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論 文

ON THE MANGANESE CONTENT OF ANIMAL TISSUES.

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1. INTRODUCTION.

It is a well known fact that a trace of manganese occurs widely in animal and plant bodies. In 1905 Bertrand accomplished exact scientific researches on the subject of manganese. He investigated the catalytic action of manganese on the growth of plants, molds, and bacteria, and concluded that manganese is of great physiological importance for the plant and animal life. Bertrand and Medigreanu reported the following results on the normal manganese content of bloods of various animals.

per liter of blood.

Man	0.02 mg.
Sheep	0.06
Horse	0.02
Steer	0.02
Pig	0.02

Rabbit	0.02
Seal	0.02
Chicken	0.02
Duck	0.02

And they reported several hundred analysis of various tissues of many invertebrates, birds, fishes and lower animals. manganese is invariably found as an ingredient in them. The following table gives some of the results.

In 100 parts of the fresh substance.

	Liver	Kidney	Lungs	Eggs
Dog	0.306mg.	0.106mg.	0.010mg.	
Ox	0.298	0.084		
Calf	0.290	0.063	0.011	
Pig	0.265	0.128	0.023	
Horse	0.285	0.077	0.066	
Rabbit	0.285	0.093	0.010	
Chicken	0.041	0.271	0.010	0.063
Duck	0.380	0.283	0.010	0.540
Erog	0.040			
Dogfish	0.089			

Bertrand pointed out the fact that the organs of principal functional importance, e. g. liver, kidney, etc. have the highest content of manganese, while the muscles, lungs, nerve tissues, etc. contain it very little in quantity. He found also more manganese in the organs of birds than in those of animals. There is some in the yolks of eggs and some of milk. From these facts he concluded that the manganese plays an important part in the living organism.

In 1922 C. K. Reiman and A. S. Minot published the developed method for the analysis of manganese and a series of the results for the manganese contents of the human blood and tissues. The follow-

ing table gives the average of the results concerning to each tissue.

	Mn per 100. gr.
Blood	0.012 mg.
Stomach	0.026
Small intestine	0.029
Colon	0.033
Liver	0.170
Kidney	0.061
Spleen	0.032
Pancreas	0.076
Adrenals	0.013
Lymphnodes	0.063
Muscle	0.014
Lung	0.020
Brain	0.028
Heart	0.021

They further investigated the absorption, distribution and excretion of manganese ingested in the form of the oxides and silicates.

Dr. Nakaseko got the following results by the microchemical analysis.

	Mn per I. k.g. of fresh substance.
Human embryo	0.29 mg.
Liver of embryo	0.67
Placenta	0.08
Brain of child	0.20
Spleen of child	0.31
Liver of child	0.71
Embryo of goat	0.22
Rat	0.43
Wellwater	0.002

I. Hatano reported in 1911 on the study of the chemistry of the gastric juice of silkworms that it contains 1.293 percent of manganese as Mn_3O_4 , for the total ash.

The author carried out the following experiments to study the manganese contents of the tissues of the insectile bodies (silkworms and others.)

2. EXPERIMENTAL.

The dry sample was carefully burned to ash in a platinum crucible at low temperature, and the ash thus obtained, was dissolved in nitric acid(1.3). The manganous salts in the ash were then oxidised to permanganic acid by the lead peroxide method, and then determined by the coloring method.

The results thus obtained were as follows.

(1) Silkworms. (*Bombyx mori*)

	Mn per 100.gr. of dry.	Mn_3O_4 per 100 parts of ash.
Blood (100 c. c.)	0.071mg.	0.114%
Silk-gland	0.910	0.109
Excrement of moths	0.534	0.052
Eggs	1.736	0.702
Moults of larva	4.993	1.309
Pupae	0.724	1.307
Moths	0.518	0.186
Moults of pupae	0.737	0.114
Silk-fibroin	0.007	0.256
Silk-sericin	2.830	0.222

(2) Several kinds of cocoon.

Kinko	0.851mg.	0.144%
Kansen	1.208	0.204
Snokci	0.946	0.161

Blanc pur	0.840	0.121
Giallo Varo	0.820	0.118
Akajiku	0.958	0.209
Sekko	0.752	0.109
Taihakuryu	1.011	0.165

(3) Wild silkworms.

Cocoons of <i>Antheraea pernyi</i>	17.592mg.	1.167%
Pupae of <i>Antheraea pernyi</i>	1.087	0.306
Cocoons of <i>Antheraea yamamai</i>	1.638	0.022
Pupae of <i>Antheraea yamamai</i>	0.737	0.014
Cocoons of <i>Attacus synthia</i>	2.859	0.088
Cocoons of <i>Dictyoploca japonica</i>	3.504	0.542
Pupae of <i>Dictyoploca japonica</i>	0.611	0.019
Eggs of <i>Dictyoploca japonica</i>	0.835	0.087

3. SUMMARY.

A series of results given in above show that manganese was found in all tissues of the insects even in the sericin of silk and also in the fibroin.

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〔摘要〕

動物體中の滿俺に就て

動物並に植物體中に滿俺の存在する事は從來幾多の學者の研究せし處なり。Bertrand 一派の學者に依れば滿俺は生物體の生長にあたり接觸作用をなして生理的重要なるものせり。酸化作用の促進、抗毒作用の生成等の作用をなすも説くものあり。

著者は家蠶、柞蠶、天蠶、濡蠶及栗毛蟲等の昆虫を用ひて動物體内の滿俺を検索せり。幼蟲、蛹、成蟲の何れにも、又何れの組織中にも滿俺は檢出され、絹質物にありては、セリシン、フィブロイン ともに滿俺の存在を確めたり。