follows: It is very soluble in water, fairly soluble in weak alcohol (50 per cent.), almost insoluble in absolute alcohol, and quite insoluble in ether, acetone, ligroine and chloroform. Its aqueous solution, even when freed from adherent sulphuric acid, has a slightly acid reaction. The addition of iodine water to a neutral solution does not give a rose-red color. Alkalies added to a strong solution give a brown color which deepens on heating. Ferric chloride gives a purplish brown, almost black in concentrated solution, which on the addition of tartaric acid and an alkali passes into a deep red color. Before the removal of the carmine-red substance the addition of ferric chloride gives the well-known emerald green color, which passes into red on the addition of an alkali.

It is evident that our sulphate gives Vulpian's ferric chloride reaction, though somewhat changed by the removal of what we take to be the chromogenic substance which gave his iodine reaction. It also promptly reduces silver nitrate in alkaline solution, but does not reduce Fehling's solution even on boiling.

Relation to Alkaloids

More than a year ago, during our first studies with suprarenal extract, we were struck with the fact that every extract entirely free of proteids and physiologically active gave a fine pyrrol reaction when subjected to dry distillation. This is evidenced both by the odor and by the pine sliver reaction. A small quantity of the isolated sulphate also gives the pyrrol reaction when heated either alone or with zinc dust.

We attach considerable importance to this reaction. As is well known, alkaloids in general give pyrrol on dry distillation; morphine, for instance, on being heated with 10 parts of zinc dust gives off pyrrol, ammonia, trimethylamine, pyridine, phenanthrene, etc.[1] During the past winter we made several attempts to prove the presence of pyridine among the products of dry distillation of the active principle as above isolated, as its detection would prove that our principle was to be classed among the alkaloids. . .

Summary

We may summarize the results of our work as follows:

The blood-pressure-raising constituent of the suprarenal capsule may be completely precipitated from an aqueous extract by treatment with benzoyl chloride and sodium hydrate, according to the Schotten-Baumann method.

On decomposing the resulting benzoyl products, a residue is obtained which possesses great physiological activity. It gives the color reactions of Vulpian, reduces silver nitrate and possesses the other specific qualities of suprarenal extracts.

With the help of alkalies a carmine-red pigment may also be separated from these decomposition products. We take this pigment to be that one of the chromogenic substances of Vulpian which gives the rose-carmine color when suprarenal extracts are treated with oxidizing agents or alkalies.

A volatile, basic substance of a coniine-like odor is always found to accompany the crude benzoate. When these substances are removed the active principle is left as a highly active sulphate or hydrochlorate, as the case may be. It is therefore a basic substance. Its salts give a color reaction with ferric chloride; they also reduce silver nitrate, but not Fehling's solution.

It is not possible to split off pyrocatechin from this isolated active principle. The fact that dry distillation causes the appearance of amines and pyrrol in abundance, taken in connection with its ability to take up acid radicles, its reducing power, its precipitability by cupric acetate and iodine chloride, and its physiological action, lead us to conclude that our active principle is to be classed with the pyridine bases or alkaloids.

Science News Letter, December 17, 1932

[1]We are well aware that certain salts of glutaminic, pyromucic and its related acids also yield pyrrol on dry distillation. These compounds, however, like the proteids and their allies, appear to us to be excluded.

ENTOMOLOGY

Insects Artificially Digested To Determine Skeletal Weight

HOW MUCH does an insect's skeleton weigh?

This question has been accurately answered for the first time by Patrick Alfred Buxton, of the London School of Hygiene and Tropical Medicine.

Like many other scientists who make it their business to find out all they can about the lives of insects, he wanted to know as much as possible about their vital functions. He has been experimenting by exposing them to different conditions of dry and moist atmospheres, determining what sort of exposure does them the most harm. Yet many times, after he had noticed that insects lost both water and dry-material weight after exposure, he found himself faced with the problem:

Insects First Dried

"How much of what remains of this insect is living matter on which it could perhaps call for energy, and how much of it is 'dead' skeleton?"

He determined to find out.

Insects do not have large, bony skeletons like higher animals. Much of their "skeletons" are made of chitin, the horn-like substance that forms their shells and stings and sheaths. Mr. Buxton could not simply dissect an insect, take out all its bones, and weigh them.

Selecting a bunch of fat meal-worms, he dried them out and removed all the fat with ether. The rest he put first into pepsin and then into pancreatin, which are two digestive juices. He had to powder the little dried bodies and break up the legs, and then coat them with a liquid that would make them sink in the juices. And so he let them digest—literally, just as they would be digested in the stomach of an animal—for three or four days. What was left, he weighed.

New Method for Suckers

When he came to use blood-sucking insects, however, he found that his digestive juices would not dissolve haematin, the dried blood-substance. He had to work out another method. Back he went to his meal-worms and using the results obtained by digesting for comparison, he found that dissolving powdered dried insects in potassium hydroxide solution at the boiling point for 24 hours would give the same results. And potassium hydroxide will dissolve haematin.

About one-twelfth of the body of a meal-worm is skeleton, Mr. Buxton discovered, but that is not the important thing. Other scientists now have, thanks to his work, a method by which they can find the skeletal proportion of any insect—if they ever happen to want to.

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