

MEDICINE

Medical School Costs Now \$2,911 Per Year

MEDICAL STUDENTS are spending \$2,911 a year in medical schools across the country. That adds up to \$11,642 for the four-year course, and the student and his family are footing 82% of the bill.

The other 18% comes from medical schools, Federal and state governments, and from local banks.

Financial statistics, compiled for the Association of American Medical Colleges, Evanston, Ill., show that of students receiving M.D. degrees in 1959, 43% came from families with incomes over \$10,000. Only 14% came from families making less than \$5,000 and the rest came from the middle-income group.

The AAMC said the figures demonstrate that the lower income families simply cannot provide the amounts of money needed by the student to pay for the costs of his medical education.

"If we are to reach our goal of increasing the number of physicians to meet the nation's health needs, we must draw upon a broader socio-economic base within the population. To do this, financial assistance is necessary."

Whatever the family's ability to help out, four out of five medical students worked during the school year or summer vacation or both. Sixteen percent received no financial aid from their families. But eight percent managed to earn more than \$6,000 a year. For some, a spouse's income helped to make ends meet.

The study revealed that many working students have jobs that have nothing to do with medical education. If such students were given more financial assistance, says the AAMC, they could still work, but could choose a relevant job even if it meant less money.

Science News Letter, June 18, 1960

ENTOMOLOGY

Flies Continue to Resist Man's Insect-Killers

HOUSEFLIES have an adaptable enzyme system that changes from one generation to another and lets these house pests resist man's insecticides, the New York State College of Agriculture, Cornell University, reported.

The Cornell scientists are looking for new insecticides to replace those to which flies have already become immune.

So far man has just barely been able to keep pace with the flies and develop a new insecticide when the old ones became ineffective.

By this time, the flies pay no attention to DDT and lindane is no longer very effective. The most promising new pest-killer, dimethoate, has yet to be approved by the Food and Drug Administration as it so far has defied chemical analysis.

Each time man develops a new insecticide, most of the flies sprayed are killed, but a few of them survive. These multiply and pass on their resistance to their off-

spring. Within three to five years the whole species is immune.

At Cornell, Prof. Roger Young is studying the enzyme that enables houseflies to resist DDT. Prof. David Pimentel is studying the effects of immigration on the resistance of fruit flies.

Prof. Pimentel is trying to find out how many non-resistant flies would be needed to keep down the resistance of an entire colony through inter-breeding. He is also making a comparative study of the effects different insecticides will have on resistance.

Prof. Thomas Eisner is studying the chemical weapons insects use against each other. Cockroaches, beetles and millipedes defend themselves with poisonous liquids and sprays. Dr. Eisner believes the insects could teach man about their own methods of warfare.

New insecticides are field-tested by Prof. John Matthysse who keeps colonies of resistant flies on which he tries the new insecticides.

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MILITARY SCIENCE

Foxhole Digger Built; Weighs 36,000 Pounds

A MACHINE that digs foxholes in a minute has been developed for the Army. It weighs 36,000 pounds.

No GI will ever carry it. But the mounted machine is highly maneuverable. It can travel at 30 miles an hour on improved roadway.

Under favorable soil conditions, the machine can dig a foxhole for one or two men in a minute. It can dig heavy machine gun emplacements in a little over three minutes and large horseshoe type emplacements in five minutes, provided soil conditions are not unduly adverse.

For digging, the machine has hydraulically operated boom hoist, rams, scraper and discharge conveyor.

The device is being bought in quantity by the Army. Unlike an earlier machine, the device cannot be air-dropped, but it has greater digging ability.

The machine was developed by the U. S. Army Engineering Research and Development Laboratory at Ft. Belvoir, Va.

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BIOCHEMISTRY

Single Cells Seen Useful In Heart Studies

SINGLE BEATING cells from rat hearts are expected to be useful in studying the food and other requirements of human hearts.

The microscopic cells could be used to tell how certain foods, or a lack of them, affect the beating of the single cells.

The cells of the rat heart were separated and grown in a test tube by Drs. Isaac Harary and Barbara Farley of the University of California at Los Angeles. How various heart drugs and energy-releasing compounds affect the beating rhythm of the cells is reported in Science, 131:1674, 1960.

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IN SCIENCE

MEDICINE

Over-Use of Vitamin K Called Therapy Abuse

MASSIVE DOSES of vitamin K, a substance widely used to combat hemorrhaging, has caused anemia, vomiting, and further hemorrhaging in experimental animals, Drs. A. Marshall Smith Jr. and R. Philip Custer of Philadelphia report. They called the vitamin's indiscriminate use one of the "more patent abuses" in present-day therapy.

"Free use of these substances is made on the assumption that they are harmless, and the physician generally believes that he is doing something of real value for his patient by giving him vitamin K during a hemorrhagic episode."

"One should not be very censorious of physicians using vitamin K, however. The medical literature is virtually devoid of data relating to toxic effects of vitamin K."

Reporting in the Journal of the American Medical Association, 173:502, 1960, the doctors advise that large doses of vitamin K or related treatment should not be given to patients with significant liver disease, and even small doses should be given with caution to these patients.

In experiments at Philadelphia's Presbyterian Hospital, where Dr. Smith is a resident in medicine, the doctors found alterations in the liver function because of toxic effects from vitamin K.

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ASTRONOMY

New Director Appointed For National Observatory

DR. NICHOLAS U. Mayall, now on the staff of Lick Observatory, Mt. Hamilton, Calif., has been appointed director of Kitt Peak National Observatory, effective Oct. 1.

Kitt Peak is a national research center for optical astronomy operated by the National Science Foundation. It has a 36-inch telescope available now, and an 80-inch scheduled for completion next year.

Dr. Mayall was named to his new post by the board of directors of the Association of Universities for Research in Astronomy, Inc., (AURA), the nine-university group that operates Kitt Peak. The national observatory is located 40 miles southwest of Tucson, Ariz., on the Papago Indian reservation.

Dr. Mayall has recently specialized in spectroscopic studies of galaxies far distant from the Milky Way in which the sun and its planets are located. These studies help determine the distances, velocities and masses of such deep-space objects, each of which contains hundreds of millions of stars.

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CE FIELDS

MEDICINE

Hospital Care Lacking For Russian Children

MANY CRITICALLY ILL Russian children must be treated at home in spite of major increases in the number of hospital beds, John F. Kantner of the Bureau of Census in Washington, D. C., reports.

In a recent year, 44% of the children who died from pneumonia in Russia's city areas died in their homes, Mr. Kantner writes in *Population Trends in Eastern Europe, the USSR and Mainland China*, a study published in New York by the Milbank Memorial Fund.

The percentage of home treatment reached 73% in one rural area of Russia in 1955, Mr. Kantner writes.

"There is evidence of certain deficiencies in the regular medical establishments and other institutions for child care which could contribute to a high incidence of deaths from pneumonia, as well as from other diseases."

Mr. Kantner reports inadequacies in the care of premature infants including "the use of hot water bags instead of incubators." He says a survey of hospitals in Baku showed that of 59 children who died from diphtheria in one hospital, only six had gotten anti-diphtheria shots.

The researchers also noted that Russian doctors assigned to out-of-the-way places sometimes did not show up. Because of these AWOLs there were 30 hospitals that had no physicians at all in one remote area.

Mr. Kantner says observations leave "little doubt" that the Soviet medical system is unevenly developed and that the conquest of disease is a broken, uneven front.

In contrast to the failures, "progress seems to have been made" in those areas where simple administrative actions or low cost preventive measures are effective. (See p. 396.)

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MEDICINE

New Drugs Reduce Patients' Cholesterol

CHOLESTEROL in cardiac patients can be effectively lowered by chemically denatured thyroid hormone without stimulating their diseased hearts.

This is reported by Drs. Eliot Corday of the University of California Medical School, Los Angeles, Henry Jaffe, University of Southern California Medical School, and David W. Irving, Ventura County Heart Association Research Fellow.

Thyroid hormone, thyroxin, is needed to break down cholesterol in the system, the investigators point out. People with sluggish thyroid glands do not produce enough thyroxin and thus are subject to high

cholesterol levels, which have been implicated as a cause of heart disease and strokes.

Ordinarily such persons can be given thyroid extract to make up for this deficiency, they note. However, thyroxin is a potent heart stimulant and may cause the heart to beat too fast. Thus if a thyroid-deficient patient who also has heart disease is given thyroid extract, his heart may become overburdened from excessive stimulation.

Two new thyroid extracts—triapron and tetraiodothyroformic acid—are chemically denatured so that they do not stimulate the heart. The investigators have used the new drugs to treat 49 thyroid-sensitive patients, most of them with heart disease, over a 12-month period. In 40 of the patients a favorable cholesterol-lowering effect was noted.

No dietary restrictions were imposed upon the patients, the investigators added.

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MATHEMATICS

New Way of Predicting Lifetimes of Parts Found

A METHOD of predicting the reliability of equipment—how long parts will last before failure—has been devised by a mathematician.

The mathematical method is reported by Dr. R. F. Drenick of the Bell Telephone Laboratories, Murray Hill, N. J., in the *Journal of the Society of Industrial and Applied Mathematics* 8:125, 1960.

Reliability of equipment receives particular attention from manufacturers of electronic devices because such equipment is complex. An obstacle to his mathematical study, Dr. Drenick reports, was that the term "reliability" seems to have different meanings to different persons, and sometimes different meanings to the same person in different contexts.

Dr. Drenick found a new concept of reliability that is more general than current usage, but that reduces to concepts commonly used under appropriate conditions.

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MEDICINE

Patients Bring Staph Into Hospitals

RECENT HOSPITAL epidemics of staph may have been caused by patients who brought staphylococcal infections (staph) into the hospitals, a survey indicates.

Staph, which may be a factor in relapses and the slow recovery of hospital patients, has been blamed on lack of cleanliness in hospitals, but Dr. Marlin L. Cooper of Children's Hospital in Cincinnati, Ohio, reported that staph is a community problem.

A study made on 5,676 children as they were admitted to Children's Hospital showed that 45.9% carried staphylococcus aureus organisms in their noses or throats, and 8.2% carried those strains of the organism likely to cause epidemics.

Physicians in the hospital had a slightly higher percentage of staph themselves.

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CHEMISTRY

Chemical Coatings Help Alloys' Fatigue Strength

FATIGUE STRENGTHS of steel, magnesium, and copper-beryllium alloys are greatly increased when the metals are coated with a one molecule-thick layer of certain organic chemical compounds, research at the National Bureau of Standards has demonstrated.

Environment greatly affects the fatigue strengths of metals. Traces of water and oxygen from the air will cause surface corrosion. Even a slight amount of corrosion will considerably weaken the metal.

The coatings consist of molecules having at least seven carbon atoms in a chain with a "polar group," a group of atoms having a separation of electronic charge, at one end. These molecules tend to pack together with the polar groups attached to the surface of the metal to form the coating which keeps out the oxygen and water molecules.

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MEDICINE

Sheep Studies May Solve Human Pregnancy Puzzle

EXPERIMENTS with sheep may provide a clue to the mystery of toxemia of pregnancy—one of the major causes of death in expectant human mothers.

A research team, Dr. Nicholas S. Assali and Lawrence Longo, University of California Medical School, Los Angeles; Dr. Louis W. Holm, University of California, Davis; Dr. Yale Katz, University of Southern California, and Dr. Leon C. Chesley, State of New York University, is investigating a toxemia-like disease which occurs spontaneously among pregnant sheep.

Nine of ten symptoms of human toxemia, whose cause is unknown, are found in the sheep disorder. These include the fact that the disease occurs sporadically during the latter part of pregnancy in both humans and sheep, occurs more frequently in short, obese types, is more frequent with large or multiple fetuses, manifests itself in prominent nervous system and visual disturbances, convulsions and coma. A rapid improvement is noted in both humans and sheep following delivery.

One mystery about sheep toxemia is that high blood pressure, a characteristic of human toxemia, does not occur. This difference is being investigated at the present time. Spontaneous toxemia among sheep seems to be associated with lack of exercise. Physical stress such as snowfalls and rainstorms may precipitate the sheep disorder by a mechanism not yet clear.

So far the study of the disease in humans has not been productive as to its cause or cure. The disease can now be produced experimentally in sheep, which are gentle and easily managed animals for experimental work under carefully controlled conditions. For this and other reasons, sheep studies may determine the cause of human toxemia.

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