Following the recent discovery of T-shaped GeC₂ by chirped-pulse FT microwave spectroscopy, evidence has been found for two longer carbon chains, GeC₄ and GeC₅, guided by high-level quantum chemical calculations of their molecular structure. Like their isovalent Si-bearing counterparts, those with an even number of carbon atoms are predicted to possess ¹Σ ground states, while odd-numbered carbon chains have low-lying ³Σ linear isomers; all are predicted to be highly polar. With the exception of ⁷³Ge, rotational lines of the other four Ge isotopic species have been observed between 6 and 18 GHz. From these measurements, the Ge-C bond length has been determined to high precision, and can be compared to that found in other Ge species, such as GeC [1] and GeC₃Ge [2] studied previously at rotational resolution. Somewhat surprisingly, the spectrum of GeC₅ very closely resembles that of ¹Σ molecule, presumably owing to the very large spin-orbit constant of atomic Ge, which is manifest as an equally large spin-spin constant in the chain. A comparison between the production of SiCₙ and GeCₙ chains by laser ablation, including the absence of those with n = 3, will be given.