Isolation and Structure of Isobutyrylleucanidin Produced by *Streptomyces halstedii*

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TABLE I. ^1H -NMR ASSIGNMENTS OF **2**
(CDCl_3 , 400 MHz)

C-position	δ	Splitting pattern	J (Hz)	
33	0.76	d	3H	7
30	0.86	d	3H	7
25	0.91	d	3H	7
32	0.92	d	3H	7
28	0.94	d	3H	7
31	1.05	d	3H	7
20a	1.05	br. t	1H	11, 2
27	1.06	d	3H	7
3''	1.22	d	3H	7
4''	1.23	d	3H	7
6'	1.29	d	3H	6
22	1.44	m	1H	10, 10, 7
18	1.76	br. q	1H	7, 2
9a	1.76	d.d	1H	15, 11
29	1.84	br. s	3H	
24	1.91	m	1H	7, 7, 2
8	1.99	m	1H	11, 7, 7
26	1.99	d	3H	1
9b	2.09	br. d	1H	15, 1
16	2.15	m	1H	11, 7, 2
20b	2.39	d.d	1H	11, 5
6	2.67	m	1H	9, 7, 2
2''	2.68	q.q	1H	7
35	3.25	s	3H	
2'	3.37	d.d	1H	1.5, 3
4'	3.37	br. t	1H	9
7'	3.47	s	3H	
23	3.53	d.d	1H	10, 2
34	3.64	s	3H	
3'	3.71	m	1H	10, 9, 3
5'	3.72	d.q	1H	9, 6
21	3.74	m	1H	11, 10, 5
14	3.91	t	1H	9
17	4.15	m	1H	11, 4, 2
OH-17	4.65	d	1H	4
7	4.74	d.d	1H	7, 2
15	4.98	d.d	1H	9, 2
1'	5.05	d	1H	1.5
13	5.21	br. d.d	1H	15, 9
OH-19	5.45	d	1H	2
5	5.81	br. d	1H	9, 1
11	5.85	br. d	1H	11, 1
12	6.50	d.d	1H	15, 11
3	6.66	br. s	1H	

was much weaker than that of leucanicidin (**1**). **2** only induced a slight growth delay when topically applied to the fifth instar larvae of *L. separata* at a dose of $2\mu\text{g}$ per larvae, whereas **1** was lethal at the same dose.

Leucanicidin (**1**) and isobutyrylleucanicidin (**2**) have the same 16-membered lactone moiety as the bafilomycin group.³⁻⁷⁾ The lactone moiety of the hygrolidin group⁸⁻¹⁰⁾ is also very similar, in which the methoxyl group at C-2 was replaced by the methyl group. Isobutyrylleucanicidin (**2**) is the first case of an acyloxy function in the 16-membered lactone moiety. The fact that this acyl conversion of **1** caused a great decrease of the insecticidal activity suggests that the free hydroxyl function at C-7 in **1** might be very important for the biological activity.

Acknowledgments. We express our thanks to Professor. N. Otake of the University of Tokyo for his helpful discussions throughout this work. We are also grateful to Dr. H. Nakayama of the University of Tokyo for fermentation of the microorganism.

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