jobs they have to do. But psychologists are upping production and making employees happier by the simple expedient of passing around the various kinds of tasks.

New ways of fitting the industrial machine to human beings were reported by Dr. Morris S. Viteles, psychology professor of the University of Pennsylvania, at the sessions of the American Association for the Advancement of Science.

First of all, Dr. Viteles advised that less intelligent people be picked for monotonous jobs, because they are less susceptible to boredom. Personnel managers and industrial executives already have caught onto this. Many people are finding machine-like, speed-regulated work challenging.

But the main method of making factories happier is to use the trick of what Dr. Viteles calls "changing the work situation." This means that a girl is changed, during the day, from making cigarettes to cutting them, or a clerk is shifted from one kind of routine work to another to vary the job.

Rest pauses help alleviate boredom, and the tempo of the work can be adjusted to the need of individuals without loss of efficiency.

The dangers of monotony did not arise with the modern industrial age, Dr. Viteles said, because throughout the ages a large proportion of the work of the world has been repetitive.

Today, despite the intensification of repetitive work by machine, the situation may be better than in the past because of the shorter working day, higher standards of living, and better recreation and educational facilities.

Playing music as a background in the factory does not significantly decrease or increase output, late studies show. But most employees like it.

Science News Letter, January 10, 1953

IN SCIENCE

BIOLOGY

Make Phase Photographs Of Living Chromosomes

See Front Cover

► **SHOWN ON** the cover of this week's SCIENCE NEWS LETTER is a photograph, believed to be the first made in the living state, of the anaphase step in division of a cell in the anther of the spiderwort plant.

The clarity and detail of this and similar photographs, Dr. A. M. Winchester of Stetson University, DeLand, Fla., reported to the American Association for the Advancement of Science, are probably better than those from stained preparations.

For many years, scientists have had to depend upon killed and stained tissues for knowledge of the chromosomes, tiny bodies within cells that carry the hereditary genes. Such treatment, it was feared, might alter the nature of the cells to give an erroneous picture.

Dr. Winchester used a special experimental phase microscope at Harvard University to take his pictures of chromosomes in living cells. Details of the method of shortening and thickening of the chromosomes as they prepare for division was a major point brought out by his study.

Science News Letter, January 10, 1953

TECHNOLOGY

Must Design Machines To Fit Their Operators

► **MACHINES MUST** be designed to fit their operator's capabilities and limitations or else some of the gadgetry that has been included to get better results may go to waste.

Machines are not replacing men; they are merely changing the nature of their work, Dr. Jack W. Dunlap, president of Dunlap and Associates, Inc., Stamford, Conn., reported to the American Association for the Advancement of Science meeting.

Machines relieve workmen of some muscular effort, routine work, rapid computations and some fine discriminations, but require more dial-watching, panel-monitoring and machine maintenance. Failure to consider the human element can result in serious curtailment of machine performance, he said.

One undisclosed firm requested plans for a new control room in which operator comfort, ease of operation, accuracy and efficiency of operation were to be considered. Subsequent statistics show the control room is recovering its complete design and construction costs every 60 days with increased production.

Science News Letter, January 10, 1953

CE FIELDS

BIOLOGY

Viruses "Order" Reproduction of Cells

► VIRUSES DO not reproduce themselves, but chemically "order" the cells they are found in to carry out the reproduction.

Describing his studies on the tobacco mosaic virus, Dr. Barry Commoner, Washington University biologist, told the American Association for the Advancement of Science meeting in St. Louis that viruses, like chromosomes or other reduplicating agents in cells, can control the basic chemical processes of the cells in which they are found.

In this way, the virus attains the extreme limit of parasitism, Dr. Commoner said. A virus not only takes its raw materials from the host cell, but it controls the chemical processes of host cells to cause itself to be reduplicated.

When tobacco mosaic virus enters a tobacco cell, this non-living protein starts a strange chemical process going in the host. First, ammonia in the cells begins to collect around a cell particle. Then other cell substances are broken down and their ammonia gathered.

This ammonia furnishes the core for synthesis of new type protein substances which eventually end up as more tobacco mosaic virus. Dr. Commoner said that chemical reactions occurring in the virus-infected cell balance with reactions in a normal cell, indicating that the difference is only in kind of protein made.

Dr. Commoner said that viruses and chromosomes or other reduplicating agents in cells exhibit similar characteristics, so much so that a virus can be figuratively thought of as a "free hereditary agent." Thus study of viruses may lead to greater understanding of the way chromosomes and other cell reduplicating agents work.

Science News Letter, January 10, 1953

ELECTRONICS

Guided Missiles Can Overcome Own Errors

► GUIDED MISSILES can now carry inside them complicated gadgets which will make up for any navigation errors caused by mistakes in manufacturing parts. The same controls can account for side winds, changes in air density and other unexpected atmospheric events that would throw the guided missile off target.

This is revealed by Capt. Robert W. Fye, an instructor in guided missiles at Fort Bliss, Tex.

The best of these systems, but also one of the most complicated, accomplishes the task without any help whatsoever to the missile

from outside during the course of the flight. Outside help, in the form of LORAN or from the stars can be interfered with, the first by the enemy, the second by the elements.

For the basis of this internal navigational system, the guided missile scientists went all the way back to Newton and his second law of motion. This says that force equals mass times acceleration. Devices, called accelerometers, in the missile measure the rate of acceleration at which the missile is deviating from its appointed path. They send signals to the steering mechanism that will put the missile back on the correct path to the target.

The drawback to this system, Capt. Fye states in *Antiaircraft Journal* (Nov.-Dec., 1952), is the complexity of the equipment necessary to it. Other systems, based on pre-setting the course, on use of a magnetic compass, or on radio or the stars, however, make for errors in navigation.

These navigation devices are all designed for surface-to-surface, or SSM, missiles.

Science News Letter, January 10, 1953

BIOCHEMISTRY

Nitrogen Grabbers Taken From Intact Plant

► CHEMISTS ARE delving into one of nation's most important secrets—how living things can capture nitrogen gas from the air and turn it into the raw materials of growth.

Dr. R. H. Burris, biochemist at the University of Wisconsin, told the American Association for the Advancement of Science meeting in St. Louis that recently developed methods for removing nitrogen-grabbing factors from a whole plant have sped up research in this important life process.

Nitrogen compounds in the soil are the basic ingredients of living tissue. When nitrogen compounds are removed from the soil by farming, or carried to the sea by erosion, the soil becomes impoverished.

Nitrogen gas in the air, however, is "grabbed," or fixed, by many living things, like leguminous plants and many bacteria, to return nitrogen compounds to the soil.

Biochemists are now attacking the problem of what are the chemical steps lying between free nitrogen gas in the air and its final form as nitrates or nitrites in the soil.

Dr. Burris said that ammonia has been found to be one of the key intermediate states in nitrogen fixation. The importance of ammonia, Dr. Burris said, is that it combines with carbon groups to form organic nitrogen compounds.

Further research is going on now to discover the steps that lie before and after ammonia formation. A recent big step in understanding nitrogen fixation has been a technique for removing the nitrogen-fixing nodules of leguminous plants without impairing the fixation properties of the nodules. This offers a simplified system for study, as the intact plant can be replaced by the detached nodule, Dr. Burris said.

Science News Letter, January 10, 1953

BIOCHEMISTRY

Lost Enzyme Seen As Cancer Cause

► LOSS OF an enzyme chemical from some body cells may be the cause of cancer.

Studies supporting this theory of the cause of cancer were reported by Dr. James A. Miller of the University of Wisconsin at the meeting of the American Association for the Advancement of Science in St. Louis.

Cancer researchers have for years thought that the reason cancer cells multiply without the restrictions of normal cells is that some chemicals in the cells or some genes are changed when the cells become cancerous.

Dr. Miller's theory is that a chemical is somehow lost entirely from the cell. This chemical, perhaps an enzyme, according to this theory is the growth self-governor of the cell.

Support for the theory comes from studies of rats that get liver cancer when fed an azo dye. The dye, Dr. Miller said, combines with and possibly destroys the chemical effectiveness of certain proteins necessary for control of growth but not for life.

If this continues, cell generations might arise, he said, which lack entirely one or more normal growth control chemicals. These cells could respond to continued nourishment only by continuing to grow and would thus be tumor or cancer cells.

Science News Letter, January 10, 1953

PSYCHOLOGY

Sound Thinking Possible Without Logic Training

► THE ABILITY to reason logically depends on native intelligence as well as on formal training in logic.

This conclusion is based on an experiment with government employees reported by Dr. and Mrs. William J. Morgan, consulting psychologists of Merrifield, Va., to the American Association for the Advancement of Science meeting in St. Louis.

The 134 government workers were given a test of logical reasoning. They were divided into two groups according to whether or not they had had formal training in logic. Each person in the logic-trained group was matched for sex, age and college degree with an individual in the group without such training.

Those without logic training did 73% as well on the test as the group with such training. And 38% of those without training got higher scores than their opposite numbers in the group who had received college courses in logic.

Nine persons with Ph.D. degrees who had not had training in logic obtained higher scores than those with lower degrees, even though the latter had had such training.

There is great variation among college graduates in ability to think logically. Some received scores 70 times as high as others.

Science News Letter, January 10, 1953