PROOF OF FORMULA 3.194.5

$$\int_0^a \frac{x^{\mu-1} \, dx}{1+bx} = \frac{a^{\mu}}{\mu} {}_2F_1 \left[1, \mu; \mu+1; -ab\right]$$

This is the special case $\nu = 1$ of 3.194.1.