lower pillows. The interspaces between the two pillows beyond the glassy margins are occupied by greenish chloritic material.

2. On the southern bank of the Pench river, just near the Chhindwara-Narsinghpur road bridge, 2 km SE of Singori (22°12′37″N, 79°03′30″E) at 620 m MSL several irregular-shaped, roughly ellipsoidal pillow-like bodies ranging from less than a meter to 2.2 m in diam. are found. Some pillows exhibit radial cracks, otherwise concentric ring-like structures formed by comparatively medium to fine-grained minerals near the centre and glassy/pitchstone-like material near the peripheral zone. Each pillow exhibits chilled margins of shining glass/pitchstone-like material ranging from 5 to 15 cm in thickness. Gradual reduction in glass content towards central part is observed in some pillows. The basal part of each pillow is moulded over the irregular top of the lower pillows and the interspaces between these bodies are occupied by secondary silica and Zeolites.

Similar pillow lava occurrences are also recorded by the present authors near Chargaon (22°07′05″N, 78°58″E) and Anjaniya (22°05′30″N, 79°00″E) and in other parts of Chhindwara district.

The pillow horizon of Chhindwara area was also seen to be overlain by the medium-grained tholeiitic basalt enriched with secondary glass and opaques suggesting grading of spilitic lava to tholeiitic type. Based on available evidence, it is likely that such structures were also forced under subaqueous condition. Considering the distribution of the pillow lava in Chhindwara area along with its petrographic study, it appears that this area was also in close proximity to the sea and (or) was connected by arm of sea from the west.

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IMMOBILIZATION OF CELL WALL DEGRADING ENZYMES BY ISOLATED HOST AND NON-HOST CELL WALLS

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Plant cell walls have high capacity to bind proteins including polygalacturonase, produced by plants and fungi1-3. Cooper et al4 reported binding of pectic enzymes (endo-polygalacturonase and endo-pectin lyase) of plant pathogens by isolated host as well as non-host cell walls. Studies on binding of enzymes by plant cell walls have been limited only to endo-type of pectic enzymes. In the present study we have examined the ability of isolated host (pigeon pea) and non-host (tomato) cell walls to bind and inactivate exo-pectic enzymes [exo-pectin lyase (exo-PL) and exo-pectic acid lyase (exo-PAL)] and endo-xylanase of Fusarium oxysporum f.sp. udum, causing wilt of pigeon pea.

Enzyme samples, prepared from fungal cultures grown on Czapek medium containing host cell walls (pigeon pea) were examined for their activity on predetermined optimum incubation period (6th day for pectic enzymes and 12th day for xylanase). The enzyme was assayed by methods described earlier5. The hydrolytic or trans-eliminative cleavage of the pectic substances was identified spectrophotometrically by thiobarbituric acid (TBA) test of Neukom7, as modified by Sherwood8. A colour reaction between an acid reagent solution of TBA and product of enzyme substrate reaction, gives characteristic absorption peaks for the hydrolytic and trans-eliminative split. A peak at 510 nm suggests the presence of a galacturonase enzyme while a peak at 547 or 550 nm indicates lyase activity. Release of reducing sugars from pectic substances suggests exo-enzymes activity. The enzyme that releases reducing groups from pectin is called exo-PL while exo-PAL releases reducing groups from pectic acid (sodium polypectate). The results of enzyme assays are expressed as (μmol of substrate hydrolysed/min/ml).

Cell walls were isolated from the host (pigeon pea) and non-host (tomato) plants by the method described earlier5. The isolated cell walls (not containing any ionically bound proteins) were hydrated by soaking them in distilled water for 5 min. Fifty mg of hydrated cell walls was added to 5 ml of enzyme samples and removed after 1 h by centrifugation. Supernatant was used for enzyme assays. The control set lacked the cell walls. Enzyme activities of the 'control' and the supernatant were compared to determine loss in activity, if any, due to the presence of cell walls. The release of bound enzymes from cell walls was achieved by adding 5 ml of 0.2 M NaCl to the centrifuged cell wall samples. The centrifuged supernatant was used to assay the enzyme activities (desorbed from cell walls on addition of NaCl). The enzyme remaining in the supernatant after removing the cell walls plus the
Table 1  Binding of some cell wall degrading enzymes of *Fusarium oxysporum* f.sp. *udum* by isolated host- and non-host cell walls

<table>
<thead>
<tr>
<th>Enzyme</th>
<th>(Control cell walls)</th>
<th>In presence of cell walls</th>
<th>After desorption with 0.2 M NaCl</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Enzyme activity*</td>
<td>Enzyme activity</td>
<td>% activity*</td>
</tr>
<tr>
<td>Exo-PL</td>
<td>27.7</td>
<td>Host</td>
<td>12.3</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Non-host</td>
<td>13.6</td>
</tr>
<tr>
<td>Exo-PAL</td>
<td>12.6</td>
<td>Host</td>
<td>7.3</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Non-host</td>
<td>8.4</td>
</tr>
<tr>
<td>Endo-xylnase</td>
<td>78.1</td>
<td>Host</td>
<td>54.6</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Non-host</td>
<td>53.7</td>
</tr>
</tbody>
</table>

*Enzyme activities are expressed in IU x 10^2 ml^-1.

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SOMATIC INSTABILITY IN THE POPULATIONS OF *CYPERUS CYPEROIDES* (L.) O. KUNTZE (CYPERACEAE)

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*CYPERUS CYPEROIDES* is one of the polymorphic sedges widely distributed adapting to different geo-