In order to gain first insight into candidate Maillard reaction products formed upon thermal processing of garlic, mixtures of glucose and S-allyl-l-cysteine, the major sulfur-containing amino acid in garlic, were low-moisture heated, and nine major reaction products were isolated. LC-TOF-MS, 1D/2D NMR, and CD spectroscopy led to their identification as acortatarin A (1), pollenopyrroside A (2), epi-acortatarin A (3), xylapyrroside A (4), 5-hydroxy methyl-1-[(5-hydroxymethyl-2-furanyl)methyl]-1H-pyrrole-2-carbaldehyde (5), 3-(allylthio)-2-(2-formyl-5-hydroxymethyl-1H-pyrrol-1-yl)propanoic acid (6), (4S)-4-(allylthiomethyl)-3,4-dihydro-3-oxo-1H-pyrrolo[2,1-c][1,4]oxazine-6-carbaldehyde (7), (2R)-3-(allylthio)-2-(4R)-4-(allylthiomethyl)-6-formyl-3-oxo-3,4-dihydropyrrole-[1,2-a]pyrazin-2(1H)-yl)propanoic acid (8), and (2R)-3-(allylthio)-2-(4S)-4-(allylthiomethyl)-6-formyl-3-oxo-3,4-dihydropyrrol-1,2-yl)propanoic acid (9). Among the Maillard reaction products identified, compounds 5-9 have not previously been published. The thermal generation of the literature known spiroalkaloids 1-4 is reported for the first time. Sensory analysis revealed a bitter taste with thresholds between 0.5 and 785 mumol/kg for 1-5 and 7-9. Compound 6 did not show any intrinsic taste (water) but exhibited a strong mouthfulness (kokumi) enhancing activity above 186 mumol/kg. LC-MS/MS analysis showed 1-9 to be
generated upon pan-frying of garlic with the highest concentration of 793.7 mumol/kg found for 6, thus exceeding its kokumi threshold by a factor of 4 and giving evidence for its potential taste modulation activity in processed garlic preparations.