Change of sex under these conditions is merely the premature realization of the animal's definitive genetic characteristics.

W. R. COE

OSBORN ZOOLOGICAL LABORATORY
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PROTECTIVE VACCINATION OF HORSES WITH MODIFIED EQUINE ENCEPHALOMYELITIS VIRUS

By serial passage through pigeons a strain of equine encephalomyelitis virus of the eastern type has been so changed that it promises to be of value as a vaccine. The pigeons were inoculated by the intracerebral route, under ether anesthesia, and the brain tissue for passage secured from birds that had just died or were killed when moribund. The virus has been carried through 100 passages, but most of the work to be reported was done with brains from the 40th and 49th serial passages.

In order to secure more material than is provided by the pigeon brain, a young lamb was inoculated intracerebrally with brain from the 40th pigeon passage and another lamb was likewise inoculated with brain from the 49th passage. Both animals promptly developed encephalomyelitis and died. Their brains were preserved in sterile 50 per cent. glycerin and suspensions were made as needed for the experiments. As little as 1 cc of a 10⁻³ dilution of a 10 per cent. suspension of the brain of either lamb injected subcutaneously into guinea pigs would immunize against from 10,000 to 100,000 infective doses of the unmodified virus injected either subcutaneously or intracerebrally. Of 117 guinea pigs inoculated with the 10 per cent. brain suspension, 8, or 7 per cent., died with symptoms of encephalitis and all but 15 of the remainder were immune. The majority of those that were not immune were tested by intracerebral injection of large amounts of virus. Had they been tested by the subcutaneous route they would probably have lived.

Although the modified virus usually fails to produce disease when injected subcutaneously, if it is brought directly into contact with the central nervous system an encephalomyelitis results. Its activity following intracerebral injection is, however, about 100 times less than that of the unmodified virus. Intracerebral passage of the modified virus through a horse, calf, sheep, rabbit, and serially through five guinea pigs has not restored the lost property of invasion of the central nervous system following subcutaneous injection.

Under controlled laboratory conditions 11 horses have been inoculated subcutaneously with suspensions of the lamb brains mentioned above. The majority of the animals were given 10 cc of a 10 per cent. suspension. Not one horse developed a temperature nor could virus be demonstrated in blood drawn at various intervals after the injection. With the assistance of Dr. J. H. McNeil, state veterinarian for New Jersey, 67 horses were each given subcutaneous injections of 5 cc of the 10 per cent. lamb brain suspension. The inoculations were made in a region where there were many cases of encephalomyelitis, and two of the inoculated animals developed the disease. The virus present in the one brain secured was highly virulent for guinea pigs and was evidently not the strain injected. The other 65 horses showed no reaction to the virus, except that many of those tested as well as all those inoculated at the laboratory developed neutralizing antibodies.

Testing the immunity of horses is a difficult problem because the only certain method of producing disease in these animals is by the intracerebral injection of virus and only a horse with a very high degree of immunity can withstand such an inoculation. Four out of nine vaccinated animals tested by this method showed no temperature reaction or other sign of infection. The other five animals, after an incubation period that was from one to two days longer than that in the controls, developed the disease and died. Two other vaccinated horses inoculated intravenously with virus showed no evidence of disease, but since only one of two controls was infected the results are not conclusive.

In spite of the fact that more than half of our vaccinated horses died from a test intracerebral inoculation, we believe that vaccination with the modified virus will protect against the natural disease. This belief is based on the results of the experiments with guinea pigs and on the facts that vaccinated horses developed neutralizing antibodies and that four horses became so highly immunized that they resisted the intracerebral injection of active virus.

ERICH TRAUB
CARL TEN BROECK

THE ROCKEFELLER INSTITUTE FOR MEDICAL RESEARCH, PRINCETON, N. J.

BOOKS RECEIVED


ITEMS

NORTHERN INDIA, stricken by disastrous earthquake on May 31, is one of the "most seismic regions in the world," Frank Neumann, seismologist of the U. S. Coast and Geodetic Survey, told Sciences Service. In prehistoric, possibly pre-human, times the most tremendous earthquakes the world has ever known rocked the region, as is evidenced by geological structures still existing. The mountains are still growing, so that earthquakes are still to be expected fairly frequently. A violent earthquake there on August 26, 1931, killed several hundred people. There was another sharp shock, though not fatal in its effects, on June 14, 1934. The location of the epicenter of this earthquake was an unusually difficult matter, because of its remoteness from the reporting seismograph stations. However, the Jesuit Seismological Association, St. Louis, Mo., has calculated a tentative location in latitude 27.3 degrees north, longitude 65.7 degrees west. This is in the mountainous region of eastern Baluchistan, approximately 220 miles in a southeasterly direction from the ruined city of Quetta.

Professor G. H. Parker, Harvard University zoologist, held a watch on three different hippopotamuses, in the zoological gardens at Hamburg, Germany, Philadelphia and Washington, respectively, as the huge creatures, immersed in their tanks, came bubbling up at intervals to breathe. He found that the longest time that any of them stayed under was 4 minutes 40 seconds, the shortest time 5 seconds, and the average time 2 minutes 14 seconds. This, he comments, does not come anywhere near the long breath-holding performances of submerged whales, which are truly aquatic mammals. The hippo is to be classified as an amphibious rather than an aquatic animal. Professor Parker's observations are recorded in detail in the current issue of The Journal of Mammalogy.

The heavy mortality among infants under one year of age is due in large part to inferior quality of the eggs from which these infants started life, Dr. George L. Streeter, of the Carnegie Institution of Washington, stated in a lecture delivered under the auspices of the Harvey Society. Experiments with frogs' eggs and pigs' eggs were cited by Dr. Streeter to show how poor quality prevents survival. A baby starting from a poor egg is badly handicapped in the struggle for survival, he pointed out. Many of them can not withstand the hardships of the first year of life and particularly the change in living conditions met at birth. These infant deaths, he said, represent Nature's first sorting of the fit from the unfit.

Man-eating sharks have been claiming increasing numbers of victims, recently, along the Australian coast, especially on the beaches of New South Wales, according to Gilbert Whitley in a report to The Victorian Naturalist. The number of authentic shark-attack records in the decade 1912-21 was 13; in the decade 1922-31 it jumped to 45, and in the three-year period 1932-34 there were sixteen recorded cases of shark onslaughts. It is believed that the increasing use of bathing beaches is responsible for the rising count of tragedies. Enclosing beaches in netting or "shark fences" is strongly advised, with patrolling from airplanes or "shark towers" where such complete protection is not practicable.

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