idea of *Endamoeba histolytica,* as found in infections, than is conveyed by the use of ordinary cultures of this parasite.

J. H. ST. JOHN

ARMY MEDICAL SCHOOL,
WASHINGTON, D. C.

PHOTOGRAPHING ANIMALS

THE scientific photographer often has trouble getting animals in a suitable position. Small animals are very active and will not stay long enough in a pose to be photographed successfully. We tried out a method for quieting snakes and lizards and it gave good results.

The photographs were made at night with Eastman flash paper, and the animals remained still in spite of the flash. The animal to be photographed was placed under an inverted box for a minute or two until all signs of commotion had ceased. The box was lifted quickly but smoothly, the flash-paper was ignited and the film was exposed. This method was also tried in broad daylight with lizards, snakes and rats, and gave good results with all the animals tried. This simple method may be good when the animal has to be moved to certain surroundings and resents it. Evidently the swift change from total darkness to a sudden glare leaves the animal dazed for a moment and gives time for the exposure.

ARTHUR L. KAHN
GEO. H. HANLEY

SPECIAL ARTICLES

ACCELERATED INFECTION IN EXPERIMENTAL POLIOMYELITIS

THE 1931 epidemic of poliomyelitis will enable investigators to study by experimental means, in monkeys, many aspects of the disease, as well as the virus inducing it. The establishment of strains of the human virus in monkeys is attended by initial difficulties which it is desirable to overcome. The experience of the past indicates that a proportion only of human strains can be implanted on the monkey. *Macacus rhesus* is the species which has been commonly employed for inoculation. It has not infrequently happened that after the first successful inoculation of monkeys with human spinal cord or medulla obtained from fatal cases of poliomyelitis, the succeeding inoculation of the spinal cord of the affected monkey has failed to induce disease. The reason for this disparity is not known. It is supposed that degeneration or virus metabolic products contained in the human cord act to make the originally inoculated monkey more susceptible to infection.

A way has been found to increase the proportion of successful inoculations of affected human and monkey spinal cords and brain stems. A number of years ago, Amoss and I observed that an attenuated strain of the monkey virus, unsuccessful on first inoculation, could be made to induce infection by repetition of the injection. We have recently employed this method in implanting 1931 human strains of virus on *Macacus rhesus* monkeys. The method consists in injecting intracerebrally and intraperitoneally, under ether anesthesia, 10 per cent. suspensions of glycerolated spinal cord. The suspensions should be free from bacteria as shown by aerobic plate tests. In our experience thus far, symptoms have either not appeared at all in from 7 to 10 days, or initial symptoms, slight in degree, have arisen and have failed to progress or have disappeared. The effects, if any occurred, tended therefore to the production of the abortive form of experimental poliomyelitis.

Time was allowed to elapse in order to determine whether the symptoms would progress or recede. As no increase occurred, reinoculation was resorted to with material from the same subjects as was employed for the original injection. Again the double—intracerebral and intraperitoneal—inoculations were made, using of course the opposite side of the brain. The symptoms which were stationary or receding were rapidly augmented; and about three days after the second injection the symptoms became pronounced, progressing quickly to paralysis and prostration, as is the rule with infected monkeys.

Not only can the abortive be converted into the progressive paralytic disease by means of reinoculation, but monkeys which develop no detectable symptoms in 11 or 12 days have been successfully infected through the employment of a second injection. The critical period seems to be about three days after the second injection. Within this brief period an accelerated reaction occurs. Whether the acceleration is due to virus alone, or in part to the alien (human) tissue elements, is not known. It may be merely a summation of virus effects, such as Amoss and I observed with monkey strains of virus. The results as described are not invariable. In one or two instances the accelerated effect either failed to arise or was delayed.

The tests to determine whether the reinoculation method suffices to establish durably in monkeys many strains of human poliomyelitis virus have yet to be completed. It remains also to be seen whether highly potent virus strains adapted to monkeys can be readily secured in this manner.

The histological changes present in the spinal cord

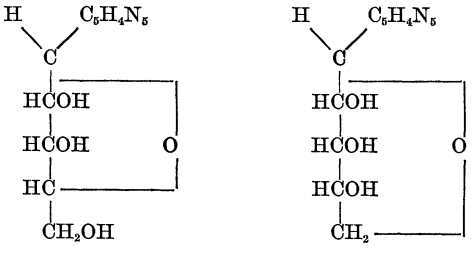
and the basal and intervertebral ganglia of the reinoculated animals are typical of experimental poliomyelitis.

SIMON FLEXNER

THE ROCKEFELLER INSTITUTE FOR MEDICAL RESEARCH, NEW YORK, N. Y.

THE RING STRUCTURE OF ADENOSINE

ADENOSINE is an adenine glycoside of d-ribose. As in the case of other glycosides, this particular one may exist in two forms isomeric with regard to their ring structure.



I. II.

Fig. I represents the furanoside and Fig. II the pyranoside structure. It has now been established that natural adenosine possesses the furanoside structure. This information is important in connection with the theory of the structure of nucleic acids, of which a detailed discussion will be given elsewhere.

The structure was established through the complete methylation of the nucleoside. By hydrolysis of the methylated nucleoside a trimethyl ribose differing from 2, 3, 4-trimethyl ribose has been obtained and to the new sugar is attributed the furanose structure. The points of difference are:

(1) The physical state at room temperature; the substance from the nucleoside being a liquid whereas 2, 3, 4-trimethyl ribose is crystalline.

(2) The optical rotation; that of the new substance being $[\alpha]_D^{26} = +51.6°$ and that of the corresponding pyranose $[\alpha]_D^{27} = -51.7°$.

P. A. LEVENE
R. STUART TIPSON

THE ROCKEFELLER INSTITUTE FOR MEDICAL RESEARCH, NEW YORK, N. Y.

ALARIA MUSTELAE SP. NOV., A TREMATODE REQUIRING FOUR HOSTS

AN undescribed trematode of the superfamily, Strigeoidea, occurring in the intestines of wild minks and weasels of Michigan, is of particular interest because it requires four hosts for the completion of its life history and its hermaphroditic adult stage is preceded by a series of three larval stages, cercaria, agamodistomum and metacercaria.

The cercaria resembles in many respects *Cercaria marcianae* Cort and Brooks, 1928, but differs from the latter in its smaller size, its simpler excretory system which consists of five flame cells in the body and two in the tail stem on each side, the spination which is restricted to the anterior portion of the body, the possession of only a single row of spines around the opening of the acetabulum, and by the position of the four penetration glands, two on either side of the ventral sucker. The further development of the cercaria is much like that of *C. marcianae* for it also penetrates frogs and tadpoles, in which it undergoes some growth and development. It also retains many of its cercarial characters after entering its first vertebrate host so that it is similar to *Agamodistomum marcianae* from which it can be distinguished, however, by the same characters which differentiate the cercariae of the two species. When these agamodistomes were fed to laboratory raised rats and mice, they underwent further growth and development becoming fully developed metacercariae of the diplostomulum type in the muscles. Similar metacercariae were found as natural infections in the muscles and lungs of the mink and raccoon, and in the muscles of the white-footed deer-mouse.

Experimentally infected laboratory mice were fed to a parasite-free ferret, and ten days later full grown Alaria were found in the intestines. Metacercariae from lungs of minks when fed to dogs, cats and ferrets also developed into Alaria. The worms raised experimentally in all these hosts agree in all characters including measurements with those found in the intestines of wild weasels and minks.

Experiments to get cercariae to penetrate directly into mice were unsuccessful, proving that the stage occurring in frogs and tadpoles is an essential step in the life cycle of this parasite. *Alaria mustelae* passes through the following stages and hosts in order to complete its life history; sporocysts in the snail, producing cercariae, which penetrate into tadpoles or frogs in which they become agamodistoma; these when eaten by a mammal, such as a mink, raccoon or mouse, become metacercariae in the muscles or lungs; metacercariae grow to adult state when eaten by another mammal such as a mink, weasel, cat, dog or ferret, in the intestines of which they deposit their eggs. From the latter, miracidia hatch, which are capable of infecting the snail.

Many metacercariae in all stages of development were secured from lungs of mink, making it possible to follow the development of the reserve excretory system and the reproductive system. The reserve