near $u = 1$, this resemblance may be exploited to give (after elementary but tedious calculations)

$$\pi\Sigma p_m^2 = B(n + 1, \tfrac{1}{2}) + e \tag{10}$$

with

$$0 < e < 2e^{-n\delta} + (\tfrac{2}{3})[\delta/(1 - a)]^{3/2}$$

whenever $n > a/(1 - a)$. Here δ is any number $< pq$. Picking $\delta = n^{-\theta}$, $\theta < 1$, shows that the error goes to zero almost as fast as $n^{-3/2}$. A similar result may be obtained by the methods of Uspensky.

From (10) we have easily

$$\Sigma p_m^2 \sim 1/(2\sqrt{\pi npq}) \qquad (n \to \infty), \tag{11}$$

which is correct even for $p = q$.

It was pointed out by the referee that (9) and (11) are special cases of the relation

$$\Sigma p_m^2 \sim (\tfrac{1}{2}) \sqrt{\text{variance}}$$

which generally holds whenever the shape of the distribution curve approaches a limit.

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APPROXIMATION TO THE POINT BINOMIAL

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The following approximation to the sum of the first $(t + 1)$ terms of the point binomial appears to be useful. Let this sum be denoted by S_{t+1}, and let the point binomial be the expansion of $(p + q)^N$; *i.e.*, let

$$S_{t+1} = p^N + Np^{N-1}q + \cdots + \binom{N}{t} p^{N-t}q^t. \tag{1}$$