Table 1. Precision and accuracy of modified method in recovering added Br\(^-\) with bromide ion electrode

<table>
<thead>
<tr>
<th>Bromide added (µg g(^-1))</th>
<th>Alfisol</th>
<th>Vertisol</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Range</td>
<td>Mean</td>
</tr>
<tr>
<td>10</td>
<td>9.5-10.0</td>
<td>9.97</td>
</tr>
<tr>
<td>100</td>
<td>96.4-100.0</td>
<td>97.83</td>
</tr>
</tbody>
</table>

*Results based on six determinations

if present in traces in the filtrate can considerably reduce the sensitivity of the ion-selective electrode\(^{11}\). This analytical procedure was also found to be highly stable and precise (Table 1). Hence, it can be used more successfully for studying the movement of NO\(_3\) in these soils.


ACKNOWLEDGEMENTS. A K P thanks the Joint Committee of the Indian Council of Agricultural Research (ICAR), New Delhi and ICRISAT for awarding the Post-Doctoral Fellowship at ICRISAT.

Received 21 February 1994, revised accepted 18 June 1994

Surface ultrastructure of *Beauveria bassiana* infecting silkworm *Bombyx mori* Linn.

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The surface ultrastructure investigations on entomopathogenic fungi, *Beauveria bassiana* infecting silkworm *Bombyx mori* Linn. reveal that the infecting stage, i.e. oval or spherical conidia are formed on host integument from aerial hyphae. The vegetative hyphae form a network inside the integument and further divide in haemolymph. The crystals of varying size, formed of ammonium and magnesium oxalate have also been observed on integument and in haemolymph.

The disease, white muscardine caused by entomopathogenic fungi, *Beauveria bassiana* (Balsamo) Vuillemin in silkworm (*Bombyx mori* L.) has been responsible for considerable silkworm crop loss in the recent past.

The disease is contagious in silkworm and infects the integument, digestive tract, and haemolymph\(^1\)-\(^6\). The life cycle\(^4\) and histological observations on oral infection\(^5\)-\(^6\) of *B. bassiana* infecting *B. mori* have been studied earlier. However, no attention has been paid so far on surface ultrastructure study on *B. bassiana* infecting *B. mori* in order to generate further information. Therefore, in the present paper, SEM has been used as a tool to investigate the different stages of life cycle and route of infection of *B. bassiana* infecting *B. mori* to confirm the findings generated by earlier workers based on visual and light microscopy observations.

Third instar larvae of *B. mori* (NB,\(_{18}\)) were surface infected with 4 \(\times 10^5\) spores/ml and reared on mulberry leaves at 25 ± 1°C temperature and 60-70% RH. On the seventh day of post infection, larvae were dissected to process the infected integument, digestive tract and trachea. The tissue was fixed in 2.5% glutaraldehyde prepared in cacodylate buffer for 2 h, dehydrated in ethanol series, critically dried, coated with gold, mounted onto copper stubs and scanned under JEOL 100 CX II at 20 kV. Further, a few critically dried samples were also randomly fractured to observe under electron micro-
Figure 1 a-f. SEM photographs of Beauveria bassiana infecting the silkworm Bombyx mori Linn. a. Network of aerial hyphae (Ah) over the integument (bar = 10 μm); b. Fractured portion of integument showing vegetative hyphae (Vh) inside (bar = 5 μm); c. Aerial hyphae (Ah) bearing conidiophores (Cp) (bar = 2 μm); d. Dividing vegetative hyphae (Vh) inside the integument (bar = 2.5 μm); e. Oval or spherical conidia (Cd) showing detachment. Conidiophores (Cp) can be seen on integument (bar = 3 μm); f. Multi-layered ammonium and magnesium oxalate crystals (Cr) deposited over integument (bar = 3 μm).
Analysis of trace elements of some edible trematodes parasitizing the bovine hosts

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With the aid of atomic absorption spectrophotometer a qualitative and quantitative analysis of trace element composition of some edible trematode parasites namely, Gastrothylax crumenifer, Fischoederius elongatus, F. cobboldi, Calicophoron calicophorum, Orthocoeolum orthocoeolum and Paramphistomum epithelium revealed the occurrence of Cu, Ca, Mg, Mn, Pb, Fe, Ni, Zn, Cr, Cd, K, Se and Co in all the studied species, with K showing the highest concentration and Co the lowest in dry weight of the flukes. Further, Ca, Fe, Zn, Cr and Se were found to be higher in immature and Cu, Mg, Mn, Cd, K and Co were more in mature G. crumenifer and F. elongatus.

Trace elements, which are not synthesized in the animal tissue but have significant role in the normal functioning of the body, constitute an important diet among vital foods. However, both excess and deficiency of any one of these metals may lead to toxicity and metabolic, reproductive and skeletal disorders in the body.

Among helminth parasites, the paramphistomid flukes recovered commonly and in abundance from the rumen of cattle and buffaloes constitute an unusual food item and a non-traditional source of animal protein relished by the local tribal population of Meghalaya. In context of helminth parasites, trace elements of several cestode and nematode species have been investigated and their content found to be species-specific. However, similar information with regard to trematode parasites is relatively scant. The present communication deals with a qualitative and quantitative analysis of trace elements of the edible trematodes all of which are amphistomid digenea.

Live parasites, namely Gastrothylax crumenifer, Fischoederius elongatus, F. cobboldi, Calicophoron calicophorum, Orthocoeolum orthocoeolum and Paramphistomum epithelium were recovered from the rumen of cattle, Bos indicus, slaughtered at local abattoirs. The mature specimens of all the six species and also the immature (i.e.


ACKNOWLEDGEMENT. We thank Dr R. K. Datta, Director, CSRTI, Mysore, for valuable suggestions and encouragement.

Received 7 February 1994, revised accepted 13 July 1994