$$\begin{array}{ccc}
\pi_m(X_1 \vee \ldots \vee X_k) & \xrightarrow{\psi_*} & \pi_m(X_1 \times \ldots \times X_k) \\
\varphi \downarrow & & \cong \downarrow \\
\bigoplus_{j=1}^{k} \pi_{k+1}(X_i) & \xrightarrow{=} & \prod_{j=1}^{k} \pi_{k+1}(X_i)
\end{array}$$