GLUCOSE CONTENT OF THE BODY FLUID IN MARINE ANNELIDS

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Bahl (1) maintains that there are 100 mg. of glucose in 100 cc. of earthworm blood but that there is no sugar in the coelomic fluid. On the other hand, Damboviceanu (2) found no reducing sugar in the plasma from Sipunculus nudus. There is no information in the literature concerning the sugar content of the body fluid in marine annelids from the American coast. A series of analyses was, consequently, made to ascertain the amount of glucose in two common North American marine worms.

Material and Methods

The worms, Phascolosoma gouldii and Amphitrite ornata, were obtained in the living condition from the supply department of the Marine Biological Laboratory during the summer of 1947. Body fluid was carefully removed with a hypodermic needle and syringe. Only fresh samples were studied. The amount of glucose in each sample was estimated according to the method of Folin (3). A second series of analyses was made by the method of Somogyi (7). Only the latter method was used for the body fluid from Amphitrite. Another series of analyses was made of fluid from Phascolosoma which had been heated to 30° for 30 minutes.

Results

The results are summarized in Table I which shows that in Phascolosoma there is an average of 17.3 mg. of glucose per 100 cc. of fluid with the Folin filtrate, but only an average of 4.6 mg. per 100 cc. with the Somogyi filtrate. In Amphitrite the Somogyi filtrate yields an average of 8.4 mg. of glucose per 100 cc. of body fluid. After heating Phascolosoma to 30° for 30 minutes, there is a marked increase in the glucose values with either filtrate: Folin, 30.2 mg. per 100 cc.; Somogyi, 26.1 mg. per 100 cc.

Discussion

The results show that in these two marine worms there is much less glucose than in human blood (70 to 90 mg. per 100 cc.) or in earthworm blood (100 mg. per 100 cc.). The values are, however, similar to those
obtained for *Sipunculus*, which contains 10 to 25 mg. of glucose per 100 cc. of body fluid (4).

A comparison of the present results with those of Morgulis (5), who studied the blood in *Homarus, Libinia, Callinectes*, and *Limulus*, and with those of Myers (6), who analyzed blood from *Strongylocentrotus, Cancer*, and *Haliotis*, indicates that the body fluid in the annelids contains appreciably less glucose than the fluid from other invertebrates.

*Arenicola marina* is another marine annelid which is reported to have a relatively low content of sugar in the coelomic fluid (8).

### Table I

**Amount of Glucose in Phascolosoma gouldii and in Amphitrite ornata**

Glucose values (in mg. per 100 cc. of body fluid) are given for the *Phascolosoma* at 20° and after heating to 30° for 30 minutes.

<table>
<thead>
<tr>
<th>Sample No.</th>
<th>Phascolosoma gouldii</th>
<th>Amphitrite ornata</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Folin filtrate</td>
<td>Somogyi filtrate</td>
</tr>
<tr>
<td>Sample No.</td>
<td>20°</td>
<td>30°</td>
</tr>
<tr>
<td>1</td>
<td>15</td>
<td>30</td>
</tr>
<tr>
<td>2</td>
<td>15</td>
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<td>27</td>
</tr>
<tr>
<td>10</td>
<td>19</td>
<td></td>
</tr>
<tr>
<td>Mean</td>
<td>17.3</td>
<td>30.2</td>
</tr>
</tbody>
</table>

The increase in sugar content of the body fluid in *Phascolosoma* after heating at 30° for 30 minutes is interesting. Apparently, the increased temperature stimulated the breakdown of glycogen stored in the muscles or elsewhere. Since nothing is known about the mobilization and storage of carbohydrates in *Phascolosoma*, the place of origin of the increased amount of sugar in the body fluid after heating is not at all certain. A change in the relation of sugar values obtained with the Folin filtrate to those obtained with the Somogyi filtrate occurred after heating. At 20° the relation of Somogyi filtrate sugar to Folin filtrate sugar is 0.28; after heating to 30° for 30 minutes the relation of these quantities is 0.86. These two ratios indicate that there is a real increase in glucose values in *Phascolosoma* after heating and not chiefly of non-glucose reducing substances.
SUMMARY

1. The amounts of glucose in the body fluids of Phascolosoma gouldii and Amphitrite ornata were estimated.

2. It was found that there is an average of 4.6 mg. of true glucose per 100 cc. in the fluid from Phascolosoma and 8.4 mg. per 100 cc. in Amphitrite.

3. After heating Phascolosoma to 30° for 30 minutes the amount of true glucose in the body fluid increases to 26.1 mg. per 100 cc.

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