

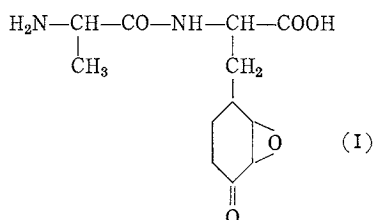
Communications to the editor

THE PROBABLE IDENTITY OF
BACILYSIN AND TETAINE

Sir:

Frequent cases of the independent isolation of the same antibiotic by different workers are known.¹⁾ In this paper the close similarity of bacilysin and tetaine is discussed and the complete structure of tetaine proposed.

Bacilysin, for which the isolation procedure and preliminary structural data were reported in 1965^{2,3)}, is a dipeptide (I)-alanyl-(2,3-epoxycyclohexanone-4)-alanine with the structure:



The C-terminal amino acid of I previously unknown accompanies bacilysin in the fermentation broth of *Bacillus subtilis*⁴⁾. It

is also produced by *Streptomyces griseoplanus*¹³⁾. Under conditions of acidic hydrolysis the epoxycyclohexanone ring of I is dehydrated to the phenolic system, resulting in the formation of tyrosine.³⁾ Similar aromatization of α,β -epoxy-cyclohexanones in acidic media has been reported^{5,6)}. Pure tetaine was isolated in 1957⁷⁾, but its structure is still being studied and has so far not been completely elucidated. The partial structure that was proposed for this compound¹²⁾ must be considered as an erroneous one for the following reasons:

(1) The presence of the tyrosine residue in the antibiotic was concluded from the fact that this amino acid was one of the products of acidic hydrolysis.⁹⁾ Obviously this fact could be explained by the dehydration reaction.

(2) It was postulated that alanine is linked to the rest of the molecule by an ester bond, since lipase hydrolyzes tetaine to alanine and desalaninotetaine¹¹⁾; it is known that commercial lipase preparation also possess peptidase and amidase activities.

Table 1. Similarities between bacilysin and tetaine

Physical or chemical property	Bacilysin	Tetaine	References	
			Bacilysin	Tetaine
1. Producer	<i>Bacillus subtilis</i> strain NCTC 7179 Other strains of <i>B. subtilis</i> Some strains of <i>B. pumilus</i>	<i>Bacillus pumilus</i> strain B-180	2	7
2. Isoelectric point	pH 4.5	pH 4.4	3	8
3. UV spectrum	No selective absorption at above 220 nm		3	12
4. IR spectrum (cm ⁻¹)	3300 (broad), 3080, 1710, 1670, 1600, 1525, 1390	3550~3200, 3120~3030, 1715 ^{a)} , 1675, 1605, 1535, 1400	3, 4	12
5. Stability	After several month of the storage revealed the presence of the two other components; in paper electrophoresis at pH 4.5 One of these compounds migrated towards the cathode, the other towards the anode.	pH 5.85	4	12
6. Acidic hydrolysis ^{b)}	L-Ala - L-Tyr - NH ₃ 1 : 0.78 : 0.06	L-Ala - L-Tyr - NH ₃ 1 : 0.72 : traces	3	9
7. Reaction with NaBH ₄	3 products; unidentified.	2 main products; unidentified.	3	12
8. Reaction with DNFB	DNP-derivative is formed.	Its hydrolysis yielded only DNP-alanine.	3	10
9. Other reactions	Reacts with thiols.	Reacts with H ₂ S.	3	12

a) The same absorption band is observed in IR spectrum of desalaninotetaine.¹²⁾

b) In both cases estimated with an amino acid analyser.

In addition, the absence of the ester carbonyl group is clearly shown by the IR spectrum of tetaïne and desalaninotetaïne¹²⁾.

Consequently, we assume the desalaninotetaïne to be epoxy-cyclohexanone-alanine, *i. e.* to be identical with the C-terminal amino acid of bacilylsin. Bacilylsin and tetaïne show striking similarities in their physical, as well as chemical properties as illustrated in Table 1.

These similarities lend us to propose the structural identity of the two antibiotics—bacilylsin and tetaïne.

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