

High School, Reptiles; and Richard Leroy Jorandby, 16, Grafton (N. Dak.) High School, Mammalian Skull Structure.

Winners of the fourth place wish awards, amounting to \$25 in scientific equipment of their own choosing are:

Elizabeth Annette Moak, 18, Neville High School, Monroe, La.; Sheila Evans, 16, Aquinas Academy, Tacoma, Wash.; Kay Marie Cowan, 17, Bessemer (Ala.) High School; Catherine Ruth Beal, 17, Little Rock (Ark.) Central High School; Janice C. Kearney, 17, Grafton (N. Dak.) High School; Alice M. Nelson, 15, Ivanhoe (Minn.) High School; Judith Agnes Davenport, 15, Chattanooga (Tenn.) High School; Lydia Sue Shipe, 16, Central High School, Fountain City, Tenn.; Margaret Edna Lenderking, 17, Martinsville (Va.) High School; Richard R. Sommerfield, 18, Tucson (Ariz.) Senior High School; Harold James Cromack, 16, Farmington High School, Unionville, Conn.; Stewart Abel, 18, Miami (Fla.) Senior High School; Alvin McKinnon Fields, 17, Brown High School, Atlanta, Ga.; George James Kelso Jr., 17, Valparaiso (Ind.) High School; Kent Bradley, 15, Avon High School, Dan-

ville, Ind.; Robert W. Shantz, 17, Roosevelt High School, St. Louis, Mo.; Charles William Canada, 18, Guilford (N. C.) High School; Jerome Duane Anderson, 17, Minot (N. Dak.) High School; Stephen E. Dubin, 17, Overbrook High School, Philadelphia, Pa.; Richard Hudson Palmer, 14, Chattanooga (Tenn.) High School; Winston Stanley Marshall, 18, Isaac Litton High School, Nashville, Tenn.; John Edward Schmidt, 17, Port Washington (Wis.) High School; Gary K. Ackers, 15, Berkeley (Calif.) High School; James Berg, 17, Ishpeming (Mich.) High School; Beckwith Horton, 17, Sumner High School, Kansas City, Kans.; Leonidas Judd Betts Jr., 17, Fuquay Springs (N. C.) High School; John Cornelius Roan, 18, LaSalle Academy, Providence, R. I.; George H. Birkett, 17, Arlington Heights High School, Fort Worth, Texas, and Carl Manfred Hakan-son, 18, Martinsville (Va.) High School.

The National Science Fair is conducted annually by Science Clubs of America, administered by SCIENCE SERVICE. The 1956 event will be held next May in Oklahoma City, Oklahoma.

Science News Letter, May 28, 1955

**FAIR EXHIBITS**—Teen age scientists show their projects at the Sixth National Science Fair in Cleveland.

Left, from top to bottom, are: Evelyn La Heist, showing protozoan life; Rosemary Och with her prize winning mechanical brain; Albert Aube, Jr., showing principles of heredity; Anne Lugar with her chicken-egg incubating demonstration.

Middle, from top to bottom, are: James Ellingboe, making amino acids; Carol Hawkins, demonstrating coal microscopy; Richard Jorandby, showing mammal skull structure, and Edward Karrer with his TV microwave set-up.

Right, from top to bottom, are: Douglass Saunders, demonstrating geotropism; Vladimir Baicher with his insect survey; Thomas Coblenz with his collection of reptiles, and Robert Dunning showing how to determine a Curie point.



#### MILITARY STRATEGY

## Oil Lines Vulnerable

► ALL-OUT WAR would immediately peril the free world's oil supply because American pipelines are easy game for an enemy, the American Petroleum Institute was warned.

Cost of protecting the pipelines and installations becomes a secondary factor. A military oil line can repay its entire cost on the first day of wartime operation, two oil experts reported.

The country should be prepared to take the following steps:

To pump backward if need be, to demolish our own lines completely as a last resort if they are threatened to be overrun, and to destroy the fuel in the lines.

"This would mean a complete job—not merely breaking the line in a few places and blowing up the stations and farms, but taking such measures as pumping slugs of concrete or heavy mud into the lines at irregular intervals, loading the lines with contaminants to prevent later use and taking out major river crossings," they said.

C. B. Lester of the Mid-Valley Pipeline Co., Longview, Tex., and H. T. Chilton Jr., of the Service Pipe Line Co., Tulsa, Okla., urged realistic thought and action to insure transportation of military fuel in emergency periods.

There are three kinds of installations in a pipeline system, such as the Big Inch and Little Big Inch: the pipelines themselves, the pump stations and the tank farms. Prerequisites for protection were given.

The pipelines are relatively safe from bombardment since they are underground, but anyone with a shovel and a stick of dynamite can shut down a long stretch of

line. Such measures as security guards, fencing, air and ground patrols, monitoring instruments and camouflage were suggested. Stockpiling of pipes, especially for river crossings, would enable quick repair, they said.

The pumping station, a heavy concentration of valuable equipment, can be defended against sabotage, but is vulnerable to bombardment. In anticipation of an all-out war these stations should be shielded by concrete and sandbags, partly buried, camouflaged, and power supply should come from fuel in the pipeline to make it independent of outside failures. Stockpiles of engine driven pumping units are a must.

The tank farm is a large, easy to hit installation. Strafing or bomb splinters could set an oil tank on fire. Strengthening sabotage defenses, partly burying and shielding the tanks against near misses were suggested.

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#### BOTANY

## Too Much of a Food Halts Sick Cell Growth

► IF A diseased plant cell, such as cancer-like crown gall, is fed too much of a food it normally feeds on, its growth will be halted.

Evidence to show that diseased plant tissues cannot cope with an overabundance of normal food items was uncovered at the University of Wisconsin by Drs. A. J. Riker and A. C. Hildebrandt.

Experimenting with crown gall, a dis-

eased form of plant growth that starves out normal cells, the Wisconsin scientists found that an excess of amino acids or vinegar-like acetic acid, added to the gall's diet, slows and stops growth. This and other experiments in growth-inhibiting diet factors have led the Wisconsin scientists to conclude that diseased cells are unable to "take or leave alone" a super-abundance of some food elements.

To aid their study, the Wisconsin doctors, together with research assistant W. H. Muir, devised a method whereby they grow strains of plant tissues from a single cell.

Using these "racially pure" colonies of cells from such plants as the sunflower, tomato and tobacco, normal or diseased growth can be controlled. To do this, the scientists subject the cells to carefully defined chemical diets, changes in temperature, the addition or subtraction of acid or alkaline to the environment or by adding drugs to the culture.

In this manner, the scientists have also found that some antibiotics inhibit crown gall development while others kill the healthy tissue. Temperature too has been found to be a factor in the case of the tobacco mosaic virus. Drs. Riker and Hildebrandt found that virus infected tissues grew best at temperatures between 75.2 degrees Fahrenheit and 82.4 degrees, while healthy tissue grew well at temperatures between 96.8 and 98.6 degrees Fahrenheit.

The scientists reported their findings to the American Cancer Society, which is supporting the studies.

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Increased activity of the *adrenal*, such as apparently takes place after stress or injury, promotes a greater combustion of protein in the body.