Which is the word in English that has nine letters, and remains a word at each step even when you remove one letter from it, right up to a single letter remaining.

'Startling' is the word. Begin by removing 'l', which makes it 'starting', then take away the 't', making it 'staring', and so on - string; sting; sing; sin; in; and, I.

Our speaker (Marc) found another answer: stringier, stinger, singer, singe, sing, sin, in, I