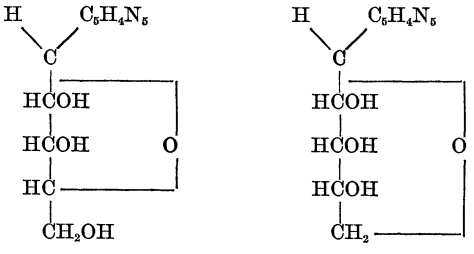
and the basal and intervertebral ganglia of the reinoculated animals are typical of experimental poliomyelitis.

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