SCIENCE NEWS

OZONE

Science Service

OBSERVATIONS on the screen of ozone, which exists some twenty miles up in our air and blocks radiations of certain wave lengths to or from the earth, were made for the first time in America at Mount Wilson Observatory by Dr. C. G. Abbot, of the Smithsonian Institution, this summer. Dr. Abbot has just returned to Washington, having secured data that may prove of importance to astrophysicists and may also throw much light on world weather changes.

The amount of ozone in our atmosphere is very small, but that small amount is very important. Although if the layer of ozone which exists some fifteen or twenty miles up were placed under atmospheric pressure at the surface of the earth, it would be no thicker than the little finger on a man's hand, yet this scant amount of ozone serves as a screen which blocks off much of the important invisible radiation coming from the sun and stars to the earth or going outward from the earth.

All the shorter wave lengths of the ultra-violet at one end of the spectrum and some of the infra-red or heat rays, at the other end, are shut off by the ozone in much the same fashion that our ordinary window glass shuts out the longer of the ultra-violet rays which are so beneficial to health.

Many of the stars have their chief energy spectrum in the shorter portions of the ultra-violet, so that this screen shuts off observation of these important sections of their invisible light. Heat rays from the earth which are intermediate between light and radio waves are also stopped from radiating into space by this same gaseous screen.

Dr. Abbot's observations were made for the purpose of determining whether or not the amount of ozone in the upper air varies with variations in the earth's heat and with radiations from the sun. The ozone is produced from oxygen in the air by the action of the sun's rays which have a wave length of less than 2,000. Ozone is destroyed by the sun's rays of wave lengths between 2,000 and 3,000.

The amount of this gas in the air, acting as a screen to hold in the earth's heat rays or shut out the ultra-violet rays from the sun at any time, represents a balance between the ozone productive and destructive rays in sunlight.

Dr. Abbot, in discussing his observations, compared these forms of radiations to two men carrying sand to and from a sand pile representing the amount of ozone in the air. If one man carries the sand away faster than the other adds it to the pile, the size of the pile will diminish, while if the man carrying sand to the pile gains on the one carrying it away, the pile will increase in size. Dr. Abbot suspected that some such variation takes place in the amount of ozone in our air.

If there is less at some times than others, obviously at such times the ozone screen will be less effective in preventing heat from radiating away from the earth and so influence climate. The pioneer in these ozone observations was Dr. Fabry, of Marseilles, France, now lecturing at the Massachusetts Institute of Technology.

TRANSPLANTED EYES

Science Service

How eyes of rats, cut out of their sockets and then replanted, recover a considerable degree of their normal structure and function is explained by Dr. Theodore Koppanyi, of Budapest, working in the physiological laboratories of the University of Chicago under Professor A. J. Carlson.

Controversy has been aroused by the work of Dr. Koppanyi, for the problem is recognized by scientists as an important one, with significance for the future of surgery.

Both Dr. Koppanyi and Professor Carlson, who has supervised his work, are cautious in their statements; but they point out that two undoubted results have been accomplished.

In the first place, in at least two of the cases they had under experiment, new nervous tissue grew from the cut end of the optic nerve in the eye socket, penetrated the eyeball, and established good anatomical connections, closely resembling the structures to be found in normal eyes. In the second place, when these rats were tested, the transplanted eyes reacted in a normal manner to light. The eyes would move, and the pupils contract, when light was thrown upon them. Blind eyes, with the optic nerve severed or destroyed by disease, do not react in this way.

Dr. Koppanyi related experiments he performed with the rats, to test their power of sight. Normal rats go away from strong light, while blind rats do not react to light at all. Blind rats placed in a box with a partition, making one side dark, were unable to discriminate between the light and the dark chambers. They walked around in either compartment indifferently. Normal rats remained less than a quarter of a minute in the light before passing through to the dark compartment. Three rats with transplanted eyes behaved in this test like normal rats.

Rats were also tested by placing them on a platform at an elevation of about a foot above the laboratory table. Blind rats do not jump, but sometimes crawl down from the platform clinging to the iron rod on which the platform rests, probably guided by the sense of touch. Normal rats and the three spotted rats with transplanted eyes jumped down from the platform. When the platform was raised to a greater height the rats with transplanted eyes showed some hesitation about jumping, as though they could see the height and appreciate the risk.

Having succeeded in these preliminary experiments with rats, Dr. Koppanyi is now beginning work on animals with larger eyeballs, using dogs at first, and planning to work on monkeys later on.

Professor Carlson stated that he believed Dr. Koppanyi succeeded where other experimenters on the same subject had failed, because of two things. The first is the quickness and skill with which Dr. Koppanyi performed the operation. Drying out of the tissues, and especially bacterial infection, which are almost certain to follow even short exposures to the air, greatly increase the chances of failure. Even with the best of methods one success in ten attempts is counted a very good score. The second item in the success of the present experiments is the fact that Dr. Koppanyi sewed the eyelids of his subjects shut until the wounds of the operation healed up, thus preventing the rats from rolling their eyes about in the sockets and increasing the difficulty of reestablishing connections.

Dr. Carlson warned against too easy credence of stories that similar operations have been performed on human beings, and stated that only after many years of cautious experiment and much improvement in methods would it be justifiable to attempt surgical transplantation of the eyeball.

THE DEATH RATE

Science Service

JUDGED by the health record of the first nine months of 1924, it is highly probable that the death rate for the year, as a whole, will be considerably lower than for any prior year. This is indicated by the mortality experience of the more than 15,000,000 industrial policyholders of the Metropolitan Life Insurance Company.

Among the white policy holders the death rate for all causes combined was but 8.2 per 1,000, which may be compared with 8.8 for the corresponding period of 1923, 8.4 in 1922 and 8.2 in 1921. The 1924 figure, however, reflects an even more favorable condition than did the identical rate recorded at this time in 1921. The reason is that the 1924 rate includes figures on very young lives, among whom the death rate is higher than at any other age, and the 1921 rate does not. This year, therefore, stands out as the most favorable in the history of the industrial populations of the United States and Canada.

The experience among the colored population has not been so favorable, as this year's death rate was 15 per 1,000, which is identical with that in 1923 and considerably higher than in either 1922 or 1921.

The tuberculosis death rate will decline to a new minimum in 1924. A sufficiently large drop was recorded during the first nine months of the year to assure this. The decline has been much greater, however, among white than among colored persons. Among other favorable developments are a further decline in the mortality from typhoid fever and a pronounced drop in the death rate among white women from conditions incidental to pregnancy and childbirth. For the latter the figures for colored women show not only a less favorable record, but an actual increase as compared with this time last year.

There were 342 deaths from alcoholism with a death rate of 2.9 per 100,000. This compares with 323 deaths during the same months of 1923; but these 323 deaths were equivalent to a rate of 3.0 per 100,000. It is now fairly well assured that there will be no rise in the death rate from alcoholism this year as compared with last, and that for the present, at least, the peak in the rise which has been observed since 1920 has been reached. Cirrhosis of the liver, which is closely associated with alcoholism, caused 673 deaths as compared with 630 during the first nine months of last year. The actual death rate, however, runs a trifle lower this year. Only 13 deaths from wood and denatured alcohol poisoning were recorded as compared with 22 during the corresponding period of 1923.

The record for violent deaths shows fewer suicides and fewer fatal accidents among both the white and colored population. The homicide situation has improved among the whites, but among colored persons the record is bad with the rate much higher than for the first nine months of either 1923 or 1922. There have been more accidental drownings and more automobile fatalities this year than last.

PNEUMONIC PLAGUE

Science Service

THE only preventive of the plague, a virulent pneumonia, which has broken out in Los Angeles, is the complete isolation of the patient.

"Careless disposal of the discharges of the patient is the main way of spreading the disease," according to Dr. M. J. White, acting surgeon general of the Public Health Service.

The people infected with the disease in the present outbreak have been Mexican natives of Los Angeles. They were ranch workers and doubtless were infected by ground squirrels. Unlike the bubonic plague, it is not spread by the bite of animals, but through droplets of sputum given off in the air by the patient. It is almost impossible to detect the difference between it and broncho pneumonia in the early stages, except that it is more virulent from the first. An examination of the sputum of the patient will show the presence of the germs.

Dr. G. W. McCoy, director of the Hygienic Laboratory, U. S. Public Health Service, states that the disease must have spread from the ground squirrels in California, since no case of the plague has been recorded in Mexico for the last two years.

The pneumonic plague is a native of Manchuria and other northern climates. The last great outbreak occurred in 1911 when over 50,000 people died in a few weeks. The first known case of pneumonic plague came to the western hemisphere in 1899 from Africa.

In 1919 fourteen cases were recorded in different parts of California. Ground squirrels were examined and found to be infected with the disease. The death rate in this slight epidemic was 100 per cent. It was not recognized definitely until the last case where an autopsy proved it to be plague and not pneumonia. It can never be particularly violent in California as the germs need a cold, damp atmosphere to thrive. Under favorable conditions they can lie dormant for years and still spread the plague. It is probable that it was the pneumonic rather

than the bubonic plague that swept through England and France in the Middle Ages.

Two specialists in contagious diseases, Dr. J. C. Berry and Dr. M. E. Wayson, have been sent out to the coast by the U. S. Public Health Service to study the conditions leading up to the plague. The situation in California is not alarming to any except the ground squirrels as a war of extermination is being waged against them. Every precaution is being taken to prevent new cases. Rats are also suffering in the war. They have been in bad odor as carriers of plague for centuries. The same quarantine precautions are being observed as in diphtheria.

The germ was discovered and isolated by The Royal Academy of Science of Austria in 1898. The germs were brought over from India and Dr. Muller was put in charge of the experimental work. The earliest victim of the plague in Europe was a man named Barisch, who was detailed to watch the animals used in the experiment. Due to carelessness, he became infected with the disease and died. This definitely established the fact that pneumonic plague was caused by a plague germ, bacillus pestis. The people attending his case also died, proving the infectious quality, high fatality and difficulty of diagnosis of this disease, as it was not recognized until he had been ill three days.

Complete extermination of the rats in Los Angeles may be necessary before the pneumonic plague can be stopped. Ground squirrels may have spread the disease to the rats of the city. So far the cases have been confined to the Mexican quarter and to the people who have visited their sick friends. In this case only the most extreme quarantine will have any effect.

A plague serum, rather like the anti-toxin used in diphtheria, has been sent out to the coast by a drug company in Philadelphia. This is purely an experiment, as it has never been tried before in the treating of pneumonic plague. No alarm is shown by the U. S. Public Health Service over the report of a case of bubonic plague in New Orleans. The plague was brought over by a Belgian sailor on a Greek ship from Algeria. The case was diagnosed upon his arrival and all precautions were taken. Since the plague is spread by the bite of a rat flea the ship, *Atlanticos*, has been entirely cleared of rats and has been disinfected.

About a month ago a case of yellow fever was reported in New Orleans without causing a ripple of interest in the medical profession. It was impossible for that case to spread because it was so late in the season that mosquitoes which act as the carrier were dead. In the second place, the case was fully developed and a yellow fever patient can not infect the carrier after the first seventy-two hours of the development of the case.

LOSSES CAUSED BY INSECTS

Science Service

LOSSES equal to $20.00 a year for every man, woman and child in the United States are caused by insects, and the insects are still on the increase, Professor J. J. Davis, of Purdue University, says in a report to the Indiana Academy of Science.

The greater abundance of insects now than formerly was explained as due to civilization having brought about unnatural conditions which have interfered with the natural balance among plants and animals. Among the principal causes which have produced this interference, Professor Davis mentioned the extensive and continuous cultivation of the same or related crops, which is favorable to insect reproduction by offering unlimited food supplies continuously year after year. Corn-root aphis and corn-root worm, for instance, become more severe when corn follows corn.

Another factor, he pointed out, has been the eradication or reduced supply of the native plants upon which the insects formerly lived. Curculio existed only on wild fruits before cultivated varieties were introduced, and the rose-root worm, which now attacks roses in greenhouses, at one time only attacked wild species.

Transportation has also played an important part in the spread of insects, and more than half of our destructive pests are of foreign origin. They are not necessarily pests of prime importance in their native home, but brought here and finding favorable breeding places with the absence of their natural enemies, they are capable of increasing with scarcely any restriction. Notable examples include the Hessian fly, San José scale, Oriental peach moth, currant worm, cabbage maggot, cabbage worm, wheat midge, European corn borer, gypsy and browntail moths, Japanese beetle, cotton boll weevil, pink bollworm and elm leaf beetle.

Even within our own country transportation has had a marked influence on the spread of insect pests. The San José scale, first introduced into America at San José, California, from China, was carried in shipments of nursery stock across the entire continent to New Jersey, from which place it was soon distributed to many other sections of the country. Increase in population, reduction of forests and hunting have also helped the insects by reducing the number of birds and animals which feed upon them.

ITEMS

Science Service

A RACE between archeologist and engineer is in progress near Muscle Shoals, where Gerard Fowke, of the Bureau of American Ethnology, of the Smithsonian Institution, is rushing the excavation of prehistoric Indian mounds soon to be covered by water backed up by Wilson Dam. The party of scientists working at the mouth of Town Creek on the Tennessee River has uncovered thousands of implements from the kitchen middens or refuse heaps of ancient Indian villages. Horn instruments were found showing that the matured horn of the southern deer was used in making arrow heads and spear points. It was used in pressing up the edge of freshly splintered flint and in shaping it into arrow heads and spear points. Flint is easily worked with this horn and the bevel edge, which give the rifle twist to the arrows, was made by these horn instruments. The mound is composed largely of periwinkle shells and thousands of bone-picks used to extract the meat of this snail from the shell have been discovered. Some of these picks have a perforated end for hanging, but the majority of them are pointed at both ends.