15.5:13.6:7.3, which is approximately 2:2:1, as in the comment.

Unless corrected subsequently, Eq. 3 in the manuscript that we have before us does not seem to be dimensionally consistent; however, using that equation to calculate $D_{min}$, the minimum finger width for the same three cases, we obtain 2.5:1.9:1.6 cm.

In the next-to-the-last paragraph, the authors apparently refer to tensiometric data presented in our Fig. 6 and 11, rather than Fig. 6 and 8 as they indicated.

We would point out that the minimum suction measured at the interlayer as the fingers begin to form (Fig. 6) corresponds to the portion of the soil moisture characteristic curve (Fig. 2) close to the inflection point of a van Genuchten (1980) S-shaped function fit to the $\psi(\theta)$ data. This we discussed in Baker and Hillel (1990) within the second paragraph of p. 28. This result differs somewhat from the explanation offered by the same group (Glass et al., 1989) that postulates the position of the water entry suction $\psi_{we}$ on the characteristic curve (Fig. 2 of Glass et al., 1989). Our results suggest that $\psi_{we}$, as we called it, does not lie very near suction values corresponding to $\theta_{s}$.

Our interpretation of the cause of the suction at the interlayer becoming larger after the fingers enter the sublayer is the accumulation of water in the top layer during the pause of the wetting front's advance prior to breakthrough. The accumulation is followed by a drawdown of the stored water from the top layer, via the newly-formed fingers. The lengthening fingers thus serve as conduits through which is drained the excess water that had accumulated in the top layer in the region above each finger. In the process, the boundary potential at the supply plane (the interlayer plane) changes to a higher suction in response to desorption of the top layer.

This process of drainage of water through the newly-formed fingers helps to explain why it is observed (Glass et al., 1989) that values of soil wetness are lower behind than within the advancing finger tips. This effect, combined with the effect of hysteresis (Glass et al., 1989) that was anticipated by Raats (1973) in his comment concerning the experimental observations of Tabuchi (1961), contributes to a more complete understanding of finger formation.

Note that this increase in suction following formation of fingers is not associated with redistribution due to discontinuation of surface ponding, as has been observed in other tensiometric studies of infiltration (e.g., Bouma et al., 1982). In our experiments (Baker and Hillel, 1990), ponding was continuous throughout the duration of each of the trials.

In closing, we are glad to note increased interest in fingering, as this previously unrecognized phenomenon may be relevant to many groundwater contamination problems. Fingering may invalidate existing models of vadose zone transport. Sampling and monitoring programs investigating chemical fate and transport in soils may be inadequate if they do not take into consideration the possibility of preferential flow, by this or other mechanisms. We would hope that more studies will be done to further clarify the remaining uncertainties in this with this interesting and pertinently important phenomenon.


Comments on the Calcium-Aluminum Balance (CAB)

In three recent articles (Noble et al., 1988a,b; Noble and Sumner, 1988), Noble and coworkers proposed a new index termed a CAB (Calcium-aluminum balance) in the following form (braces denote molar activities):

$$
CAB = (2 \log \{Ca^{2+}\}) - (3 \log \{Al^{3+}\} + 2 \log \{Al(OH)_{2}\})
$$

The coefficients of the terms are based on the valences of the ions and weight the relative toxicities (this form is more convincing than the reciprocal weighting in the equations mentioned in Table 2, Noble and Sumner, 1988).

We share the opinion of Kinraide and Hillel (1990) that would like to draw attention to another point. The equation above could easily be rearranged as:

$$
CAB = \log \frac{[Ca^{2+}]^{2}}{[Al^{3+}]^{3} \times [Al(OH)_{2}]^{2} \times X}
$$

This form shows that activities of the different Al species are summed up, so that low activity of only one species has little influence on the result. It is easily conceivable that this equation is not.

We rather suggest an equation in which the Al species are summed up, so that low activity of only one species has little influence on the result.

$$
ATI = -\log \frac{[Ca^{2+}]^{2}}{[Al^{3+}]^{3} + [Al(OH)_{2}]^{2} + [Al(OH)]^{2}}
$$

We, therefore, propose an ATI (Aluminum Toxicity Index) in the following form:

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ATI = -\log \frac{[Ca^{2+}]^{2}}{[Al^{3+}]^{3} + [Al(OH)_{2}]^{2} + [Al(OH)]^{2}}
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