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Wanlin Li, Elena Mantovan and Rachel Pries* (`pries@math.colostate.edu`), CO, and
Yunqing Tang. *Curves whose Newton polygons have many slopes of $1/2$.*

There are applications of supersingular curves to identity-based cryptosystems and Goppa codes. If p is an odd prime, it is not known whether there exists a smooth supersingular curve of genus g , defined over a finite field of characteristic p , for every natural number g . We prove that there exists a smooth supersingular curve of genus g in characteristic p when $g = 5, 6, 7$ for infinitely many new primes p . For $p \equiv 2 \pmod{3}$ and $g > 1$, we prove there exists a smooth curve of genus g in characteristic p whose Newton polygon has slopes only $0, 1/2, 1$ and such that the multiplicity of the slope $1/2$ is about $2g/3$. For $g > 200$, these curves demonstrate an unlikely intersection of the Torelli locus with the Newton polygon strata in the moduli space of abelian varieties. (Received January 25, 2019)