

BIOLOGY

Link to Man's Heredity

Forerunners for man's heredity, chemical changes in water, and chemicals producing smell, are reported by Gloria Ball from the American Institute of Biological Sciences meeting.

➤ A POSSIBLE missing link in the evolution of heredity mechanisms has been found and photographed in simple yeast cells by a University of Chicago scientist, Dr. Balaji Mundkur.

In these cells Dr. Mundkur found cords that may be the forerunners of the chromosomes through which man and other animals pass on characteristics from generation to generation.

Speaking before the Genetics Society of America, meeting with the American Institute of Biological Sciences in Stillwater, Okla., Dr. Mundkur reported that although yeast cells have no conventional chromosomes, they do have "chromosomal substance or faintly staining submicroscopic basophile cords."

The cords are dotted with darker-staining particles of DNA protein, a heredity-carrying chemical. Outside the nucleus, in the cytoplasm, there are densely staining particles of RNA protein. DNA is deoxyribonucleic acid and RNA is ribonucleic acid.

To see these structures, Dr. Mundkur had to use ultra-rapid freeze-drying and a staining technique aimed at selective disclosure of DNA protein and RNA protein. Then

he could photograph the heart of the yeast cells with an electron microscope.

In the resting yeast cell, Dr. Mundkur explained, the cords somewhat resembled what would be seen if a fisherman's net were wadded up in a ball and cut through the middle.

In the budding yeast cell, however, the cords in the dividing nucleus straighten out and appear as faint streamers from the mother to the bud cell.

Through a conventional light microscope this organization is not visible—DNA protein in the nucleus appears as a homogeneous mass. But with an electron microscope, the submicroscopic cords could be measured and were found to be about 700 angstroms wide. An angstrom is about four-billionths of an inch.

The DNA protein particles were about 50 to 80 angstroms in diameter, and RNA protein particles in the cytoplasm were about 100 angstroms in diameter.

The particles were identified as RNA protein and DNA protein by putting yeast cells to an enzyme test.

Dr. Mundkur said, "I prefer not to call the submicroscopic cords 'chromosomes' be-

cause they have none of the characteristics of conventional chromosomes."

The nucleus, he said, is "either a degenerative or primitive form." He plans further studies at the University of Connecticut at Storrs to make an evolutionary reconstruction of the different nuclear patterns.

• Science News Letter, 78:163 September 10, 1960

Chameleon-Like Ditches

➤ MUDDY ROADSIDE DITCHES may all look alike, but each has an individual character that changes chemically and biologically from hour to hour.

Dip a piece of litmus paper in a water-filled ditch at dawn and the paper turns pink. Try again at three in the afternoon and it may come out gray-green or blue.

The reason for the change was reported by Dr. Stuart S. Bamforth of Tulane University, New Orleans, La., to the American Institute of Biological Sciences meeting in Stillwater, Okla. In the morning, water in a typical ditch, like soda pop in a bottle, contains extra carbon dioxide which makes it acidic and turns the litmus pink, he explained.

This situation exists because nighttime activity of microscopic animals and decaying matter have used up much of the oxygen and released carbon dioxide and phosphate, an essential nutrient for plants, into the water.

As the sun comes up there are many animal forms in the water. Green plants start making food, using up the carbon dioxide and phosphate and releasing oxygen again. The acidity of the water decreases and by three or four in the afternoon, when plant activity is at its peak and animal forms have been reduced, the litmus paper will show a more alkaline reaction.

During a year-long study of daily changes in shallow aquatic habitats—ditches, edges of swamps, streams and ponds no more than two or three feet deep—Dr. Bamforth also found that the rate and extent of chemical changes from hour to hour give some indication as to the balance of plant and animal life in the pool. The more plants in the water, the greater the daily chemical changes. When animals dominate, there is little change.

There are also local differences within a single ditch, Dr. Bamforth pointed out. Changes at one end may proceed rapidly during the day, while the other end, perhaps only 50 feet away, changes quite slowly.

One important conclusion from the study, Dr. Bamforth emphasized, is that comparison of two shallow habitats may have more meaning if daily changes are compared.

• Science News Letter, 78:163 September 10, 1960

Use Chemical For Smell

➤ APPLES, BEANS, TOBACCO and avocados may not smell like roses but they do use the same chemical, I-quininate, that goes into making roses smell good.

Dr. L. H. Weinstein, Dr. C. A. Porter and H. J. Laurencot, all of the Boyce Thompson Institute for Plant Research, Inc.,



TIRE COLOR-WHEEL—Colored sidewall tires may find wide application in the future. Scientists at Esso Research and Engineering Co., Linden, N. J., are developing special butyl synthetic rubber blends for sidewalls, white and multi-colored, that will be resistant to ozone cracking, easy to clean and will retain color. The discs will be exposed to actual road conditions and then checked for durability and ease of cleaning.

in Yonkers, N. Y., reported to the American Institute of Biological Sciences meeting in Stillwater, Okla., that they soaked leaves of these different plants in 1-quinatone tagged with radioactive carbon to see if it was used in producing aromatic substances.

As might be expected of different smelling plants, each type of leaf used the substance a little differently. Beans, they found, absorbed the smallest amount of the tracer substance but converted more than half to

products that are a little closer to the ones responsible for fragrance. Tobacco, on the other hand, soaked up eight times as much of the chemical as beans but converted only about one-fourth of it.

Going a step further, the researchers found that in tobacco, apples and avocados there was twice as much of one aromatic amino acid, phenylalanine, as of another, tyrosine. In beans, the opposite was true.

• Science News Letter, 78:163 September 10, 1960

BIOLOGY

Wake Early, Bloom Late

► THE MOST EFFECTIVE way to make poinsettias bloom just before Christmas is to shine lights on the plants from midnight to one a.m. each night from Sept. 22 to Oct. 10. Under this treatment the plants are at the peak of blooming on Dec. 20, rather than Dec. 10—the natural peak point.

These conclusions are the result of a two-year study of plant reaction to different periods of light exposure, Drs. Robert C. Miller and C. C. Kiplinger of the Ohio Agricultural Experiment Station, Wooster, reported in an abstract at the American Institute of Biological Sciences meeting in Stillwater, Okla.

Why does giving a plant more light make it bloom later? Dr. Miller explained it this way: Poinsettias start forming flowers when the days get shorter and are called short-day plants. But really they are long-night plants.

Like people, they need their rest. If their night-long "sleep" is interrupted, they do not flower as soon as they would under normal conditions. Under constant light these plants will not bloom at all.

Researchers and greenhouse owners have tried turning on lights at the beginning and end of the daylight hours, thus lengthening the number of hours of exposure to light. Some used four additional hours of light either in two doses or all in one.

However, no method has proved so effective as "waking up" the plant exactly in the middle of the night, Dr. Miller determined. During the daytime, of course, the plant gets normal sunshine.

The middle-of-the-night method works

just as well even if the light is not continuous. A technique known as "flashlighting" is just as effective, not only for poinsettias but for chrysanthemums as well. This consists of dividing each minute of the hour-long period into two seconds of light and 58 seconds of darkness. For poinsettia growers who have large numbers of plants, flashlighting is particularly valuable for cutting down on electricity bills and is one way of staggering loads on power lines.

Either technique works for poinsettias of any age kept at 62 degrees Fahrenheit. The best type of light found so far is regular incandescent light of about 20 foot-candle intensity.

Because the long-red visible radiation is the most effective agent, fluorescent lights—mostly in the blue range—are not suitable, Dr. Miller said. However, a fluorescent lamp concentrated in the red range is being developed and may prove to be better than ordinary electric bulbs.

Just why a plant reacts this way to interrupted nights is not known. The physiology has not been worked out. The factor that controls flowering is believed to be a growth regulator. Root growth inhibits flower budding and vice versa.

It also has been shown that the leaves of the poinsettia produce a flower inhibitor. A branch from a light-treated plant grafted to an untreated host will flower only if the leaves of the host plant are removed. Dr. Miller found that this single graft can also influence the host to flower earlier than usual.

• Science News Letter, 78:164 September 10, 1960

of Establishing Charges. In general, a uniform system of charging for hospital care will be followed, and this system will relate the charges to the full cost of furnishing that care. The 'full cost' includes the direct cost and a pro rata portion of the overhead cost. We did not set rates."

The other speakers were Samuel J. Tibbetts, administrator of the California Hospital in Los Angeles, and E. Reid Caddy, administrator of the Westmoreland Hospital in Greensburg, Pa.

In California the average daily hospital bill is the highest in the United States, \$41.80, and in Pennsylvania the charge averages \$23.98 per day.

• Science News Letter, 78:164 September 10, 1960

SCIENCE NEWS LETTER

VOL. 78 SEPTEMBER 10, 1960 NO. 11

Edited by WATSON DAVIS

The Weekly Summary of Current Science, published every Saturday by SCIENCE SERVICE, Inc., 1719 N St., N.W., Washington 6, D. C., North 7-2255. Cable Address: SCIENSERV.

Subscription rates: 1 yr., \$5.50; 2 yrs., \$10.00; 3 yrs., \$14.50; ten or more copies in one package to one address, 7½ cents per copy per week; single copy, 15 cents, more than six months old, 25 cents. No charge for foreign postage.

Change of address: Three weeks notice is required. When ordering a change please state exactly how magazine is now addressed. Your new address should include postal zone number if you have one.

Copyright © 1960 by Science Service, Inc. Reproduction of any portion of SCIENCE NEWS LETTER is strictly prohibited. Newspapers, magazines and other publications are invited to avail themselves of the numerous syndicated services issued by Science Service. Science Service also publishes CHEMISTRY (eight times a year) and THINGS of Science (monthly).

Printed in U.S.A. Second class postage paid at Washington, D. C. Established in mimeograph form March 13, 1922. Title registered as trademark, U. S. and Canadian Patent Offices. Indexed in Reader's Guide to Periodical Literature, Abridged Guide, and the Engineering Index. Member Audit Bureau of Circulation.



SCIENCE SERVICE

The Institution for the Popularization of Science organized 1921 as a non-profit corporation.

Board of Trustees—Nominated by the American Association for the Advancement of Science: William W. Rubey, U. S. Geological Survey; Wallace R. Brode, Department of State; Douglas Whitaker, Rockefeller Institute for Medical Research. Nominated by the National Academy of Sciences: Harlow Shapley, Harvard College Observatory; Philip Bard, Johns Hopkins University; Henry Allen Moe, John Simon Guggenheim Memorial Foundation. Nominated by the National Research Council: Leonard Carmichael, Smithsonian Institution; John R. Dunning, Columbia University; Benjamin H. Willier, Johns Hopkins University. Nominated by the Journalistic Profession: Michael J. Ogden, Providence Journal-Bulletin; O. W. Riegel, Washington and Lee University; Lee Hills, Detroit Free Press. Nominated by the Scripps Estate: Edward J. Meeman, Memphis Press-Scimitar; Frank Ford, Washington, D. C.; Charles E. Scripps, Cincinnati, Ohio.

Officers—President: Leonard Carmichael; Vice President and Chairman of Executive Committee: Charles E. Scripps; Treasurer: Wallace R. Brode; Secretary: Watson Davis.

Staff—Director: Watson Davis. Writers: Gloria Ball, Ann Ewing, W. T. M. Grigg, Lillian Levy, Faye Marley, Jane Marye, Tove Neville, Marjorie Van de Water, Judy Viorst. Science Youth Division: Joseph H. Kraus, Shirley Moore, Dorothy Schriver, Leslie Watkins. Photography: Fremont Davis. Production: Priscilla Howe, Marcia Nelson. Syndicate Sales: Hallie Jenkins. Librarian: Margit Friedrich. Interlingua Division in New York: Alexander Gode, 80 E. 11th St., GRamercy 3-5410. Advertising Manager: Fred A. Moulton, METropolitan 8-2562.

MEDICINE

Hospital Charges Probed

► HOSPITALS all over the country are raising their charges but for widely different reasons, a hospital administrator reported to the American Hospital Association meeting in San Francisco.

"We found there was no rhyme or reason, or any similarity of method, that we could count on," Benny Carlisle, administrator of the Oklahoma General Hospital in Clinton, said of a survey of hospital charges in Oklahoma.

"We inquired of hospitals, 'What do you base your charges on?' Some said, 'I inherited this rate schedule' . . . others had formulas for mark-up, still others ad-

justed when other hospitals in the area adjusted, but no method that was explainable, or understandable to anyone was used."

Mr. Carlisle was one of three hospital administrators from the East, West and Middle West who spoke on principles of establishing hospital charges.

Mr. Carlisle said that he assisted with the survey of hospital charges in Oklahoma and found the hospitals' prices for pills varied more than 500%. Laboratory charges varied 120% and operating room charges 200%.

"From all this research, we emerged with our Principles of Uniform Methods