sidering the extent of the total lymphoid mass to be in the vicinity of 1-3% of the body weight, and the high lability and great regenerative capacity of lymphoid tissue, the turnover during stress of chemical factors contained within these organs may be greater, actually, than that occurring within the liver.

This investigation emphasizes the tendency of epinephrine to mimic, in the adrenalectomized rat, the action of adrenal cortical factors upon the various phenomena examined. The possibility of adrenal cortical rests in the adrenalectomized animals has been considered, but careful examination at autopsy, of the animals injected with epinephrine, only occasionally revealed the presence of small fragments of accessory tissue. It appears more likely that epinephrine, independently of the pituitary-adrenal cortical axis, may initiate, in the chronic type of experiment herein described, reactions which produce some of the end results found in animals treated with cortical factors. It is probable, however, that the mechanisms set into play by the two types of hormones are quite different. The effects of epinephrine upon carbohydrate and respiratory metabolism are complex, and appear to depend upon the dosage and duration of hormone treatment, and whether or not insulin is present(25). The extensive work of Ingle and his associates (5,26,27) has given proof of an extrahepatic function of epinephrine in the eviscerated animal.

Summary. Adrenalectomy in the female rat results in a lowering of the glycogen content of lymphoid tissues as well as liver. Respiration (tetrazolium reduction) of these organs is increased by adrenal removal. Chronic administration of adrenal cortical extract or epinephrine to adrenalectomized rats, restores the glycogen content and reduces the respiratory activity of the thymus, lymph nodes, spleen and liver. Similarly the hypertrophy of the thymus in the adrenalectomized animal is reduced by both hormones. Maximal effects are produced at the 2nd or 3rd week of treatment. By the 4th week, these effects of the hormones are no longer apparent. The demonstrated influence exerted by the adrenal gland upon lymphoid organ glycogen and respiration may be of importance in the general problem of resistance to stress.

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Nitrogenous Excretion in *Colpidium campylum.* (18265)

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As a waste product of protein metabolism, nitrogen is excreted as ammonia, urea, or uric acid. In the ciliate protozoa, the nitrogenous end products have not been identified with any degree of certainty. It has been reported that uric acid is excreted by ciliates (1,2). However, other investigators contend that most ciliates are ureotelic(3,5). There is, moreover, some evidence that ammonia

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is the principal nitrogenous waste product formed by ciliates. By reason of the fact that bacteria-free cultures were not employed it cannot be concluded whether the reported results stem from protozoan metabolism. A series of experiments was therefore performed in an attempt to ascertain what nitrogenous waste is formed by the ciliate *Colpidium campylum*,‡ which was grown on a carefully controlled, sterile medium.

Material and methods. Pure, sterile, cultures of *Colpidium campylum* were established in test tubes containing 3% Difco proteose-peptone solution [Elliot(9), rendered fat free (Bloor)(10)]. Each day, for 14 days, 5 test tubes were quantitatively analyzed for ammonia, using the colorimetric method of Folin and Bell(11), and for urea, using a method modified from Folin and Youngburg(12). Qualitative analyses for uric acid (Feigl)(13) were also made. The Accurate population records were kept during the experiment using a dilution method of counting.

Results. The results of the ammonia analyses are summarized in Fig. 1 which shows the mean ammonia production and population respectively plotted against time. A lag

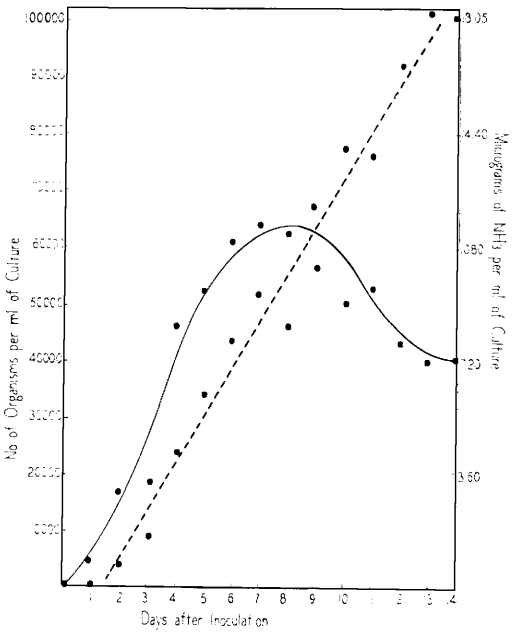

FIG. 1.

Graph comparing 2 curves: ●—— was obtained by plotting number of colpidia per ml against the time in days; curve ● - - -, obtained by plotting the number of γ of ammonia N against the time in days.

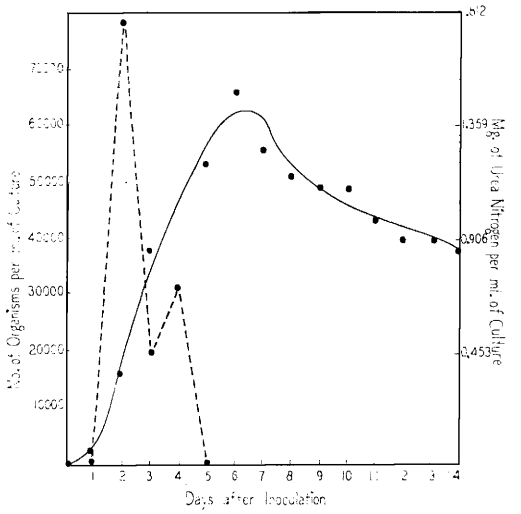

FIG. 2.

Graph comparing 2 curves: ●——, that obtained by plotting number of colpidia per ml of culture against the number of days; ● - - -, that obtained by plotting mg of urea N against the number of days.

phase of growth of 3 days was followed by a logarithmic growth phase. The maximum population of 68,000 colpidia per ml of cul-

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uric acid test was sensitive to 1 γ per ml.

ture was reached on the ninth day after inoculation. Ammonia production increased from the first to the fourteenth day after inoculation at which time 18.0 γ of ammonia nitrogen per ml of culture were produced.

Fig. 2 shows the urea production and mean population plotted against time. The curve obtained is quite similar to that shown in Fig. 1. However, the lag phase is of extremely short duration. Maximum population of 67,000 organisms per ml of culture was reached on the sixth day after inoculation. The population gradually decreased after the sixth day. As is shown in Fig. 2 maximum urea production (1.81 mg of urea N/ml of culture) was reached 48 hours after inoculation. Urea production dropped quickly and was not recorded on the fifth day after inoculation or any day thereafter. No uric acid was detected throughout the 14 days of the experiment.

Discussion. From the results of the present investigations, it might be argued that urea is produced as the principal waste of protein metabolism, and is then hydrolyzed to ammonia. However, if this is true, one would expect a much greater quantity of ammonia than actually obtains. Fig. 2 shows that the amount of urea N present 2 days after inoculation is 1.812 mg per ml of culture. The urea N content drops the following day to 0.454 mg urea N per ml of culture; a decrease of 1.358 mg. Two days after inoculation the ammonia N content is 0.00071 mg per ml of culture. On the following day 0.00143 mg of ammonia N per ml of culture is found. If 1.358 mg of urea N (the decrease in urea N from the second to the third day) were completely hydrolyzed, more than 0.00072 mg of ammonia N per ml of culture would be released. It is therefore, concluded that urea and ammonia are both produced in *Colpidium campylum* and that urea is produced almost solely when metabolic activity is greatest: during the logarithmic phase of growth. Whether urease is present in *Colpidium* is not known. The subsequent fate of urea that is produced is not known at the present time. It must form some nitrogenous compound other than ammonia or uric acid.

Summary. Urea and ammonia were estimated every day for 14 days in sterile cultures of *Colpidium campylum*. Qualitative tests for uric acid were also made. Ammonia production increased linearly with age of culture. Urea was produced only during the logarithmic phase of growth. The cause of the disappearance of urea is unknown. No uric acid was present at any time.

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A Scintillation Counter for Measurement of I^{131} Uptake in the Thyroid Gland.* (18266)

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The uptake of I^{131} by the thyroid is usually measured by a combination of a conventional Geiger counter and scaling circuit (1). In this case, as in most cases of *in vivo* assays of radioisotopes used for therapeutic purposes, the measurements are accomplished by detection of gamma rays, which undergo very little absorption in passage through a small amount of tissue.

The problem inherent in this type of measurement is three-fold: First, the detector cannot be placed in close proximity to the neck, since for accurate estimates the

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