technique to a study of this phenomenon. They have found that tubercle bacilli, injected into the peritoneal cavities of tuberculous guinea pigs, undergo rapid degeneration and a rapid decrease in number.

They interpret these changes as a rapid lysis of bacilli. If this interpretation is correct, it will necessitate a revision of current ideas concerning the resisting power of the tubercle bacillus.

We have repeated and extended their work. We have found that tubercle bacilli, injected into the peritoneal cavities of tuberculous guinea-pigs, will occasionally give the degeneration forms and the non-staining forms they describe; and that, under certain conditions, there may be a complete disappearance of the bacilli from the peritoneal fluids within as short a period of time as three hours.

Whether this disappearance is due to an actual lysis of the tubercle bacilli, or to other causes, we have not yet determined. As evidence in favor of lysis we have the observation that all of the normal control guinea pigs injected intraperitoneally with the test suspensions of tubercle bacilli have died from a fulminating type of visceral tuberculosis, within a period of from three to four weeks, while most of the tuberculous guinea pigs, receiving the same test doses, have survived for a longer period of time. A few of these tuberculous guinea pigs however have died within twenty-four hours after the intraperitoneal tests, suggesting an anaphylactic reaction.

We have obtained a similar rapid disappearance of tubercle bacilli from the peritoneal cavities of tuberculous rabbits, from tuberculous rats, and from tuberculous dogs. The mechanism of the phenomenon is now under investigation.

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## The rôle of phagocytosis in involuting organs.

By MAX MORSE.

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In order to clear the way for a study of the transfer of protein in the involuting tail of the tadpole, it was necessary to reëxamine the rôle which has been ascribed by Metschnikoff, Barfurth,

Bataillon, Mercier and many others to the leucocytes in producing the phenomenon. Looss believes on histological ground, that if leucocytes play any part in the process of tissue atrophy and absorption, they play a minor and secondary one rather than a primary rôle. The process of atrophy begins prior to the invasion of the leucocytes into the muscle of the tail and this has been described by Mercier and others, who hold that phagocytosis is the principal factor. Moreover, it has been described for other involuting organs, such as in the metamorphosis of insects, the absorption of the gills of amphibia, etc. It has been suggested for the involution of the mammalian uterus, likewise, so that it may be said that investigators are in accord in observing a dissolution of the muscles and other tissues in atrophying organs prior to the advent of leucocytes.

It is to be expected that if phagocytosis plays any important rôle in the inception of the process of absorption of tissue in the larva of the frog, the blood would show an increase in the total number of leucocytes during the stages of metamorphosis and moreover there would be an increase in polymorphonuclear leucocytes during these stages, to compensate for the drainage of these cells into the muscles. In order to examine this point, smears were made of the blood from the larvæ of the bull-frog, *Rana catesbiana* and from the western pickerel frog, *Rana areolata*. Thirty specimens were used, the blood being permitted to flow into a capillary tube from a lesion in the heart and then blown upon a slide, dried in the air and stained with Wright's stain. A large number of hematocytometer counts were made upon fresh blood, but this method of estimation was abandoned on account of the unsurmountable difficulty of recognizing the different kinds of young corpuscles. As Freidsohn has shown, the various sorts of leucocytes together with the erythrocytes take their origin from cells more or less similar in appearance in the earlier stages, this common stage resembling the large mononuclear leucocyte of the human blood.

The following table gives the summary of the differential counts made upon the smears:

Polymorphonuclear leucocytes are in slight advance in absorbing individuals over those not yet metamorphosing, but there is a

| | Polymorpho-nuclear, per cent. | Basophiles, per cent. | Eosinoph., per cent. | Large M., per cent. | Small M., per cent. |
|---|---|---|---|---|---|
| Absorbing | 9.8 | 4.2 | 6.5 | 36.1 | 42.4 |
| Non-absorbing | 8.6 | 4.7 | 7.0 | 20.6 | 59.0 |
| Adults | 18.3 | 6.2 | 0.4 | 13.2 | 61.2 |

much greater number of these cells in the adult. Of basophiles, there are more in the adult than in the larval stages and more in the non-absorbing than in the absorbing animals, although the difference is slight. Eosinophiles occur in about the same relative numbers as the basophiles, but they are rare in adults. The case is more difficult to analyze in the large and small mononuclear types, for doubtless these classes have been made to include young leucocytes of the foregoing kinds. Inasmuch, however, as histological sections of the tail of the metamorphosing larva show few cells of either of these classes, it is permissible to rule them out of the consideration as phagocytes.

From this evidence, it seems fair to conclude that phagocytosis is not the primary factor involved in the involuting tadpole's tail and, since the process of involution everywhere involves a breaking down of tissue before leucocytes have entered the tissue, it may be concluded that these blood cells nowhere are of importance in explaining the process of tissue absorption. Exception may be made in the case of certain types of carcinoma, which, however, have not been satisfactorily studied from this point of view.

Evidence will be presented later that the process of involution concerns autolysis, as has been suggested in the case of mammalian tissues. Evidence will also be submitted to show that the transfer of tissue involves a closed circuit and that there is no increase in total nitrogen in the excreta during the process of metamorphosis.

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23 (719)

## Effect of phlorhizin on a dog with Eck fistula.

By **N. B. FOSTER.**

It has been stated by Rosenfeld that the administration of phlorhizin to dogs with Eck fistula does not induce glucosuria. This observation would have so much bearing upon our ideas of the mode of action of phlorhizin that the subject required confirmatory evidence.

One gram of phlorhizin in olive oil emulsion was given to a dog on which an Eck fistula had been done. Glucose was found in the urine in considerable quantity for nine days subsequent to the phlorhizin adminstration.

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## On elimination through the mucosa of the urinary bladder.

By **ISRAEL S. KLEINER.**

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In a previous communication (*Journal of Exper. Medicine*, XIV, 274, 1911), I stated that after intravenous injections of large amounts of dextrose the intestine contained on the average 1.2 per cent. of the injected amount of destrose and in nephrectomized animals the dextrose content of the intestine reached the average of 2.2 per cent. The question arose then whether in the presence of a strong hyperglycemia, and especially after double nephrectomy, all mucous membranes are slightly permeable to this substance. The presence of measurable quantities of dextrose in the gastro-intestinal canal is no evidence for the permeability of the mucosa as such, since the mucous membrane of this organ is studded with numerous glandular structures which may readily