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Carl Pomerance* (carl.pomerance@dartmouth.edu), Mathematics Department, Dartmouth College, Hanover, NH 03755.

Erdős, van der Corput, and the birth of covering congruences. Preliminary report.

In 1849, de Polignac conjectured that every odd number is of the form $2^k + p$, where p is 1 or prime. Just over a century later, in 1950, Erdős and van der Corput independently proved that de Polignac was way off: not only are there infinitely many odd numbers not of the form $2^k + p$, there is in fact a positive proportion of odd numbers not in this form. The Erdős argument is famous because it was here that he introduced covering congruences (a finite set of residue classes with distinct moduli larger than 1 whose union contains every integer). But what of van der Corput's proof? And which proof is a better starting point for obtaining a good lower bound for the density of counterexamples? This largely expository talk will review the two proofs and discuss numerical estimates for the density. (Received August 23, 2012)