SCIENCE NEWS

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DISEASE RESISTANCE

A NEW theory of disease resistance and susceptibility has been developed through studies on rats conducted by Professor James T. Culbertson at Columbia University School of Medicine. The findings apply to man as well as rats, it is believed.

According to this theory, children and young people suffer more from some diseases than older people because certain cells in the bodies of young people have not grown up enough to act as protective agents against disease. Heretofore it has generally been believed that older people built up resistance through constant exposure. The particular cells that have to become mature before they can protect the body from disease are found throughout the body, but particularly in the liver, spleen and bone marrow. They belong to the reticulo-endothelial system.

The reticulo-endothelial system produces and mobilizes white cells in the blood which act as protective agents. Due to immaturity of this system, the changes in the number of white cells in the young rats following infection was very slight. Dr. Culbertson found that "On the other hand, the older groups showed a decided increase in white blood cells, particularly in monocytes. The maturity of the reticulo-endothelial system in the older rats enabled them to mobilize greater numbers of protective cells and therefore destroy more effectively the parasite causing the disease. While the monocyte response, or the increase in the protective cells in the blood, can not be considered to be the only cause of the older rats' resistance to the infection, in interpreting these findings it is difficult to escape the conclusion that it is a major factor. The following facts point directly to this: animals which showed an increase of monocytes survived while those which did not, died, the single, surviving member of the younger group was the only young animal that showed an increase in monocytes; the single animal in the older group that died was the only older one that did not show an increase."

Certain other cells of this system, the phagocytes, which like the monocytes are able to engulf or swallow foreign substances that might cause harm, were also more efficient in the older rats.

The third link between the ability of older rats to resist infection and the maturity of their reticulo-endothelial system is, according to Professor Culbertson's findings, the fact that the older rats were able to combat infection by mobilizing specific antibodies, another of the body's germ-fighting force, whereas the younger rats could not do this. He says: "In our experiments, the rats naturally acquired, as they matured, an increased resistance against both parasites used to induce disease, *Trypanosoma lewisi* and *Trypanosoma cruzi,* without being previously exposed to these agents. This definitely indicates that in many diseases the natural maturation of an animal, and not simply the building up of resistance because of constant contact, enables older animals to combat illness more effectively than young ones."

THE EFFECT ON BACTERIA OF ULTRA-VIOLET RADIATION

BACTERIA can be killed more effectively with ultra-violet radiation "bullets" by shooting them with pop-gun quantities of radiation than by pouring on the same amount of radiation with a heavy howitzer.

This principle, of possible great importance in the prevention, control and treatment of disease, is reported by two investigators of the Westinghouse Lamp Laboratories, Dr. Harvey C. Rentschler, director, and Dr. Rudolph Nagy.

Short, intense dosage of bacteria with the germ-killing rays found in a particular portion of the ultra-violet spectrum is less lethal than long, mild exposures, at least in the case of one species of germ, escherichia coli, a harmless variety used in their experiments.

The research tested the Bunsen-Roscoe reciprocity law, propounded more than seventy years ago. Applied particularly to photochemistry, this law suggests that the killing effect of radiation will be the same, whether the bacteria are subjected for a long time to low intensity radiation or for a short time to high intensity, provided the total energy is the same. They found that this is not true.

Their studies may be somewhat disappointing to those now developing ultra-violet radiation methods of germ control, because there is some mechanical advantage to the use of high intensities.

Drs. Rentschler and Nagy explain their results by supposing that there is a particular time in the life cycle of the bacteria when they are especially vulnerable. When short, intense exposure is used, not so many bacteria are caught at that particular time as in the case of the longer exposure. They found a minimum exposure below which there was no significant killing effect.

HIGH-SPEED PHOTOGRAPHY

A SPEEDING bullet that "shoots" itself is the newest addition to the ranks of the minifans—those camera enthusiasts who take pictures with the compact, miniature cameras.

At the Armour Institute of Technology, Chicago, a swift-flying bullet took its own picture. It used a new device to set off the trigger action that made possible an exposure time of only one millionth of a second.

Drs. F. W. Godwin and A. O. Walker demonstrated their new system of bullet self-portraiture which utilizes the light from a long thin tube that glows into luminescence when 38,000 volts of electricity break down across it. This discharge tube is under partial vacuum. Connected to its electrical circuit is a spark gap. As the bullet speeds to its target—in the demonstration case a sheet of plate glass—it passes between the two poles of the spark gap. The imminent discharge in the tube is just at the unstable condition of being ready to discharge but not being quite able to do so. As the bullet passes through the spark gap some of the gases of its firing follow along behind it, like the tail of a comet. These gases change the electrical condition of the spark gap, make it dis-

charge and thus produce an intense light which makes possible the photographing of the moving bullet with a small, miniature camera.

The new method is said to be the first case where such high speed photography is accomplished without the use of an independent mechanism causing the tripping of a shutter or the discharge of a spark for illumination. The pictures taken show: a bullet in flight just before it strikes a plate of glass; just as the bullet is half way through the glass, showing cracks beginning to form in the glass, and finally after the bullet has passed through the glass, but with the shattered glass still standing in place.

Records of bullets and shells in flight have previously been obtained by other methods. The usual method is to shoot the bullet through some trigger mechanism that will suddenly cause a light to flash or a spark gap to discharge. The passage of the steel bullet through a magnetic field has been found to create enough disturbance to trip off an auxiliary mechanism and record the flying bullet.

In other cases the bullet is made to break a wire or network of wires and do the same thing. Experiments in Canada have tested the velocity of artillery shells by passing them through reflected beams of light that form what amount to invisible "curtains." As the shell momentarily cuts off the light beam from a photocell, the electrical impulse produced records the position of the shell at intervals. From these data the velocity can be computed.

The difference between these past methods and the new Armour Institute technique is that in the latter the passage of the bullet through the space between the pole pieces of the spark discharge is itself the act which trips off the illumination source. All other methods are said to involve the use of auxiliary apparatus.

THE NEW ENGLAND HURRICANE

THE freak New England hurricane of last September was a tragic thing from the standpoint of loss of life and property damage, but its lessons are teaching beach erosion experts of the Federal and State Governments how to provide better protection and preservation for the future.

Only now, at the meetings of the American Shore and Beach Preservation Association, are the authentic hurricane facts being presented. Major A. C. Lieber, Corps of Engineers, of the Beach Erosion Board, Washington, D. C., described the little-noted point that at places where the greatest damage to property occurred, there was often little damage to the beaches. In some cases beaches in these locations were better after the hurricane than before. The reason, he explained, was that the great increase in tides in some localities permitted the heavy seas to break inland from the beaches. Thus while the seas destroyed much property the beaches themselves were spared.

Rear Admiral L. O. Colbert, director of the U. S. Coast and Geodetic Survey, reports that while a systematic check of high-water marks over the whole New England area has not been completed the figures at some of the most important tide stations are now available.

At the edges of the hurricane region, New York on the south and Boston harbor on the north, the hurricane tides were from two to four feet above mean high water. At the intermediate tide stations, however, the rise was much greater above mean high water: 8.6 feet at New London, 10.4 feet at Newport, 8 feet at Woods Hole, Mass., and the peak, 13 feet, at Providence, R. I.

Along Long Island, sand dunes which had taken 100 years to build up by slow accretion from the sea were washed away in a few hours. Private sea-walls, protecting shorelines of estates, were found—in many places—to have caused major damage to neighboring regions. These sea-walls in many cases failed ultimately to provide protection of the estates they were supposed to guard because the excessively high water and mountainous waves flowed over them.—ROBERT D. POTTER.

PILOT'S LICENSE FOR "FOOLPROOF" PLANES

THE Civil Aeronautics Authority will issue a new grade of pilot's license requiring less training than at present as soon as the aviation industry has developed "foolproof" airplanes for sale to the man in the street, it has been learned.

The day when an airplane that will not spin, can't stall and won't nose over on landing is actually on the market is believed not far off. At that time, simplification of flying procedure will make learning how to fly much easier and will require less time.

Pilots holding these special licenses would be permitted to fly only the "foolproof" planes. To fly other types regular licenses, from private grade up, would still be required. The step of creating this new pilot grade would be of inestimable importance to the development of flying as a mass sport, aviation leaders believe.

Though Grove Webster, chief of the private flying development division, said no such step is contemplated at present and denied that discussion of it had taken place, it was learned that some CAA people and private industry men have tentatively talked it over. At least a year must elapse before the plan can be considered for putting into immediate practice.

One model that represents a stride in the direction of the "foolproof" plane and may actually be it is now undergoing tests for its CAA approved type certificate near Washington. It features the tricycle landing gear and can not nose over because of its nosewheel. Landing planes equipped with the gear is much simpler than landing the conventionally fitted ship. It is reported to incorporate also other late safety developments.

Air leaders, however, are still going slow when it comes to talking about "foolproof" planes. Though engineers feel it possible to develop a small plane which the adjective "foolproof" might fit, none has actually so far been placed on the market. Past "foolproof" planes haven't been "foolproof" against flying fools. Even the safer types now being developed will still require a maximum of common sense even though only a minimum of skill may be needed.—LEONARD H. ENGEL.

THE AMERICAN MEDICAL ASSOCIATION

A FIGHT to the bitter end in the case arising from the District of Columbia grand jury indictment of the Amer-

ican Medical Association is forecast by denial by the medical association of reports that it had made overtures to the Department of Justice for an out-of-court agreement.

The American Medical Association has not attempted to settle the anti-trust law violation charges, according to an editorial in this week's issue of the *Journal* of the American Medical Association. The *Journal* has previously stated "that the House of Delegates has already authorized the Board of Trustees to fight this case to the courts of last resort to determine the issue."

Under the title, "Commentators Spread False News," Dr. Morris Fishbein in an editorial contradicts the statement made by the Washington columnists, Drew Pearson and Robert S. Allen, in the "Washington Merry-Go-Round" on January 8, that officials of the American Medical Association had made such overtures. They said that the negotiations were getting nowhere "because of the physicians' insistence that the medical society be given special privileges under the law."

"As far as is known in the headquarters office of the American Medical Association, no official of this association has made overtures to the Justice Department to compromise the case," the *Journal* states. "Neither have attorneys for the association, nor has any official been authorized to make overtures or to conduct such negotiations."

"A telegram was sent to Messrs. Pearson and Allen calling attention to the misstatements of fact. No answer was received. Mr. Allen was then called on the telephone. He said: 'We received our information from the Department of Justice from a source we consider unimpeachable.'"

ITEMS

EXPENDITURES of $180,000,000 were made in 1938 for industrial and engineering research, according to estimates published in *Industrial and Engineering Chemistry*. The estimates were made from figures compiled by Dr. William A. Hamor, of the Mellon Institute, Pittsburgh.

INFLUENZA cases reported throughout the nation increased to 3,225 during the week ending January 7, according to the U. S. Public Health Service. The rise is not, however, considered significant. An increase such as this is expected at this time of the year and does not necessarily mean an epidemic. Federal health officials are playing the rôle of watchful waiters over the situation. Largest number of cases were reported from the South, South Carolina having 909 and Virginia 454.

COMPLETE records for 1938, now compiled in the office of the U. S. Weather Bureau, show that the year was warm and wet. Although the extreme high summer temperatures of the drought years were not reached, the averages, including those of the mild winter months, made it one of the warmest years of record. One unique feature, to which the Weather Bureau calls attention, was that every first-order station in the country reported above-normal temperature for the year, probably an unprecedented condition. For the country as a whole, the average precipitation of 29.47 inches was about 1 per cent. above normal. This is slightly less than last year's record of 30.34 inches.

THE Arctic ice is thawing out, and has been for at least twenty years, declared Professor L. Berg, of the University of Leningrad, in a report to Tass. Some of the indications, derived from observations by himself and other Soviet scientists and explorers, are: Recession of ice boundary; appearance of warm-water fish and other marine animals in Arctic regions; higher temperatures observed in sea water; boats passing the hitherto impassable northern limits of Franz Josef Land and other Arctic islands; earlier thawing and later freezing of Arctic rivers; northward retreat of the limits of permanently frozen soil in Siberia.

DEFINITE proof that a school of whale sharks exists in the waters around the Bahama Islands has been reported to *Nature* by Dr. E. W. Gudger, of the American Museum of Natural History. Observations on a school of a dozen of the enormous fish, ranging in length from 18 to 31 feet, were made by a Camden, N. J., citizen, E. R. Fenimore Johnson, while cruising in his ketch. He was also able to get about 200 feet of motion picture film, showing the sharks feeding. It is the first known observation on the feeding habits of this species. The whale shark behaves surprisingly like some whales who are his namesakes. He cruises along, barely submerged, with his huge mouth partly open. In this moving trap he catches whatever small animal forms happen to be afloat, filters the water out through his gills, and swallows his small prey in quantities.

GOLD production in the United States in 1938 increased six per cent. over 1937, according to preliminary estimates furnished by the U. S. Bureau of Mines. The increase is in units of weight rather than in dollar value. Since 1933 the production of gold in the United States has nearly doubled in weight, amounting to an increase of 94 per cent. Of the 1938 production, California contributed 25 per cent.; Philippine Islands, 17 per cent.; Alaska, 13 per cent.; South Dakota, 12 per cent.; Colorado, 7 per cent.; Arizona, 6 per cent.; Nevada, 6 per cent.; Utah, 4 per cent., and Montana, 4 per cent.

THE menace of the one-eyed driver, of whom there are in effect from 20 to 40 out of every 100 persons behind the wheel of an automobile, is made even worse by the fact that most of these drivers are ignorant of the dangers due to their deficient vision. Drivers completely blind in one eye make up only one or two per cent. of all drivers, according to a report made by Drs. H. R. DeSilva, W. H. Frisbee, Jr., and P. Robinson, of Yale University, to the National Society for the Prevention of Blindness. But from 20 to 40 per cent. of all motorists have deficient vision in one eye which handicaps them enough to make them dangerous on the road. "The greatest human hazard," the investigators state, "arises not from the defects but from ignorance of the dangers from such defects. For most of these drivers the solution lies in personal re-education adapted to their individual needs. For others, and especially those who have shown themselves incapable of profiting from re-education, the solution lies in revocation of their licenses."