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SUPPLEMENTARY DATA

Model compounds related to saquayamycin. Attempts to introduce the *cis* dihydroxyl substitution at the A/B ring junction.

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Table 2. ¹H NMR data for bis-epoxide 8

1H ppm	Assignment	Area	Multiplicity/J	COSY	ROESY
3.51	H _{9a}	1	d, 4.5Hz	H _{9b}	H _{9b} , H _{3a}
3.34	H ₈	1	broad singlet	H _{6up}	CH _{3down} , CH _{3up}
3.15	H _{3a}	1	dd, 7.2, 11.1 Hz	H _{4down} , H _{9b}	H _{4down} , H _{9a}
3.09	H _{9b}	1	dd, 4.5, 11.1 Hz	H _{3a} , H _{9a}	H _{9a} , H _{4down} , H _{6down}
3.04	H ₅	1	d, 4.2 Hz	H _{4up}	H _{6up} , H _{4up}
2.68	H _{4up}	1	dd, 4.2, 15 Hz	H ₅ , H _{4down}	H ₅ , H _{4down}
2.22	H _{4down}	1	dd, 7.2, 15 Hz	H _{4up} , H _{3a}	H _{up} , H _{3a}
2.12	CH ₃ , Acetate	3	s		
1.94	H _{6down}	1	d 13.8Hz	H _{6up} , CH _{3down}	H _{9b} , CH _{3down} , CH _{3up}
1.45	CH _{3down}	3	s	H _{6down}	CH _{3up} , H _{6down} , H _{6up}
1.09	CH _{3up}	3	s		CH _{3pdown} , H _{6down} , H _{6up}
0.79	H _{6up}	1	d 13.8Hz	H _{6down} , H ₈	H ₅ , CH _{3down} , CH _{3up}

Table 3. ¹³C NMR data for bis-epoxide 8

1Hppm	Assignment	HMQC	Assignment	HMBC
3.51	H _{9a}	37.2	C _{9a}	9b, 5, 5a, 8, 9
3.34	H ₈	67.2	C ₈	CH _{3up} , 7, 6/9a, 9
3.15	H _{3a}	37.6	C _{3a}	4, 9b, 5
3.09	H _{9b}	39.85	C _{9b}	4, 3a/9a, 5a, 9
3.04	H ₅	55.2	C ₅	4, 3a/9a/6, 5a
2.68	H _{4up}	24.1	C ₄	3a/9a, 9b, 5, 5a

2.22	H _{4down}	24.1	C ₄	3a/9a, 5, 5a
2.12	CH ₃ , Acetate	21.2	Acetate	9
1.94	H _{6down}	37.4	C ₆	CH _{3down} , CH _{3up} , 7, 5a, 8
1.45	CH _{3down}	23.17	CH _{3down}	CH _{3up} , 7, 6, 8
1.09	CH _{3up}	27.5	CH _{3up}	CH _{3down} , 7, 6, 8, 9
0.79	H _{6up}	37.4	C ₆	CH _{3down} , 7, 9a, 9b, 5, 5a, 8

Table 4. ¹H NMR data for mono-epoxide 7

1H ppm	Assignment	Area	Multiplicity/Js	COSY	ROESY
5.62	H ₈	1	broad singlet	H _{9a} , H _{6up}	CH _{3down} , CH _{3up}
3.49	H _{9a}	1	dd, 2.4, 6 Hz	H ₈ , H _{9b}	H _{9b} , H _{3a} , H _{4down} , H _{6down}
3.14	H _{9b}	1	dd, 6, 11.4 Hz	H _{9a} , H _{3a}	H _{9a} , H _{3a} ,
3.13	H ₅	1	d, 4.2 Hz	H _{4up}	H _{4up} , H _{6up}
3.12	H _{3a}	1	ddd, 1.2, 7.8, 11.4 Hz	H _{9b} , H _{4down}	H _{9a} , H _{9b} , H _{4down}
2.73	H _{4up}	1	ddd, 1.2, 4.2, 15.6 Hz	H _{4down} , H ₅	H ₅ , H _{4up}
2.27	H _{4down}	1	dd, 7.8, 15.6 Hz	H _{4up} , H _{3a}	H _{4up} , H _{3a}
2.19	CH ₃ , Acetate	3	s		
2.12	H _{6down}	1	d, 14.4 Hz	H _{6up}	H _{6up} , CH _{3down} , CH _{3up} , H _{9a}
1.22	H _{6up}	1	d, 14.4 Hz	H _{6down}	H _{6down} , CH _{3down} , CH _{3up} , H ₅
1.12	CH _{3down}	3	s		
1.11	CH _{3up}	3	s		

Table 5. ¹³C NMR data for mono-epoxide 7

1Hppm	Assignment	HMQC	Assignment	HMBC
5.62	H ₈	127	C ₈	CH _{3down} , 9a, 9b, 9
3.49	H _{9a}	36.5	C _{9a}	3a, 5, 5a, 8, 9, 2
3.14	H _{9b}	38	C _{9b}	1, 2, 5a, 3a/9a
3.13	H ₅	53.7	C ₅	1, 2, 5a, 6, 3a/9a/9b, 4
3.12	H _{3a}	37.1	C _{3a}	4, 9b, 5
2.73	H _{4up}	24.1	C ₄	1, 5a, 5, 3, 9a, 4
2.27	H _{4down}	24.1	C ₄	1, 3a, 5a
2.19	CH ₃ , Acetate	21.2	CH ₃ , Acetate	
2.12	H _{6down}	41.6	C ₆	CH _{3down} , CH _{3up} , 7
1.22	H _{6up}	41.6	C ₆	8, 5a, 9b, 7
1.12	CH _{3down}	28.4	CH _{3eq}	CH _{3up} , 7, 6
1.11	CH _{3up}	30.8	CH _{3ax}	CH _{3down} , 7, 6, 9

Table 6. ¹H NMR data for bromo-adduct 9

1H ppm	Assignment	Area	Multiplicity/J	COSY	ROESY
5.99	H ₅	1	m	H _{9a} , H _{4down} , H _{4up} , H _{6down}	H _{4up} , H _{9a} , H _{6up}
5.65	H ₈	1	bs	H _{6up}	Acetate
3.81	H _{3a} and H _{9a}	2	m	H ₅ , H _{4down} , H _{4up} , H _{6down}	H _{4down} , H _{4up} , H _{6down}
2.77	H _{4up}	1	ddd 2.4, 7.2, 15.6 Hz	H _{3a} , H ₅ , H _{4down}	H ₅ , H _{3a} , H _{4down}
2.45	H _{4down}	1	bd 15.6 Hz	H _{4up} , H _{9a} , H ₅ , H _{6down}	H _{3a} , H _{4up}
2.33	H _{6down}	1	bd 13.8 Hz	H _{4down} , H _{9a} , H ₅ , H _{6up}	H _{6up}
2.21	Acetate	3	s		H ₈
2.11	H _{6up}	1	d 13.8 Hz	H _{6down} , H ₈	H _{6down}

1.06	CH ₃	3	s		CH ₃ , H ₈
0.83	CH ₃	3	s		CH ₃ , H ₈

Table 7. ¹³C NMR data for bromo-adduct 9

1H ppm	Assignment	HMQC	Assignment	HMBC
5.99	H ₅	124.92	C ₅	
5.65	H ₈	130.97	C ₈	9, Acetate
3.81	H _{3a}	55.96	C _{3a}	5, 5a, 1, 2
3.81	H _{9a}	45.06	C _{9a}	5, 5a, 9, 1, Acetate
2.77	H _{4up}	22.72	C ₄	5, 5a, 2
2.45	H _{4down}	22.72	C ₄	
2.33	H _{6down}	44.89	C ₆	5, 5a
2.21	Acetate	21.68	Acetate	9, Acetate
2.11	H _{6up}	44.89	C ₆	5, 8, 5a
1.06	CH ₃	30.1	CH ₃	8
0.83	CH ₃	27.36	CH ₃	8

Table 8 ¹H NMR data for aromatic system 11

1H ppm	Assignment	Area	Multiplicity/Js	COSY	ROESY
7.87	H ₄	1	d, 7.8 Hz	H ₅	H ₄
7.62	H ₅	1	d, 7.8 Hz	H ₄	H ₅ , H ₆ , H ₆
6.3	H ₉	1	t, 6 Hz	H ₈ , H ₈	H ₈ , H ₈
2.84	H ₆	1	d, 11.3 Hz	H ₆	H ₆ , H ₅
2.69	H ₆	1	d, 11.3 Hz	H ₆	H ₆ , H ₅
2.17	H ₈	1	dd, 5.8, 13.8 Hz	H ₉ , H ₈	H ₉ , H ₈ , H ₆ , CH ₃
2.06	Acetate	3	s		
1.85	H ₈	1	dd, 5.2, 13.8 Hz	H ₉ , H ₈	H ₉ , H ₈ , H ₆ , CH ₃
1.08	CH ₃	3	s		H ₈ , H ₈ , H ₆ , H ₆ , H ₉
1.05	CH ₃	3	s		H ₈ , H ₈ , H ₆ , H ₆ , H ₉

Table 9 ¹³C NMR data for aromatic system 11

1Hppm	Assignment	HMQC	Assignment	HMBC
7.87	H ₄	124.79	C ₄	9b, 9a, 2
7.62	H ₅	137.32	C ₅	3a, 5a
6.3	H ₉	66.03	C ₉	9b, 5a, 9a, 1
2.84	H ₆	44.06	C ₆	5a, 5, 9a
2.69	H ₆	44.06	C ₆	5a, 5, 9a
2.17	H ₈	41.06	C ₈	5a, 1
2.06	Acetate	20.62	Acetate	1
1.85	H ₈	41.06	C ₈	5a
1.08	CH ₃	28.41	CH ₃	
1.05	CH ₃	27.94	CH ₃	

Table 10. ¹H NMR data for bromo mono-epoxide 12a

1H ppm	Assignment	Area	Multiplicity/Js	COSY	ROESY
5.65	H ₈	1	s		CH ₃ , CH ₃

3.84	H _{9a}	1	s		H _{6down} , H _{4down}
3.54	H _{3a}	1	d, 7.2 Hz	H _{4down}	H _{4down} , H _{4up}
3.16	H ₅	1	d, 4.2 Hz	H _{4up}	H _{6down} , H _{6up} , H _{4down} , H _{4up}
2.75	H _{4up}	1	dd, 4.2, 15 Hz	H ₅ , H _{4down}	H ₅ , H _{3a} , H _{4down}
2.56	H _{4down}	1	dd, 7.2, 15 Hz	H _{3a} , H _{4up}	H ₅ , H _{3a} , H _{4up}
2.2	CH ₃ , Acetate	3	s		
2.13	H _{6down}	1	d, 14.4 Hz	H _{6up}	H ₅ , H _{9a} , H _{6up}
1.17	H _{6up}	1	d, 14.4 Hz	H _{6down}	H _{6down} , H ₅
1.1	CH ₃	3	s		H _{6down} , H ₅ , H ₈
1.08	CH ₃	3	s		H _{6down} , H ₅ , H ₈

Table 11. ¹H NMR data for bromo mono-epoxide 12b

1H ppm	Assignment	Area	Multiplicity/Js	COSY	ROESY
5.65	H ₈	1	s		CH ₃ , CH ₃
3.68	H _{9a}	1	s		H _{6down} , H _{4down}
3.61	H _{3a}	1	d, 7.2 Hz	H _{4down}	H _{4down} , H _{4up}
3.09	H ₅	1	d, 4.8 Hz	H _{4up}	H _{6down} , H _{6up} , H _{4down} , H _{4up}
2.7	H _{4up}	1	dd, 4.8, 15 Hz	H ₅ , H _{4down}	H ₅ , H _{3a} , H _{4down}
2.5	H _{4down}	1	dd, 7.2, 15 Hz	H _{3a} , H _{4up}	H ₅ , H _{3a} , H _{4up}
2.2	CH ₃ , Acetate	3	s		
2.13	H _{6down}	1	d, 14.4 Hz	H _{6up}	H ₅ , H _{9a} , H _{6up}
1.17	H _{6up}	1	d, 14.4 Hz	H _{6down}	H _{6down} , H ₅
1.1	CH ₃	3	s		H _{6down} , H ₅ , H ₈
1.08	CH ₃	3	s		H _{6down} , H ₅ , H ₈

Table 12. ¹³C NMR data for bromo mono-epoxides 12a and 12b

1H ppm	Assignment	HMQC	Assignment	HMBC
5.65	H ₈	131.05	C ₈	9, 9a, CH ₃
3.84/3.68	H _{9a}	42.56	C _{9a}	3a, 8, 9, Acetate
3.54/3.61	H _{3a}	53.24	C _{3a}	4, 5, 9b,
3.16/3.09	H ₅	54.46	C ₅	3a, 4
2.75/2.7	H _{4up}	24.29	C ₄	3a, 5, 9a, 9b
2.56/2.5	H _{4down}	24.29	C ₄	5, 5a
2.2	CH ₃ , Acetate	21.83	Acetate	2
2.13	H _{6down}	42.58	C ₆	CH ₃ , CH ₃ , 1, 7
1.17	H _{6up}	42.58	C ₆	CH ₃ , CH ₃ , 5a, 9a
1.1	CH ₃	27.88	CH ₃	CH ₃ , 8, 9a, 9b
1.08	CH ₃	30.87	CH ₃	CH ₃ , 8, 9a, 9b

Table 13. ¹H NMR for the aromatic system 13

1H ppm	Assignment	Area	Multiplicity/Js	COSY	ROESY
7.82	H ₅	1	d, 7.6 Hz	H ₄	H ₄
7.64	H ₄	1	d, 7.6 Hz	H ₅	H ₅ , H ₆
5.88	H ₈	1	s		H ₆ , CH ₃
2.92	H ₆	2	s		H ₄ , H ₈
2.34	Acetate	3	s		
1.15	2 x CH ₃	6	s		H ₈

Table 14. ¹³C NMR for the aromatic system 13

1H ppm	Assignment	HMQC	Assignment	HMBC
7.82	H ₅	137.18	C ₅	1, 3a, 5a
7.64	H ₄	124.57	C ₄	3, 3a, 5, 5a, 6, 9a
5.88	H ₈	134.31	C ₈	6, 7, 9, 9a, CH ₃
2.92	H ₆	43.79	C ₆	3a, 5, 5a, 7, 8, 9a, CH ₃
2.34	Acetate	21.08	Acetate	Acetate CO
1.15	2 x CH ₃	26.51	2 x CH ₃	6, 7, 9a

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C9b	.69490(8)	.91208(10)	.79420(14)	.0222(5)	Uani	?	?	1.00000	?	?
H3a	.6031(11)	.9415(14)	.966(2)	.040(4)	Uiso	?	?	1.00000	?	?
H4A	.4931(12)	1.0520(14)	.787(2)	.042(4)	Uiso	?	?	1.00000	?	?
H4B	.5849(11)	1.1130(14)	.862(2)	.039(4)	Uiso	?	?	1.00000	?	?
H5	.5520(10)	1.1417(13)	.5674(17)	.028(4)	Uiso	?	?	1.00000	?	?
H6A	.6784(11)	1.1525(13)	.3851(19)	.035(4)	Uiso	?	?	1.00000	?	?
H6B	.7538(11)	1.1915(14)	.5187(19)	.037(4)	Uiso	?	?	1.00000	?	?
H71A	.9035(13)	1.1042(16)	.237(2)	.054(5)	Uiso	?	?	1.00000	?	?
H71B	.8111(13)	1.1752(16)	.210(2)	.050(5)	Uiso	?	?	1.00000	?	?
H71C	.8782(12)	1.2004(14)	.355(2)	.041(4)	Uiso	?	?	1.00000	?	?
H72A	.7985(13)	.9278(15)	.222(2)	.051(5)	Uiso	?	?	1.00000	?	?
H72B	.7182(11)	.9167(14)	.332(2)	.038(4)	Uiso	?	?	1.00000	?	?
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H8	.9126(11)	.9600(13)	.4693(18)	.031(4)	Uiso	?	?	1.00000	?	?
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H92B	.9960(14)	.8283(18)	1.076(3)	.067(6)	Uiso	?	?	1.00000	?	?
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O1	.0498(6)	.0211(4)	.0350(5)	.0003(4)	.0066(4)	-.0033(4)
O2	.0390(5)	.0257(5)	.0363(5)	-.0115(4)	-.0011(4)	.0019(4)
C3	.0297(6)	.0330(7)	.0279(6)	-.0057(5)	-.0033(5)	.0090(5)
O3	.0284(5)	.0460(6)	.0490(6)	-.0088(4)	-.0029(4)	.0168(5)
C3a	.0236(5)	.0326(6)	.0210(5)	-.0028(5)	.0016(4)	-.0000(5)
C4	.0269(6)	.0301(6)	.0327(6)	.0026(5)	.0030(5)	-.0052(5)
C5	.0265(6)	.0204(5)	.0306(6)	.0027(4)	-.0032(5)	-.0026(5)
O5	.0246(4)	.0213(4)	.0262(4)	-.0033(3)	-.0036(3)	-.0027(3)
C5a	.0251(5)	.0169(5)	.0230(5)	-.0026(4)	-.0038(4)	-.0014(4)
C6	.0317(6)	.0211(6)	.0264(6)	-.0056(5)	-.0066(5)	.0040(5)
C7	.0333(6)	.0272(6)	.0202(5)	-.0100(5)	-.0009(5)	.0025(4)
C71	.0453(8)	.0407(8)	.0292(7)	-.0177(7)	-.0001(6)	.0082(6)
C72	.0448(8)	.0370(8)	.0246(6)	-.0149(6)	.0032(6)	-.0054(6)
C8	.0286(6)	.0279(6)	.0228(5)	-.0049(5)	.0029(4)	-.0016(5)
O8	.0274(4)	.0284(5)	.0247(4)	-.0077(3)	-.0007(3)	.0002(3)
C91	.0203(5)	.0325(6)	.0266(6)	-.0003(5)	.0016(4)	.0055(5)
O91	.0275(4)	.0258(4)	.0250(4)	.0059(3)	.0015(3)	.0030(3)
O92	.0276(4)	.0386(5)	.0264(4)	.0030(4)	-.0020(3)	-.0017(4)
C92	.0352(7)	.0356(8)	.0384(8)	.0041(6)	-.0013(6)	.0128(6)
C9	.0232(5)	.0201(5)	.0227(5)	-.0004(4)	-.0006(4)	.0014(4)
C9a	.0230(5)	.0181(5)	.0198(5)	-.0005(4)	-.0004(4)	-.0007(4)
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5. Molecular Geometry

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C1 C9b . . 1.5167(17) ?
O2 C3 . . 1.3809(17) ?
C3 O3 . . 1.1925(17) ?
C3 C3a . . 1.5091(18) ?
C3a C4 . . 1.5393(19) ?
C3a C9b . . 1.5403(17) ?
C3a H3a . . .979(17) ?
C4 C5 . . 1.501(2) ?
C4 H4A . . .991(18) ?
C4 H4B . . .975(16) ?
C5 O5 . . 1.4506(15) ?
C5 C5a . . 1.4606(17) ?
C5 H5 . . .971(15) ?
O5 C5a . . 1.4636(14) ?
C5a C6 . . 1.4971(18) ?
C5a C9a . . 1.5291(15) ?
C6 C7 . . 1.5343(19) ?
C6 H6A . . .962(15) ?
C6 H6B . . .973(16) ?
C7 C71 . . 1.531(2) ?
C7 C72 . . 1.532(2) ?
C7 C8 . . 1.5115(17) ?
C71 H71A . . .99(2) ?
C71 H71B . . .951(18) ?
C71 H71C . . .977(17) ?
C72 H72A . . .98(2) ?
C72 H72B . . .969(17) ?
C72 H72C . . .987(19) ?
C8 O8 . . 1.4675(15) ?
C8 C9 . . 1.4600(17) ?
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O8 C9 . . 1.4176(15) ?
C91 O91 . . 1.3699(15) ?
C91 O92 . . 1.1966(16) ?
C91 C92 . . 1.490(2) ?
O91 C9 . . 1.4181(14) ?
C92 H92A . . .94(2) ?
C92 H92B . . .96(2) ?
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C9 C9a . . 1.5203(17) ?
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O1 C1 C9b . . . 130.64(12) ?
O2 C1 C9b . . . 109.36(10) ?

C1	O2	C3	.	.	.	110.18(10)	?
O2	C3	O3	.	.	.	120.85(12)	?
O2	C3	C3a	.	.	.	110.87(11)	?
O3	C3	C3a	.	.	.	128.28(13)	?
C3	C3a	C4	.	.	.	110.47(10)	?
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C3	C3a	H3a	.	.	.	105.9(10)	?
C4	C3a	C9b	.	.	.	115.87(10)	?
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C5	C4	H4B	.	.	.	108.9(10)	?
H4A	C4	H4B	.	.	.	109.6(14)	?
C4	C5	O5	.	.	.	115.91(11)	?
C4	C5	C5a	.	.	.	119.03(10)	?
C4	C5	H5	.	.	.	116.2(9)	?
O5	C5	C5a	.	.	.	60.36(7)	?
O5	C5	H5	.	.	.	114.1(9)	?
C5a	C5	H5	.	.	.	119.0(9)	?
C5	O5	C5a	.	.	.	60.16(7)	?
C5	C5a	O5	.	.	.	59.48(7)	?
C5	C5a	C6	.	.	.	122.35(10)	?
C5	C5a	C9a	.	.	.	115.42(10)	?
O5	C5a	C6	.	.	.	115.55(9)	?
O5	C5a	C9a	.	.	.	113.92(9)	?
C6	C5a	C9a	.	.	.	116.91(10)	?
C5a	C6	C7	.	.	.	113.42(10)	?
C5a	C6	H6A	.	.	.	108.7(10)	?
C5a	C6	H6B	.	.	.	107.4(10)	?
C7	C6	H6A	.	.	.	109.3(10)	?
C7	C6	H6B	.	.	.	109.5(10)	?
H6A	C6	H6B	.	.	.	108.3(13)	?
C6	C7	C71	.	.	.	109.62(11)	?
C6	C7	C72	.	.	.	111.54(11)	?
C6	C7	C8	.	.	.	109.71(10)	?
C71	C7	C72	.	.	.	109.92(11)	?
C71	C7	C8	.	.	.	108.25(11)	?
C72	C7	C8	.	.	.	107.72(11)	?
C7	C71	H71A	.	.	.	115.0(11)	?
C7	C71	H71B	.	.	.	108.2(11)	?
C7	C71	H71C	.	.	.	110.5(10)	?
H71A	C71	H71B	.	.	.	110.3(16)	?
H71A	C71	H71C	.	.	.	108.0(15)	?
H71B	C71	H71C	.	.	.	104.3(15)	?
C7	C72	H72A	.	.	.	112.1(11)	?
C7	C72	H72B	.	.	.	112.6(10)	?
C7	C72	H72C	.	.	.	110.1(11)	?
H72A	C72	H72B	.	.	.	108.1(15)	?
H72A	C72	H72C	.	.	.	106.8(16)	?
H72B	C72	H72C	.	.	.	106.8(15)	?
C7	C8	O8	.	.	.	115.69(10)	?
C7	C8	C9	.	.	.	122.02(11)	?
C7	C8	H8	.	.	.	115.7(8)	?
O8	C8	C9	.	.	.	57.93(7)	?
O8	C8	H8	.	.	.	113.2(8)	?
C9	C8	H8	.	.	.	118.4(9)	?
C8	O8	C9	.	.	.	60.77(8)	?
O91	C91	O92	.	.	.	122.36(11)	?

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