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Wasting Animal Economy.

By Profs. Samuel G. Dixon, M.D., and
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Academy of Natural Sciences of Philadelphia.

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REACTION OF THE *AMIDE-GROUP* UPON THE WASTING ANIMAL ECONOMY.

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IN 1889 I demonstrated that the tubercle bacillus and its nidus, when injected into the animal economy, produced an effect before unobserved.

In former communications I have been quite indefinite in my statements as to the real character of this toxic agent, having only suggested that it might be the residue of the pabulum remaining after the bacilli had selected that which was necessary for their existence, or a digestive secretion of the bacillus; or, again, that it might be an excretion of this living organism. However, in my endeavor to determine the true nature of the active principle of the indefinite mixture that others have entitled "tuberculine," I produced a crystalline substance that at once suggested the amide-group: Allantoin, glycocin, tyrosin, kreatin and kreatinin, taurin and cystin, etc. With this fact directly before us, that the wasting economy, accompanied by a defective liver and weak excretory organs, is often loaded up with waste products, it was believed worth while to institute a line of physio-pathological experiments by injecting the respective members of the amide-group into tuberculous animals. Kreatin being at hand, I at once injected a small quantity of its solution into tuberculous and healthy small animals, with as satisfactory results as are usually obtained with guinea-pigs and rabbits. However, owing to the fact that these animals do not give entirely satisfactory reactions, W. L. Zuill, M.D., Professor of Veterinary Surgery in the University of Pennsylvania, kindly offered to

assist in carrying out a line of physio-pathological experiments on the larger animals. His clinical experience, particularly with tuberculous cattle, made his services specially valuable in this work. A line of experiments was, therefore, immediately planned, and Prof. Zuill began the experiments to test the physio-pathological action of the respective members of the amide-group, when subcutaneously injected into the tuberculous animal economy, as well as into those in health, for control experiments. The report of Prof. Zuill on his work up to the present time is as shown in the following communication:

To Prof. Samuel G. Dixon, M.D.

DEAR DOCTOR:—I hereby submit to you the clinical results obtained from the subcutaneous injection of kreatin in tuberculous cattle. The experiments were made in accordance with our pre-arranged plan, and have extended over the last two months. The results obtained in these experiments more than fulfill my utmost expectations, and are in every respect identical with those which I have obtained with tuberculin. The physiological action of kreatin in tuberculous cows is so exact and identical with tuberculin that it is impossible to recognize a clinical difference. Its influence upon circulation and respiration is well marked in animals suffering with miliary tuberculosis of the lungs; but large doses of the drug do not react upon these organs should the disease be confined to the other tissues of the body.

The action of kreatin upon tuberculous tissues is intensely energetic, causing rapid necrosis of this tissue, giving it the appearance of having undergone a cystic degeneration. The cheesy degeneration of tuberculous tissue seemingly disappears, and its place is taken by necrotic cavities filled with serum, in which float threads and masses of the tuberculous structure more or less large.

August 13.—Experiment No. I was made with $\frac{1}{10}$ of a grain of kreatin in a tuberculous cow, with no well-marked reaction.

August 27.—Experiment No. II was made with $\frac{1}{8}$ of a grain of kreatin in a tuberculous cow, which caused an elevation of temperature from 101° to 104$\frac{1}{5}$° F.

September 9.—Experiment No. III was made with ½ of a grain of kreatin in a tuberculous cow, and caused an elevation of temperature from 101⅕° to 103⅘° F.

September 21.—Experiment No. IV was made with 1 grain of kreatin in a tuberculous cow, and caused a reaction in temperature from 102⅕° to 105⅖° F.

September 4.— Check experiment No. II was made with ⅛ of a grain of kreatin in a healthy cow, and no reaction could be observed.

September 9.—Check experiment No. III was made with ½ of a grain of kreatin in a healthy cow, and no reaction could be observed.

September 24.—Check experiment No. IV was made with 1 grain of kreatin in a healthy cow, and no reaction could be observed.

Respectfully,
W. L. ZUILL.

The report is so satisfactory in showing a marked action of one of the amide-group on wasting animals, when subcutaneously injected, that not only will the chemical work to determine the exact character of the definite crystalline substance obtained from animal tissues and artificially prepared culture mediums be carried on, but also a full line of physio-pathological experiments by the subcutaneous injection of the respective members of the amide-group into the animal economy, in the Bacteriological Laboratory of the Academy of Natural Sciences of Philadelphia, such as its facilities will warrant.

ACTION OF THE *AMIDE-GROUP* UPON THE WASTING ANIMAL ECONOMY.

IN carrying out the physio-pathological experiments by the subcutaneous injection of the respective members of the amide-group into the wasting animal economy, kreatin was followed up by taurin, with the results shown in the accompanying report, made by Dr. Zuill, Professor of Veterinary Surgery in the University of Pennsylvania:

October 9, 1891.

To Prof. Samuel G. Dixon, M.D.

DEAR DOCTOR: I hereby submit to you the clinical results obtained from the subcutaneous injection of taurin into tuberculous cattle.

The experiments were made as nearly in accordance with your request as was possible; however, the stock under my control for the purpose was not as satisfactory as I would have liked.

Experiment No. 1A, was made upon a full-grown heifer, that was previously used for the purpose of testing the action of both tuberculin and kreatin, therefore you will not look for as marked reaction as would likely take place under other conditions.

Treated with ½ grain of taurin.

TEMPERATURE.

10 A.M.....	102.° F.	7 P.M.....	**104.°** F.
1 P.M.....	102.2 "	8 "	**104.** "
2 "	102.2 "	9 "	**104.** "
4 "	102.2 "	10 "	**103.8** "
6 "	**104.2**"	11 "	103. "

Control Experiment No. 1A, unfortunately, had to be made with a healthy steer, only six months old, which fact, for obvious reasons, rendered the result less satisfactory than it would have been with a full-grown animal.

Treated with ½ grain of taurin.

TEMPERATURE.

10 A.M.....	101.6° F.	6 P.M.....	102.° F.
1 P.M.....	101.8 "	8 "	103. "
2 "	101.8 "	9 "	103. "
4 "	101 8 "	10 "	101.8 "

Experiment No. 2A, was made upon the same tuberculous heifer as was Experiment No. 1A, therefore you would not look for as high a reaction as that shown by the first injections, particularly when followed up in such close succession.

Treated with 1 grain of taurin.

TEMPERATURE.

10 A.M.. ...	102.2° F.	5 P.M.....	102.6° F.
12 M.....	102.2 "	6 "	103. "
2 P.M.....	102.2 "	7 "	**103.8**"
4 "	102.4 "	8 "	**103.6**"
9 P.M.....	**103.2**° F.		

Control Experiment No. 2A, was made on the same healthy cow as Experiment No. 2 of September 4, 1891.

Treated with 1 grain of taurin.

TEMPERATURE.

10 A.M.....	101.8° F.	5 P.M.....	101.6° F.
12 M...	102. "	6 "	101.6 "
2 P.M.....	102. "	7 "	101.6 "
4 "	101.8 "	8 "	101.6 "
9 P.M.....	101 6° F.		

Experiment No. 3A, was made with the same tuberculous heifer that I have been using to test the reaction of both tuberculine and kreatin, which renders the animal less susceptible to the action of taurin.

Treated with 1½ grains of taurin.

TEMPERATURE.

9.45 A.M....	101.4° F.	5 P.M.....	103.° F.
12 M.....	102. "	6 "	103. "
2 P.M.....	102.4 "	7 "	**103.6**"
3 "	102.8 "	8 "	**103.2**"
4 "	102.8 "	9 "	102.8 "

Control Experiment No. 3A, was made on a healthy cow, by treating her with 1½ grains of taurin.

TEMPERATURE.

9.45 A.M....	100.8° F.	5 P.M.....	102.° F.
12 M	100.8 "	6 "	102.2 "
2 P.M.... .	100.8 "	7 "	102.2 "
3 "	102. "	8 "	101.6 "
4 "	102. "	9 "	101.6 "

Hoping to have some new cattle for the next of the amide-group, I remain,

Very truly,

W. L. ZUILL.

ACTION OF THE *AMIDE-GROUP* UPON THE WASTING ANIMAL ECONOMY.

THE physio-pathological experiments with kreatin on the healthy and wasting animal economy were followed up by others upon taurin with the results heretofore reported.

January 22, 1892.

To Prof. Samuel G. Dixon, M.D.

DEAR DOCTOR :—At your request I have used kreatin, taurin, the toxic agent you extracted from tuberculous lungs and tuberculin, as diagnostic agents, with the following results :

Cow condemned for tuberculosis treated with 1 grain of kreatin.

TEMPERATURE.

11.00 A. M.....	101.6° F.	7.00 P. M.....	102.4° F.
1.15 P. M	102.0 "	8.00 "	102.4 "
2.30 "	102.1 "	10.30 "	101.6 "
6.00 "	102.4 "	11.30 "	101.6 "

Same animal treated with 1 grain of taurin.

TEMPERATURE.

9.00 A. M....	102.2° F.	5.30 P. M.....	102.4° F.
11.00 "	102.1 "	7.30 "	102.6 "
1.30 P. M.....	102.0 "	9.30 "	102.6 "
3.30 "	102.1 "	8.00 A. M.....	101.0 "

Same animal treated with tuberculous toxic agent, prepared according to Dixon, ½ grain.

TEMPERATURE.

8.55 A. M....	102.4° F.	3.15 P. M.....	102.3° F.
10.35 " ...	102.6 "	4 30 "	102.4 "
1.00 P. M....	102.4 "	7.30 "	102.6 "
		10.10 P. M.....	102.0 F.

Same animal treated with tuberculin, 400 mgs.

TEMPERATURE.

12.50 P. M.....	101.8° F.	5.30 P. M.....	102.2° F.
2.00 "	101.8 "	6.50 "	102.2 "
3.15 "	102.0 "	8.15 "	102.4 "
4.15 "	102.2 "	9.00 "	102.0 "

The results from the reagents not being consistent with our former experiments on tuberculous animals, the cow was killed and posted so as to determine the exact condition. This demonstrated a non-tuberculous condition. W. L. ZUILL.