

BIOSYNTHESIS AND BIOMIMETIC SYNTHESIS OF HETEROCYCLIC
 β -SUBSTITUTED ALANINES IN HIGHER PLANTS

Isamu Murakoshi, Fumio Ikegami and Chiharu Koide
 Faculty of Pharmaceutical Sciences, Chiba University,
 Yayoi-cho 1-33, Chiba, 260, JAPAN

Our recent works have shown that O-acetyl-L-serine(1) has an important role as a key intermediate in the biosyntheses of heterocyclic β -substituted alanines, such as β -(pyrazol-1-yl)-L-alanine(2) and similar compounds in higher plants.

This paper presents further such examples concerning enzymes in higher plants that catalyze the formation of (4)-(6) from (1) as shown in Chart 1. Enzymes for the formation of (2), L-mimosine(3) and L-quisqualic acid(4) have recently been purified to homogeneity from *Citrullus vulgaris*, *Leucaena leucocephala* and *Quisqualis indica*, respectively. These enzymes are specific for (1) as a donor for the alanyl-moiety, but show markedly differences in specificity for the heterocyclic substrate as acceptor and in molecular weight, optimal pH and K_m value for (1). From above results, it can be concluded that they are different enzymes.

On the other hand, heterocyclic β -substituted alanines, such as (2)-(6) have biomimetically been synthesized by incubating a 0.1 M acetate buffer solution containing corresponding heterocyclic compounds and (1) or serine in the presence of pyridoxal 5'-phosphate (PLP) and metal ions. This PLP-catalyzed chemical reaction depends upon pH, metal ions and temperature. The addition of Ga^{3+} , Fe^{3+} or Al^{3+} enhanced the rate of synthesis.

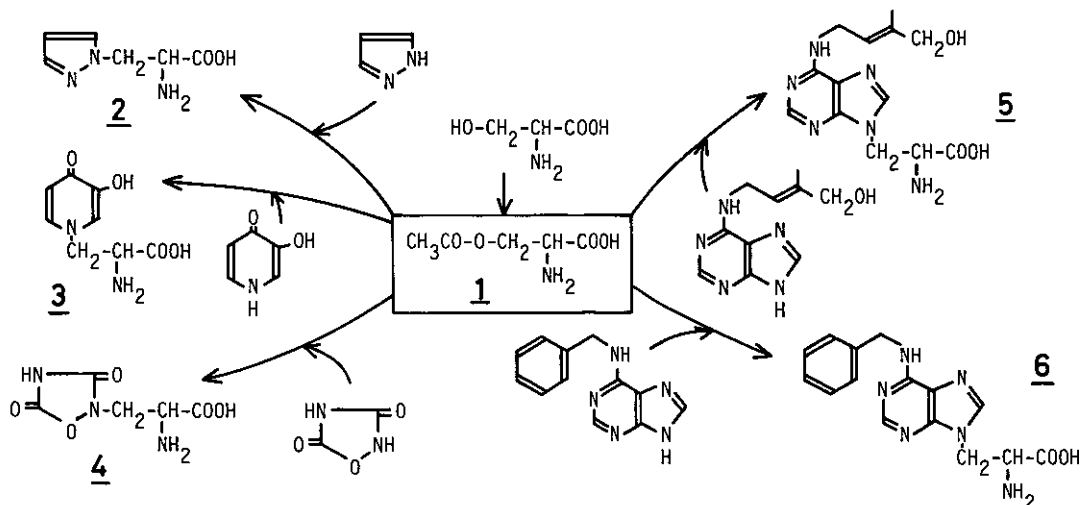


CHART 1