Supporting Information

A semi-synthetic kanglemycin shows *in vivo* efficacy against high-burden rifampicin resistant pathogens

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	IV	PO	IP
Kang A			
Dose (mg/kg)	5	5	5
AUC-inf (hr*ng/mL)	10320	BLQ	706
Dose corrected AUG	2064	BLQ	141
Bioavailability (%)	NA	BLQ	6.84
Half-life (hr)	0.84	NA	NA
k elimination (hr-1)	0.72	NA	NA
Vol. distribution (L/kg)	0.67	NA	NA
Clearance (mL/kg*hr)	487	NA	NA
J4			
Dose (mg/kg)	5	5	5
AUC-inf (hr*ng/mL)	7762	48.7	3007
Dose corrected AUG	1552	9.73	601
Bioavailability (%)	NA	0.63	38.7
Half-life (hr)	1.09	NA	NA
k elimination (hr-1)	0.51	NA	NA
Vol. distribution (L/kg)	1.28	NA	NA
Clearance (mL/kg*hr)	651	NA	NA
KZ			
Dose (mg/kg)	5	5	5
AUC-inf (hr*ng/mL)	54150	2923	14843
Dose corrected AUG	10830	585	2969
Bioavailability (%)	NA	5.4	27.4
Half-life (hr)	1.17	NA	NA
k elimination (hr-1)	0.55	NA	NA
Vol. distribution (L/kg)	0.17	NA	NA
Clearance (mL/kg*hr)	94.0	NA	NA

Table S1. Pharmacokinetic properties of Kang A, J4, and KZ. NA, not applicable; BLQ, below limit of
quantification.

Table S2. Comparison of bacterial burdens in mouse kidneys infected with MRSA strain COL following treatment with Kang A, J4, KZ or Rif. Efficacy of compounds was evaluated in a neutropenic murine acute peritonitis/septicemia model. Infected mice received IP injections of drug (15 mg/mL) or vehicle (5% DMA plus 30% Captisol) at 2, 4 and 8 hours post infection. Bacterial burdens in kidneys were determined at 24 hrs post-infection. Limit of detection for burden quantification was calculated as 100 CFU/g of kidney. Log change in burden was calculated relative to the vehicle treated group.

Treatment	Mice	Average log CFU/g kidney	Average/Group	Log change in burden
Vehicle (5% DMA plus 30% Captisol)	1 2 3 4 5 6	5.2 6.1 5.9 5.5 5.6 5.1	5.6	0.0
Kang A (15 mg/kg)	1 2 3 4 5 6	3.8 4.1 4.1 3.8 2.6 4.6	3.8	-1.8
J4 (15 mg/kg)	1 2 3 4 5 6	2.6 4.7 3.8 5.0 4.0 4.7	4.1	-1.5
KZ (15 mg/kg)	1 2 3 4 5 6	sterilized	0.0	-5.6
Rif (15 mg/kg)	1 2 3 4 5 6	sterilized	0.0	-5.6

	H ₂ N	H ₂ N	HN	l₂N ↓ O ↓ O	H ₂ N CI	H ₂ N—	H ₂ N O
	J5	C10	D4	E4	N1	C23	E3
Expected mass (M - H ⁺)	1035.5	1035.5	1007.4	1079.5	1041.4	993.4	1065.4
Experimental mass	1035.5	1035.5	1007.4	1079.5	1041.4	993.4	1065.4
WT	0.000061	0.0039	0.0039	0.0039	0.0039	0.016	0.016
H481Y	>64	>64	>64	>64	>64	>64	>64
S486L	16	16	4	64	16	16	16
	H ₂ N O-	H ₂ N F	l₂N√	H ₂ N-O	O H₂N ↓ O	H ₂ N 0	H ₂ NO
	J2	N36	D2	E1	E2	J6	N7
Expected mass (M - H ⁺)	1065.4	1025.4	1049.5	1009.4	1051.4	1065.4	1079.5
Experimental mass	1065.4	1025.4	1049.5	1009.4	1051.4	1065.4	1079.5
WT	0.016	0.016	0.063	0.063	0.063	0.063	0.063
H481Y	64	64	>64	>64	>64	>64	>64
5486L	4	4	16	16	16	16	16
	H ₂ N	H ₂ N H ₂ I	N	H ₂ N	OH H ₂ N		
	ОН	ОН	ОН	он	он он		
	G1	G2	G3	J1	G5		
Expected mass (M - H ⁺)	1037.5	1051.5	1065.5	1023.4	1083.5		
Experimental mass	1037.5	1051.5	1065.5	1023.4	1083.5		
WT	1	1	1	1	16		
H481Y	>64	>64	>64	>64	>64		
S486L	64	64	64	>64	>64		
Bound 2: 15 sub	screen						
Nouna 2. 00 300		, , ,		/		_ ОН	HO
	H ₂ N	H ₂ N	H ₂ N	→ HN HÓ	H ₂ N	H_2N	H ₂ N
	N6	N39	N40	N41	N43	N42	N44
Expected mass (M - H ⁺)	1063.5	1049.5	1091.5	1051.5	1097.5	1051.5	1141.5
Experimental mass	1063.5	1049.5	1091.5	1051.5	1097.5	1051.5	1141.5
WT	0.063	0.063	0.063	0.063	0.25	1	1
H481Y	>64	>64	>64	>64	>64	>64	>64
S486L	4	4	4	4	16	64	64

Figure S1. Complete collection of aliphatic amines used in the synthesis of Kang amides. Aliphatic amines were screened over two rounds of synthesis. The first round of synthesis broadly sampled this class of amines, while the second round utilized amines structurally related to J5, which yielded the most potent amide in the initial round of screening. The identity of each synthesized amide was verified by LC/MS. Expected and experimental masses are indicated. MIC values (μ g/mL) are shown for the amides generated from each amine against wild-type and rifampicin resistant (H481Y and S486L) *S. aureus* strains.

		H ₂ N	H ₂ N	H ₂ N	NH ₂	HNO	H ₂ N
	N29	B1	C11	J7	B4	C4	С9
Expected mass (M - H ⁺)	1047.5	1033.5	1061.5	1033.5	1063.5	1049.5	1019.4
Experimental mass	1047.5	1033.5	1061.5	1033.5	1063.5	1049.5	1019.4
WT	0.00098	0.00098	0.0039	0.0039	0.016	0.016	0.016
H481Y	>64	>64	>64	>64	64	>64	>64
S486L	4	16	64	16	4	16	16

	NH ₂		2 ^N		H ₂ N		H ₂ NN
	B3	C20	B2	C12	N9	N10	N11
Expected mass (M - H ⁺)	1063.5	1063.4	1077.5	1063.5	1087.5	1104.5	1106.5
Experimental mass	1063.5	1063.4	1077.5	1063.5	1087.5	1104.5	1106.5
WT	0.063	0.063	1	1	1	1	1
H481Y	64	>64	>64	>64	>64	>64	>64
S486L	4	16	64	64	16	64	>64

.. ..

Round 2: N29 subscreen

	KN KN KN KN KN KN KN KN KN KN KN KN KN K	$\overset{H}{\searrow} \overset{N}{\longrightarrow}$	⊢Z │		o
	<u>C5</u>	C6	N28	C7	C8
Expected mass (M - H ⁺)	1073.5	1087.5	1033.5	1115.5	1125.5
Experimental mass	1073.5	1087.5	1033.5	1115.5	1125.5
WT	0.00024	0.016	0.016	0.25	0.25
H481Y	>64	>64	>64	>64	>64
S486L	16	16	16	64	16

Figure S2. Complete collection of cyclic amines used in the synthesis of Kang amides. Cyclic amines were screened over two rounds of synthesis. The first round of synthesis broadly sampled this class of amines, while the second round utilized amines structurally related to N29, which yielded one of the most potent amides in the initial round of screening. The identity of each synthesized amide was verified by LC/MS. Expected and experimental masses are indicated. MIC values (μ g/mL) are shown for the amides generated from each amine against wild-type and rifampicin resistant (H481Y and S486L) *S. aureus* strains.

	H ₂ N	H ₂ N-0	H ₂ N-O O-	H ₂ N	H ₂ N		H ₂ N
	J4	F5	F6	A1	A2	F4	N33
Expected mass (M - H ⁺)	1069.5ª	1115.5	1113.4	1055.4	1069.5	1115.5	1095.5
Experimental mass	1069.5	1115.5	1113.4	1055.4	1069.5	1115.5	1095.5
wт	0.000061	0.0039	0.0039	0.016	0.016	0.063	0.063
H481Y	>64	>64	64	>64	64	>64	>64
S486L	16	16	4	4	16	16	16

	H ₂ N	H ₂ N-O	H ₂ N-FFF	H ₂ N	H₂N-∕⊂)-OH	H ₂ N S CI	H ₂ N
	C22	F3	N3	N8	A3	N5	C21
Expected mass (M - H ⁺)	1083.5	1115.5	1123.4	1111.5	1071.4	1146.4	1119.5
Experimental mass	1083.5	1115.5	1123.4	1111.5	1071.4	1146.4	1119.5
wт	0.25	0.25	0.25	0.25	1	1	4
H481Y	>64	>64	>64	>64	>64	>64	>64
S486L	16	4	16	16	64	>64	>64



Round 2: J4 subse	creen	о н	N		
	H ₂ NF		2 ¹ 0-	H ₂ NO	H ₂ NCI
	N4	C13	F1	F2	N2
Expected mass (M - H⁺)	1087.4	1129.5	1099.5	1099.5	1103.4
Experimental mass	1087.4	1129.5	1099.5	1099.5	1103.4
WT	0.000061	0.0039	0.0039	0.0039	0.063
H481Y	>64	>64	>64	>64	>64
S486L	16	64	64	64	4

Figure S3. Complete collection of aromatic amines used in the synthesis of Kang amides. Aromatic amines were screened over two rounds of synthesis. The first round of synthesis broadly sampled this class of amines, while the second round utilized amines structurally related to J4, which yielded the most potent amide in the initial round of screening. The identity of each synthesized amide was verified by LC/MS. Expected and experimental masses are indicated. ^aThe identity of J4, a lead compound for *in vivo* studies, was further verified by HRMS using a SCIEX X500B Q-TOF system: calcd *m*/*z* for C₅₇H₇₁N₂O₁₈ (M + H⁺) 1071.4696, found *m*/*z* 1071.4654. MIC values (μ g/mL) are shown for the amides generated from each amine against wild-type and rifampicin resistant (H481Y and S486L) *S. aureus* strains.

	H ₂ NO OH	H ₂ N, OH	° NH₃ O NHÀ O N N N N N N N N N N N N N N N N N N	H ₂ N O OH	O H ₂ N U OH	$\overset{NH_2}{\overset{I}{\overset{I}{\overset{I}}}} \overset{H_2}{\overset{I}{\overset{I}{\overset{I}}}} \overset{H_2}{\overset{NH_2}}$	H ₂ N- NH O
	N12	N17	N22	N13	N14	N18	N20
Expected mass (M - H ⁺)	1099.4	1121.5	1242.5	1113.4	1037.4	1137.5	1156.5
Experimental mass	1099.4	1121.5	1242.5	1113.4	1037.4	1137.5	1156.5
WT	1	1	1	4	4	4	4
H481Y	>64	>64	>64	>64	>64	>64	>64
S486L	16	>64	>64	>64	>64	>64	>64
	HO NH2 S O			H ₂ N OH	O H₂NOH	O H ₂ NOH	
	N21	N23	N26	N27	N15	N16	
Expected mass (M - H ⁺)	1143.4	1200.5	1125.5	1133.5	1065.4	1093.5	
Experimental mass	1143.4	1200.5	1125.5	1133.5	1065.4	1093.5	
wт	4	4	4	4	16	16	
H481Y	>64	>64	>64	>64	>64	>64	
S486L	64	64	64	>64	>64	64	

Figure S4. Complete collection of carboxylic acid amines used in the synthesis of Kang amides. The identity of each synthesized amide was verified by LC/MS. Expected and experimental masses are indicated. MIC values (μ g/mL) are shown for the amides generated from each amine against wild-type and rifampicin resistant (H481Y and S486L) *S. aureus* strains.

			H₂N-√S=0 0	H ₂ N	Н₂N О Р-ОН ОН		H₂N 0 ́S-ОН О
	P4	P5	P6	C16	P11	P3	P8
Expected mass (M - H ⁺)	1180.4	1112.4	1095.4	1205.5	1087.4	1112.4	1087.4
Experimental mass	1180.4	1112.4	1095.4	1205.5	1087.4	1112.4	1078.4
WT	0.063	0.063	0.25	1	1	4	4
H481Y	>64	>64	>64	>64	>64	>64	>64
S486L	16	16	16	>64	4	64	64
	H ₂ N OH P-OH O	H₂N O └──S-OH Ŏ	H₂N S-OH O	H₂N HO ^{∽P[≪]O HO^{∽P}OH}	H₂N OH H P-OH Ü	² N → OF OH	I
	P10	P7	P9	P12	P13	P14	-
Expected mass (M - H⁺)	1073.4	1073.4	1101.4	1101.4	1115.4	1149.4	
Experimental mass	1073.4	1073.4	1101.4	1101.4	1115.4	1149.4	
WT	4	16	16	16	16	16	
H481Y	>64	>64	>64	>64	>64	>64	
S486L	>64	>64	>64	>64	>64	>64	

Figure S5. Complete collection of phosphate mimic amines used in the synthesis of Kang amides. The identity of each synthesized amide was verified by LC/MS. Expected and experimental masses are indicated. MIC values (μ g/mL) are shown for the amides generated from each amine against wild-type and rifampicin resistant (H481Y and S486L) *S. aureus* strains.



Figure S6. Complete collection of sugar amines used in the synthesis of Kang amides. The identity of each synthesized amide was verified by LC/MS. Expected and experimental masses are indicated. MIC values (μ g/mL) are shown for the amides generated from each amine against wild-type and rifampicin resistant (H481Y and S486L) *S. aureus* strains.





Figure S7. Complete collection of Phe/Trp/Tyr/His analogue amines used in the synthesis of Kang amides. The identity of each synthesized amide was verified by LC/MS. Expected and experimental masses are indicated. MIC values (μ g/mL) are shown for the amides generated from each amine against wild-type and rifampicin resistant (H481Y and S486L) *S. aureus* strains.

	HN O	HN J		HN J	HN HN		HN N	
	C4z	KZ	Z6	Z 8	N28z	N29z	Z5	
Expected mass (M - H+)	1170.5	1225.5ª	1211.5	1227.5	1154.5	1168.5	1183.5	
Experimental mass	1170.5	1225.5	1211.5	1227.5	1154.5	1168.5	1183.5	
WT	0.0039	0.0039	0.0039	0.0039	0.016	0.016	0.016	
H481Y	>64	16	16	>64	>64	64	>64	
S486L	4	1	1	4	16	4	4	
			HN O	HN N				
	Z7	Z10	Z11	N31z	Z4	Z9	-	
Expected mass (M - H ⁺)	1245.5	1226.5	1255.6 (1096.5) ^b	1237.6	1204.5	1240.5		
Experimental mass	1245.5	1226.5	1096.5	1237.6	1204.5	1240.5		
WT	0.063	0.063	0.063	0.25	0.25	0.25		
H481Y	>64	64	64	>64	>64	>64		
S486L	16	4	16	16	16	16		

Figure S8. Complete collection of amines used in the synthesis of C-3/C-4 Kang derivatives. The identity of each synthesized compound was verified by LC/MS. Expected and experimental masses are indicated. ^{*a*}The identity of KZ, a lead compound for *in vivo* studies, was further verified by HRMS using a SCIEX X500B Q-TOF system: calcd *m*/*z* for C₆₄H₈₃N₄O₂₀ (M + H⁺) 1227.5595, found *m*/*z* 1227.5561. ^{*b*}LC/MS fragment of Z11 detected in positive ion mode (M + H⁺). MIC values (µg/mL) are shown against wild-type and rifampicin resistant (H481Y and S486L) *S. aureus* strains.

Table S3. Comparison of bacterial burdens in mouse kidneys infected with *S. aureus* ATCC 12600 carrying an S486L RNAP mutation following treatment with KZ or Rif. Efficacy of compounds was evaluated in a neutropenic murine acute peritonitis/septicemia model. Infected mice received IP injections of drug (15 mg/mL) or vehicle (5% DMA plus 30% Captisol) at 2, 4 and 8 hours post infection. Bacterial burdens in kidneys were determined at 24 hrs post-infection. Limit of detection for burden quantification was calculated as 100 CFU/g of kidney. Log change in burden was calculated relative to the vehicle treated group.

Treatment	Mice	Average log CFU/g kidney	Average/Group	Log change in burden
Vehicle (5% DMA plus 30% Captisol)	1 2 3* 4* 5 6*	4.9 6.0 5.8 5.7 6.1 5.6	5.7	0.0
KZ (15 mg/kg)	1 2 3 4 5 6	3.8 3.6 4.0 3.7 3.9 4.1	3.8	-1.9
Rif (15 mg/kg)	1* 2* 3* 4* 5* 6	4.9 4.9 5.0 5.1 5.2	5.0	-0.7
	found dead at 24 hrs	I	I	I

in



Figure S9. Calibration curve used to determine the concentration of Kang amides. Purified synthesized Kang amides were injected on a Waters Acquity H-Class UPLC and the UV absorbance of each compound was monitored at 395 nm. The area under the curve (AUC) for the UV peak corresponding to each compound was compared to the calibration curve shown above to determine the concentration (mg/mL) of each synthesized compound.



Figure S10. UPLC traces and UV spectra of purified a) Kang A, b) J4, and c) KZ. Compounds were analyzed using a Waters Acquity H-Class UPLC.



Figure S11. Mass fragmentation analysis of a) Kang A, b) J4, and c) KZ. Samples were analyzed by LC-MS/MS.



 $\frac{\text{HRMS}}{\text{Calculated }m/z \text{ for } \text{C}_{57}\text{H}_{71}\text{N}_2\text{O}_{18} \text{ (M + H^+) 1071.4696}}$ Found m/z 1071.4654

MR correlations → HMBC



Figure S12. HRMS and NMR data used to verify the structures of a) J4 and b) KZ.

Position Atom type Atom type <th< th=""><th></th><th colspan="2">Kang A</th><th colspan="2">J4^b</th><th colspan="3">KZ^{b,c}</th></th<>		Kang A		J4 ^b		KZ ^{b,c}				
$ \begin{array}{c c c c c c c c c c c c c c c c c c c $	Position	Atom type	δα	δ _H (mult J in Hz)	Atom type	δc	δ _H (mult., J in Hz)	Atom type	δc	δ _H (mult., J in Hz)
2 C C 1997 140 C 1997 140 7.7 (c) (c) C 1337 140 7.7 (c) (c) C 1337 140 7.7 (c) (c) C 1337 140 7.7 (c) (c) C 1337 140 7.7 (c) (c) 1337 140 1337 (c) (c) 1338	1	С	185.8		С	184.9	X i i	С	181.9	
3	2	С	140.9		C	139.4	/ >	С	113.5	
0 C 107 C 111 C 111 C 113 C 133 7 C 173 C 173 C 173 C 173 7 C 173 C 174 174 174 174 174 174 174 174 174 174 174 174 174 174 174 174 174	3	СН	117.0	7.80 (s)	СН	117.5	7.72 (s)	C	128.9	
0 0 0 1	4	C	104.9		C	102.2		C	143.7	
7 0 0 16.9	6	č	171.8		č	172.6		c	173.6	
8 C 171 L C 177 C 170 C 174 <th174< th=""> <th174< th=""> <</th174<></th174<>	7	С	116.9		С	115.8		С	107.9	
9 0 0 1102 C 1002 C 1002 C 1002 11 C 100.9 57 (6) C 100.9 127 2 (7)	8	С	167.4		С	167.0		С	169.8 ^v	
$ \begin{array}{cccccccccccccccccccccccccccccccccccc$	9 10	C	132.0			130.8		C	111.8	
	11	c	194.1		c	192.1		c	192.0	
13 Ch 2.7 1.87 (e) CH 2.2 1.65 (e) CH CH 2.22 (e) 1.65 (e) 16 C 77.6 C 77.8 <th77.8< th=""> 77.8 77.8 77.8</th77.8<>	12	С	109.9		С	108.0		С	106.1	
14 Chi, 2,34 (i) Chi, 7,70 2,30 (i) ² Chi, 7,70 2,14 (i) ² 17 CH 1224 6,14 (5,5) C 131.5 C 131.1 17 CH 1224 6,14 (5,5) CH 132.6 5,77 (iii) 18 CH 132.6 5,61 (15,5,5) CH 132.7 5,30 (iii) 5,77 (iii) 20 CH 83.3 2,50 (iii) CH 53.6 2,30 (iii) CH 53.7 1,77 (iii) 21 CH 83.3 2,50 (iii) CH 53.6 2,30 (iii) CH 57.7 1,72 (iiii) 22 CH 33.9 1,38 (iii) CH 32.2 1,30 (iiii) CH 57.8 (iiii) 23 CH 33.9 1,38 (iii) CH 32.9 1,30 (iiii) CH 57.8 (iiii) 24 CH 33.8 (iiii) CH 37.4 7.48 (iiii) 1,50 (iiii) 1,50 (iiii) 25 CH 13.5 (iiii) CH 17.9 5.8 (iiii) 1,51 (iiii) 1,50 (iiii) 26 CH 13.5 (iiii) CH 13.6 (iiii) CH 13.6 (iiii) 1,51 (iiiii) 27 CH	13	CH₃	23.7	1.67 (s)	CH₃	22.2	1.69 (s)	CH₃	22.2	1.69 (s) ^m
	14 15	CH₃ C	7.8 171.6	2.34 (s)	CH ₃	/./ 170.0	2.30 (s)"	CH₃ C	7.5 171.0	2.14 (s)"
17 Ch 128 Ch 128 <th< td=""><td>16</td><td>c</td><td>137.0</td><td></td><td>c</td><td>131.5</td><td></td><td>c</td><td>131.1</td><td></td></th<>	16	c	137.0		c	131.5		c	131.1	
18 CH 124 6.33 (d. 15.8, 6.5) CH 124 5.33 (d. 15.8, 8.6) CH 124 5.73 (m) ² 21 CH 83.8 (d. 15.8, 6.5) CH 134 5.73 (m) CH 83.8 (m) 21 CH 83.8 (d. 15.8, 6.5) CH 134 5.73 (m) CH 83.0 (m) 22 CH 83.8 (d. 15.0, 1.5) CH 73.2 2.76 (m) CH 73.0 2.35 (m) 23 CH 70.1 2.36 (m) CH 73.2 2.46 (m) CH 73.2 3.44 (m) 24 CH 81.3< (d. 15.2, 1.5)	17	СН	129.8	6.16 (d, 5.8)	СН	132.6	6.14 (d, 8.6)	СН	128.8	5.79 (m)°
	18	CH	128.2	5.93 (dd, 15.9, 5.8)	CH	128.7	6.30 (dd, 15.9, 8.6)	CH	129.7	5.77 (m)°
$ \begin{array}{c c c c c c c c c c c c c c c c c c c $	19	CH	134.1	5.81 (dd, 15.9, 9.3)	CH	134.7	5.97 (dd, 15.9, 8.4)	CH	134.2	5.21 (t, 11.3)
22 CH 33.8 134 (m) CH 33.2 178 (m) CH 31.5 132 (m) 24 CH 36.9 140 (m) CH 74.4 147 (m) CH 42.0 145 (m) 24 CH 36.9 140 (m) CH 77.4 147 (m) CH 42.0 145 (m) 25 CH 77.6 135 (m) CH 77.8 32.9 (m) CH 77.3 2.79 (k) 145 (m) 145 (m) 27 CH 81.5 33.8 (d, 3.2.7) CH 77.8 32.0 (k) CH 72.3 3.54 (m) 142.5 5.35 (d, 11.8) 28 CH 144.4 6.37 (d, 12.8) CH 11.2 0.56 (d, 12.3) CH 144.4 6.27 (12.3) CH 144.2 5.36 (d, 11.8) 11.2 0.56 (d, 12.7) CH 142.4 5.36 (d, 11.8) 11.2 0.56 (d, 12.7) CH 11.2 0.56 (d, 12.7) CH 11.2 0.56 (d, 11.8) 11.2 0.56 (d, 12.7) CH 11.2 0.56 (d, 15.7) CH 11.2 0.56 (d, 15.7) CH 13.6 <td>20</td> <td>СН</td> <td>68.9</td> <td>3.68 (m)^e</td> <td>СН</td> <td>69.8</td> <td>3.74 (d. 10.0)</td> <td>СН</td> <td>68.0</td> <td>3.30 (m)</td>	20	СН	68.9	3.68 (m) ^e	СН	69.8	3.74 (d. 10.0)	СН	68.0	3.30 (m)
23 CH 79.0 2.85 (cd, 10.0, 1.9) CH 72.2 2.90 (10.1, 3.1) CH 77.3 2.79 (1.2, 7) 24 CH 37.0 3.10 (m) CH 37.4 1.47 (m) CH 77.3 1.44 (m) 27 CH 81.5 5.33 (dc, 12.8, 3.27) CH 78.6 1.36 (m) CH 78.2 3.44 (m) 28 CH 11.2 5.33 (dc, 12.8, 3.27) CH 15.6 5.06 (dc, 12.3, 6.5) CH 11.14 4.91 (1.0, 3.1) 23 CH 14.4 5.33 (dc, 12.8, 3.27) CH 11.6 5.06 (dc, 12.3, 6.5) CH 11.14 4.91 (1.0, 3.1) 33 CH, 14.4 0.95 (d. 7.7) CH, 12.4 0.98 (d. 6.7) CH, 11.1 0.83 (m) 34 CH, 14.4 0.96 (d. 6.7) CH, 12.6 0.96 (d. 6.7) CH, 11.1 0.83 (m) 34 CH, 14.8 0.96 (d. 6.7) CH, 17.6 CH 17.	22	СН	33.8	1.84 (m) ^r	CH	33.2	1.78 (m) ^{<i>i</i>}	СН	31.5	1.62 (m)
24 CH 39.4 1.86 (m) CH 39.7 1.46 (m) CH 42.0 1.96 (m) 24 CH 77.0 1.35 (m) CH 77.8 3.26 (L, 5.0) CH 78.2 3.54 (m) 27 CH 81.5 3.85 (m) CH 77.8 3.26 (L, 5.0) CH 78.2 3.55 (m) 23 CH 142.4 6.37 (m) CH 78.8 3.52 (L, 5.0) CH 142.5 5.85 (m) 23 CH 144.4 6.37 (m) CH 78.8 3.52 (L, 5.0) CH 142.5 5.85 (m) 23 CH 144.4 6.37 (m) CH 144.4 6.27 (m) CH 111 0.50 (m) 33 CH 144.4 0.38 (m) CH 111 0.50 (m) CH 111 0.50 (m) 34 CH 14.4 174 (m) 1.00 (m) CH 10.10 (m) CH 111 0.50 (m) 35 C 174 (m) 0.50 (m) CH 10.0 (m) CH 10.0 (m) CH 10.0 (m) 41 CH 2.50 (m) CH 10.0 (m) CH 2.50 (m) CH 10.0 (m) 14 CH	23	CH	79.0	2.85 (dd, 10.0, 1.8)	CH	78.2	2.90 (10.1, 3.1)	СН	77.3	2.79 (t, 2.7)
$ \begin{array}{c c c c c c c c c c c c c c c c c c c $	24	CH	36.9	1.60 (m)	CH	37.4	1.47 (m)	CH	42.0	1.95 (m) ^{p}
$ \begin{array}{c c c c c c c c c c c c c c c c c c c $	25	СН	37.0	4.30 (dd, 9.5, 1.0) 2 13 (m) ^d	СН	37.6	4.54 (d, 10.3) 1 26 (m)	СН	35.3	5.14 (b) S) 1.44 (m)
28 CH 112.9 5.3 (cd) (12.8, 5.9)" CH 115.9 5.06 (d) (12.1, 3.) CH 114.4 4.91 (1.0.3) 33 CH 21.1 2.66 (d) CH 14.4 6.27 (1.2.3) CH 14.2 2.01 (0) 33 CH 2.11 2.06 (d) CH 14.4 6.27 (1.2.3) CH 14.4 (0) CH 12.4 2.01 (0) 34 CH 13.4 0.86 (1.7.2) CH 11.2 0.18 (1.7.1) CH 12.4 0.56 (0.5.1) 35 C T1.8 2.02 (0) CH 13.4 0.38 (m) ⁷ CH 14.6 (0) CH 10.0 11.4 (0) 0.56 (0) 0.56 (0) 1.34 (0) CH 10.0 CH 10.0 CH 10.0 CH 10.0 CH 10.0 CH 10.5 (0) 1.56 (0) 1.56 (0) 1.56 (0) 1.56 (0) CH 10.5 (0) 1.56 (0) 1.56 (0) 1.56 (0) 1.56 (0) 1.56 (0) 1.56 (0) 1.56 (0) 1.56 (0)	27	СН	81.5	3.85 (dd, 9.3, 2.7)	СН	78.8	3.82 (d, 5.9)	СН	78.2	3.54 (m)
29 CH 146.4 6.77 (6.12.8) CH 142.4 6.27 (d. 12.3) CH 12.5 6.86 (d. 11.8) 33 CH 34 0.83 (d. 6.7) CH 12.5 0.86 (d. 6.7) CH 12.5 0.86 (d. 6.7) CH 12.5 0.86 (d. 6.7) CH 13.4 0.83 (m ²) 34 CH 13.4 0.83 (d. 7.2) CH 13.7 CH 13.4 0.83 (m ²) 35 C 174.1 C C 173.6 CH 13.4 0.38 (d. 7.1) 36 CH 13.8 1.07 (d. 3.3) CH 18.7 1.10 (d. 6.3.) CH 13.4 0.30 (m ⁷) 41 C 41.6 C 43.3 (d. 12.2 (b.3) CH 2.16 (d. 12.0) C 0.10 (d. 6.3) CH 13.4 0.30 (m ⁷) K1 CH 42.6 43.3 (d. 12.2 (b.3) CH 2.33 (b.1 (b.2) 1.30 (m ⁷) CH 2.33 (b.1 (b.2) 1.30 (m ⁷) K3 CH 42.4 42.6 (d. 10.1) CH 2.34 (b.12.3) 2.34 (b.12.3) 1.50 (m ⁷) 1.60 (m ⁷)	28	СН	112.9	5.13 (dd, 12.8, 9.3) ^g	СН	115.9	5.06 (dd, 12.3, 6.5)	СН	111.4	4.91 (t, 10.3)
33 CH1 211 2.06 (a) CH1 202 1.34 (a) CH1 2.01 (b) 33 CH1 2.11 2.06 (a) CH1 1.22 0.18 (a, 7.1) CH1 1.24 0.58 (b, 7.1) 34 CH1 1.34 0.38 (a, 7.2) CH1 1.12 0.18 (a, 7.1) CH1 1.24 0.58 (b, 5.1) 35 C 17.4 C 17.3 D.04 (a) CH1 D.74 (a) D.58 (a) CH1 CH1 D.58 (a) CH1	29	CH	146.4	6.37 (d, 12.8)	CH	144.4	6.27 (d, 12.3)	CH	142.5	5.85 (d, 11.8)
	30	CH₃ CH₂	21.1	2.06 (s)	CH₃ CH₂	20.2	1.94 (s)	CH₃ CH₂	20.8"	2.01 (s) 0.83 (m) ^g
34 CH ₂ 12.4 0.18 (d, 7.1) CH ₃ 12.4 0.18 (d, 7.1) CH ₃ 12.4 0.08 (d, 7.1) 35 C 17.4 - C 173.6 - C 173.6 - C 160.6 - 110.6 20.9 1.44 (c) 0.90 (m) 36 CH ₃ 13.8 1.07 (d, 6.3) CH 63.7 4.30 (d) (12.2, 6.3) CH 66.7 4.72 (m) K3 C 40.8 5.06 (d) (12.7, 6.3) CH 66.7 4.72 (m) C 4.30 (d) (12.2, 6.3) CH 66.7 4.72 (m) K4 C 17.6 C 17.0 C 4.33 (d) (12.2, 6.3) CH 67.8 2.33 (t) (16.2) K5 CH ₂ 43.5 2.66 (t) (15.9) CH 2.45 (t) (15.3) CH 43.4 2.33 (t) (16.2) K10 CH 7.3.5 2.23 (d) (15.2, 0.1.1) 1.30 (m) CH 2.45 (t) (15.3) CH 2.33 (t) (16.2) 1.30 (m) CH 4.35 (t) (15.3)	33		9.4	0.69 (d. 6.7)		9.5	0.60 (d, 6.7)	CH₃ CH₃	11.1	0.83 (m)^{q}
$ \begin{array}{c c c c c c c c c c c c c c c c c c c $	34	CH₃	13.4	0.38 (d, 7.2)	CH ₃	11.2	0.18 (d, 7.1)	CH₃	12.4	0.56 (d, 5.1)
36 CH-1 21.3 20.2 (s) CH-1 21.3 20.4 (s) CH-1 20.3 (s) 1.34 (s) ² K1 CH 68.0 (d, 12.7, 6.3) CH 69.7 (d, 4.3) 1.05 (s) CH 2.33 (d, 15.2) 2.33 (d, 15.6) CH 2.33 (d, 15.6) CH 2.33 (d, 15.6) CH 2.33 (d, 15.5, 2.9, 1.1) CH 82.8 (d, 15.3) CH 2.43 (d, 15.3) 2.33 (d, 15.6) CH 2.33 (d, 15.7, 2.9, 1.1) CH 82.8 (d, 16.3) CH 2.33 (d, 15.7, 2.9, 1.1) CH 82.0 (d, 16.3, 0.1) CH 2.33 (d, 15.7, 2.9, 1.1) CH 82.0 (d, 16.3, 0.1) CH <	35	С	174.1		С	173.6		С	169.8 ^v	
$ \begin{array}{cccccccccccccccccccccccccccccccccccc$	36	CH ₃	21.8	2.02 (s)	CH ₃	21.3	2.04 (s)	CH ₃	20.9	1.94 (s) ^p
	K1 K2	CH ₃	19.8	1.07 (d, 6.3) 5.06 (dd 12.7, 6.3)		18.7	1.10 (d, 6.3) 4.93 (dd 12.2, 6.3)	CH ₃	18.4	0.90 (m) 4 72 (m)
K4 C 40.8	K3	C	176.4	5.00 (44, 12.7, 0.5)	C	176.6	4.00 (00, 12.2, 0.0)	C	175.1	4.72 (III)
$ \begin{array}{cccccccccccccccccccccccccccccccccccc$	K4	C	40.8		С	43.5		C	40.0 ^z	
NB C 1/2.0 C 1/10.5 C 1/2.0 1/2.0 K7 CH2 43.5 2.56 (d. 16.9) CH2 45.5 2.62 (d. 15.3) CH2 43.3 2.36 (d. 16.2) K8 CH3 2.33 (d. 16.9) CH4 45.5 2.62 (d. 15.3) CH3 CH3 2.33 (d. 15.2) K10 CH2 33.5 2.23 (d. 15.5, 2.9, 1.1) CH4 58.0 2.11 (d. 14.8, 0.0) CH2 32.4 1.80 (m)* K11 CH2 74.9 4.10 (m) CH4 74.0 4.01 (m) CH2 94.6 5.04 (m)* K12 CH3 5.9 5.45 (m)* CH4 74.0 4.01 (m) CH2 94.6 5.04 (m)* K14 CH4 75.7 3.56 (d.9, 0.5.3) CH 74.8 3.56 (d.9, 0.5.3) CH </td <td>K5</td> <td>CH₃</td> <td>26.2</td> <td>1.17 (s)</td> <td>CH₃</td> <td>27.0</td> <td>1.23 (s)^j</td> <td>CH₃</td> <td>25.3</td> <td>1.05 (s)</td>	K5	CH₃	26.2	1.17 (s)	CH₃	27.0	1.23 (s) ^j	CH₃	25.3	1.05 (s)
	K6 K7	C CHo	172.3	2.66 (d. 16.9)	C CHo	170.5	2 62 (d. 15 3)	C CH	172.0	2 36 (d. 16 2)
K8 CH3 24.9 1.23 (s) CH3 25.1 1.36 (s) CH3 24.3 1.07 (s) CM3 K9 CH4 97.2 456 (d) 90.1.1) CH3 95.0 450 (m) ² CH3 95.0 450 (m) ² K10 CH2 33.5 2.23 (dd, 155.2.9.1.1) CH3 92.8 2.11 (d1.14.6.3.0) CH4 95.0 CH4 95.0 CH4 97.0 1.80 (m) ² K11 CH2 7.9 3.46 (m) ² CH3 6.7 6.7 (d.5.2) CH3 1.87 (m) 1.80 (m) ² K13 CH4 7.5 3.36 (m) ² CH3 1.7 (d.5.2) CH3 1.87 (m) 8.34 (s) NH 8.34 (s) NH 8.34 (s) NH 9.30 (s) NH	K/		43.5	2.00 (d, 10.9) 2.53 (d, 16.9)		40.0	2.02 (d, 15.3) 2.45 (d, 15.3)		43.4	2.30 (d, 16.2) 2.31 (d. 16.2)
$ \begin{array}{cccccccccccccccccccccccccccccccccccc$	K8	CH₃	24.9	1.23 (s)	CH ₃	25.1	1.36 (s)	CH₃	24.3	1.07 (s)
K10 CH2 33.5 2.23 (ddd, 15, 2, 2, 1, 1) 1.83 (m) ² CH2 32.8 2.11 (dt, 14, 6, 3, 0) 1.80 (m) ² CH2 32.4 1.97 (m) 1.80 (m) ² K11 CH 74.9 4.10 (m) CH 74.0 4.01 (m) CH2 73.7 4.40 (m) K12 CH2 95.4 5.13 (s) ² CH2 95.0 5.09 (s) 4.75 (m) 4.75 (m) K13 CH 75.9 3.64 (m) ² CH 75.7 3.55 (dd, 9, 0, 5.3) CH 69.3 3.23 (m) K14 CH3 75.9 3.64 (m) ² CH 77.7 3.55 (dd, 9, 0, 5.3) CH 9.89 (dd, 8.8, 3.5) K14 CH4 70.5 3.36 (m) CH 77.3 1.24 (d, 6.2) CH3 18.3 1.13 (d, 6.0) N1 NH 8.34 (s) NH 8.34 (s) NH 9.30 (s) 9.0 (s) J4A2 J4.41 I I I IIII IIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIII	K9	СН	97.2	4.65 (dd, 9.0, 1.1)	СН	98.0	4.50 (m) ^k	СН	96.7	4.47 (d, 3.5)
K11 K12CH CH274.9 95.4 $4.10 (m)$ (m)CH CH274.0 95.0 $4.01 (m)$ (m)CH $4.01 (m)$ 73.7 CH2 $1.80 (m)$ 95.0 $1.40 (m)$ (m)K13CH75.9 $3.56 (m)^{\circ}$ (M)CH 75.7 (M) $3.55 (dc, 9.0, 5.3)$ (CH2CH (M)74.8 $3.59 (dc, 8.8, 3.5)$ K14CH75.5 $3.36 (m)^{\circ}$ (CH2CH1 75.7 (M) $3.55 (dc, 9.0, 5.3)$ (CH2CH1 (M)74.8 $3.59 (dc, 8.8, 3.5)$ K14CH77.5 $3.56 (m)^{\circ}$ (CH2CH3 $3.31 (m)$ (CH4CH4 $9.83 (s)$ (CH3CH4 $9.83 (s)$ (CH3N1NH12.60 (s)NH $8.34 (s)$ (CH2NH $8.34 (s)$ (CH2NH $9.86 (s)$ J4-A2OH12.60 (s)CH2 4.35 $4.46 (m)^{1}$ $4.26 (dc, 14.6, 5.1)$ OH $9.86 (s)$ J4-A3J4-A4CHT2.60 (s)CH2 12.80 $7.23 (m)^{12}$ (CH 22.8 $0.90 (m)'$ J4-A4CHCH2 12.80 $7.23 (m)^{12}$ CH3 $0.90 (m)'$ J4-A5CHCH 12.80 $7.23 (m)^{12}$ $CH3$ $0.90 (m)'$ J4-A6CHCH3CA8 $0.90 (m)'$ $CH3$ $0.90 ($	K10	CH ₂	33.5	2.23 (ddd, 15.5, 2.9, 1.1)	CH ₂	32.8	2.11 (dt, 14.6, 3.0)	CH ₂	32.4	1.97 (m)
K12 CH2 95.4 5.13 (b) ² CH2 95.0 5.00 (m) CH2 94.6 5.04 (m) K13 CH 75.9 3.64 (m) ⁴ CH 75.7 3.55 (dd, 9.0, 5.3) CH 74.8 3.59 (dd, 8.8, 3.5) K14 CH 70.5 3.36 (m) CH 77.7 3.55 (dd, 9.0, 5.3) CH 78.8 3.23 (m) K15 CH3 1.81 1.27 (d. 6.2) CH3 1.87 (t. 6.2) CH3 8.34 (s) NH 8.34 (s) NH 9.30 (s) N1 NH 8.34 (s) NH 8.34 (s) NH 9.30 (s) S	K11	СН	74 9	1.83 (m) 4 10 (m)	СН	74 0	4 01 (m)	СН	73 7	1.80 (m) ²
K13CH75.9 3.64 (m)*CH76.7 3.55 (d. 9.0, 5.3)CH76.7 3.55 (d. 9.0, 5.3)CH76.8 3.32 (m) 3.32	K12	CH ₂	95.4	5.13 (s) ^g	CH ₂	95.0	5.09 (s)	CH ₂	94.6	5.04 (m)
K13 CH 75.9 $3.64 (m)^{\circ}$ CH 75.7 $3.55 (dd, 9.0, 5.3)$ CH 74.8 $3.59 (dd, 8.8, 3.5)$ K14 CH 70.5 $3.36 (m)$ CH 70.2 $3.11 (m)$ CH 60.3 $3.22 (m)$ K15 CH ₃ 18.8 $1.27 (d, 6.2)$ CH 18.7 $1.24 (d, 6.2)$ NH 8.34 (s) NH 9.30 (s) 9.30 (s) N2 OH $8.34 (s)$ NH $6.60 (t, 5.1)$ OH 9.86 (s) $-10 (m)^{\circ}$ J4A1 I I I I CH $12.60 (s)$ CH $12.60 (s)$ OH 9.86 (s) IIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIII		_		4.87 (s)	_		4.82 (s)	_		4.75 (m)
K14 CH $f_{0.5}$ 3.36 (m) CH $f_{0.2}$ 3.31 (m) CH 69.3 3.23 (m) K15 CH ₃ 18.8 1.27 (d. 6.2) CH ₃ 18.7 1.24 (d. 6.2)' CH ₃ 1.13 (d. 6.0) N1 NH 8.34 (s) NH 8.34 (s) NH 9.30 (s) OH-8 OH 12.60 (s) CH ₂ 43.5 4.46 (m) ⁴ OH 9.86 (s) J4-A1 CH ₂ 43.5 4.46 (m) ⁴ OH 9.86 (s) OH 9.86 (s) J4-A4 CH 12.80 (m) C 138.7 CA (m) ⁴ OH 9.86 (s) J4-A4 CH 128.7 7.30 (m) ⁴ CH 128.7 7.30 (m) ⁴ J4-A4 CH 128.7 7.23 (m) ⁴ CH ₂ 2.88 0.90 (m)' K2-R1 KZ-R3 CH 128.7 7.30 (m) ⁴ CH ₂ 2.84 (m) ⁴ / ⁴ KZ-R4 C CH 128.7 7.30 (m) ⁴ CH ₂ 2.84 (m) ⁴ / ⁴ KZ-R4 C C 165.6 C12 (m) ⁴ / ⁴ CH </td <td>K13</td> <td>CH</td> <td>75.9</td> <td>3.64 (m)^e</td> <td>CH</td> <td>75.7</td> <td>3.55 (dd, 9.0, 5.3)</td> <td>CH</td> <td>74.8</td> <td>3.59 (dd, 8.8, 3.5)</td>	K13	CH	75.9	3.64 (m) ^e	CH	75.7	3.55 (dd, 9.0, 5.3)	CH	74.8	3.59 (dd, 8.8, 3.5)
N11 NH 8.34 (s) NH 8.34 (s) NH 9.30 (s) NZ NH 6.60 (t, 5.1) NH 9.86 (s) OH-8 OH 12.60 (s) NH 6.60 (t, 5.1) NH 9.86 (s) J4-A1 CH2 4.35 4.46 (m) ⁴ 4.26 (dd, 14.6, 5.1) OH 9.86 (s) J4-A3 CH2 138.7 CH 128.0 7.23 (m) ^{1/4} CH 22.80 0.90 (m) ⁷ J4-A4 CH 128.7 7.30 (m) ^{1/4} CH 24.8 1.83 (m) ⁷ J4-A5 J4-A6 CH 128.0 7.23 (m) ^{1/4} CH 24.8 1.83 (m) ⁷ KZ-R1 CH 128.0 7.23 (m) ^{1/4} CH2 2.83 0.90 (m) ⁴ KZ-R3 CH 128.0 7.23 (m) ^{1/4} CH2 2.83 0.90 (m) ⁴ KZ-R4 CH 128.0 7.23 (m) ^{1/4} CH2 2.12 (m) ^{1/4} KZ-R4 CH 128.0 7.23 (m) ^{1/4} CH2 48.9 3.65 (br s) ⁴ KZ-R4 CH 128.0 7.23 (m) ^{1/4} CH2	K14 K15	CH	70.5 18.8	3.36 (M) 1.27 (d. 6.2)	CH	70.2 18.7	3.31 (m) 1.24 (d. 6.2)√	CH CH	69.3 18.3	3.23 (m) 1 13 (d 6 0)
N2 NH 6.60 (t 5.1) OH-80 OH 12.60 (s) J4-A1 CH2 43.5 4.46 (m) ⁴ 4.28 (dd, 14.6, 5.1) J4-A2 CH2 43.5 4.46 (m) ⁴ 4.28 (dd, 14.6, 5.1) J4-A3 C 138.7 J4-A4 CH 128.7 7.30 (m) ^{1/2} CH 128.7 7.30 (m) ^{1/2} CH 22.8" J4-A4 CH 128.7 7.30 (m) ^{1/2} CH 22.8" 0.90 (m)' J4-A4 CH 128.0 7.23 (m) ^{1/2} CH2 26.8 1.83 (m) ² J4-A5 CH 128.7 7.30 (m) ^{1/2} CH2 2.8" 0.90 (m)' KZ-R1 CH 128.0 7.23 (m) ^{1/2} CH2 2.8 1.83 (m) ² KZ-R2 KZ-R3 CH 128.0 7.23 (m) ^{1/2} CH2 6.8 1.83 (m) ² KZ-R4 KZ-R4 CH 128.0 7.23 (m) ^{1/2} CH2 6.8 2.12 (m) ² KZ-R4 KZ-R4 CH 128.0<	N1	NH	10.0	8.34 (s)	NH	10.7	8.34 (s)	NH	10.5	9.30 (s)
OH-8 J4-A1 OH 12.60 (s) J4-A2 CH2 43.5 4.46 (m) ^k 4.28 (dd, 14.6, 5.1) J4-A3 CH 128.0 7.30 (m) ^{1/k} CH J4-A4 CH 128.0 7.30 (m) ^{1/k} CH J4-A5 CH 128.0 7.30 (m) ^{1/k} CH J4-A6 CH 128.0 7.30 (m) ^{1/k} CH J4-A7 CH 128.0 7.30 (m) ^{1/k} CH J4-A6 CH 128.0 7.30 (m) ^{1/k} CH J4-A7 CH 128.0 7.23 (m) ^{1/k} KZ-R1 CH 128.0 7.23 (m) ^{1/k} KZ-R3 CH 128.0 7.23 (m) ^{1/k} KZ-R4 CH 128.0 7.23 (m) ^{1/k}	N2				NH		6.60 (t, 5.1)			
	OH-8	ОН		12.60 (s)						/ .
J4A1 CH2 4.35 4.48 (III) J4A2 C 138.7 J4A3 CH 128.7 7.30 (m) ^{1/2} J4A4 CH 128.7 7.30 (m) ^{1/2} J4A4 CH 128.7 7.30 (m) ^{1/2} J4A4 CH 128.7 7.30 (m) ^{1/2} J4A5 CH 128.7 7.30 (m) ^{1/2} J4A7 CH 128.0 7.23 (m) ^{1/2} KZ-R1 CH 128.0 7.23 (m) ^{1/2} KZ-R2 CH 128.0 7.23 (m) ^{1/2} KZ-R3 CH 128.0 7.23 (m) ^{1/2} KZ-R4 CH 128.0 128.0 KZ-R4 CH 128.0 128.0 KZ-R4 CH 128.0 128.0 KZ-R6 C	OH-R8				CH	10 E	1 16 (m)k	ОН		9.86 (s)
J4-A2 C 138.7 J4-A3 CH 128.0 7.23 (m) ^{1/2} J4-A4 CH 128.7 7.30 (m) ^{1/2} J4-A5 CH 128.7 7.30 (m) ^{1/2} J4-A6 CH 128.7 7.30 (m) ^{1/2} J4-A6 CH 128.7 7.30 (m) ^{1/2} J4-A7 CH 128.0 7.23 (m) ^{1/2} KZ-R1 CH 128.0 7.23 (m) ^{1/2} KZ-R2 CH 128.0 7.23 (m) ^{1/2} KZ-R4 CH 128.0 1.83 (m ^{3/2}) KZ-R4 C 128.0 1.83 (m ^{3/2}) KZ-R4 C 128.0 1.83 (m ^{3/2}) KZ-R6 C 156.4 1.83 (m ^{3/2}) KZ-R7 C 156.4 1.85 (m ^{3/2}) <	J4-A1					43.5	4.46 (III) 4.26 (dd. 14.6, 5.1)			
J4-A3 CH 128.0 $7.23 (m)^{1/2}$ J4-A4 CH 128.7 $7.30 (m)^{1/2}$ J4-A5 CH 127.4 $7.27 (m)^{1/2}$ J4-A6 CH 128.7 $7.30 (m)^{1/2}$ J4-A7 CH 128.7 $7.30 (m)^{1/2}$ KZ-R1 CH 128.7 $7.30 (m)^{1/2}$ KZ-R2 CH 128.0 $7.23 (m)^{1/2}$ KZ-R4 CH 128.7 $7.30 (m)^{1/2}$ KZ-R4 CH 128.0 $7.23 (m)^{1/2}$ KZ-R4 CH $20.8^{1/2}$ $0.90 (m)^{1/2}$ KZ-R4 CH $22.8 (m)^{1/2}$ $2.12 (m)^{1/2}$ KZ-R4 CH $24.8 (m)^{1/2}$ $2.48 (m)^{1/2}$ KZ-R6 C CH2 46.9 $3.65 (br s)^{1/2}$ KZ-R7 C 156.4 C 117.9 KZ-R7 C 145.5 CH3 $20.8^{1/2}$ KZ-R10 C 145.4 C 117.9 KZ-R11 C 145.5 CH3 $20.8^{1/2}$ KZ-R13	J4-A2				С	138.7				
J4-A4 J4-A5 J4-A6 J4-A7 CH 128.7 $7.30 (m)^{1/4}$ CH 127.4 $7.27 (m)^{1/4}$ CH 128.7 $7.30 (m)^{1/4}$ J4-A7 CH 128.0 $7.23 (m)^{1/4}$ KZ-R1 CH 128.0 $7.23 (m)^{1/4}$ KZ-R2 CH 128.0 $7.23 (m)^{1/4}$ KZ-R3 CH 128.0 $7.23 (m)^{1/4}$ KZ-R4 CH 128.0 $7.23 (m)^{1/4}$ KZ-R4 CH $20.8^{1/4}$ $0.90 (m)^{1/4}$ KZ-R5 CH $22.8 (m)^{1/4}$ $2.12 (m)^{1/4}$ KZ-R6 CH CH $24.8 (m)^{1/4}$ KZ-R6 C 156.4 CH KZ-R7 CH 94.0 $6.51 (s)$ KZ-R6 C 156.4 C KZ-R6 C 117.9 C KZ-R8 C 145.5 C KZ-R10 C 145.5 C KZ-R11 KZ-R13 CH $91.3 6.77 (s)$ KZ-R14 CH $20.8^{1/4} (m)^{1/4}$ 24	J4-A3				СН	128.0	7.23 (m) ^{tx}			
J4-A6 CH 12.4 7.20 (m) ^{1/x} J4-A7 CH 128.0 7.23 (m) ^{1/x} KZ-R1 CH 128.0 7.23 (m) ^{1/x} KZ-R2 CH 128.0 7.23 (m) ^{1/x} KZ-R3 CH 128.0 7.23 (m) ^{1/x} KZ-R4 CH 20.8" 0.90 (m)' KZ-R5 CH2 65.8 2.12 (m)" KZ-R6 CH2 65.8 2.48 (m) ^{3/x} KZ-R6 CH2 46.9 3.65 (br s)" KZ-R8 C 156.4 CH KZ-R9 C 156.4 CH CH KZ-R11 C 156.4 C 117.9 KZ-R12 CH3 20.8" 0.84 (m) ^{3/x} KZ-R14 CH3 20.8" 0.84 (m) ^{3/x}	J4-A4				CH	128.7	7.30 (m) ^{tx}			
J4-A7 CH 128.0 7.23 (m) ^{1/x} CH ₃ 20.8 ^w 0.90 (m) ¹ KZ-R1 KZ-R3 CH 128.0 7.23 (m) ^{1/x} CH ₃ 20.8 ^w 0.90 (m) ¹ KZ-R3 CH 128.0 7.23 (m) ^{1/x} CH ₃ 20.8 ^w 0.90 (m) ¹ KZ-R3 CH 128.0 7.23 (m) ^{1/x} CH ₂ 2.8 1.83 (m) ⁵ KZ-R4 CH 24.8 1.9 2.12 (m) ⁿ 2.12 (m) ⁿ KZ-R5 CH ₂ 52.8 2.48 (m) ^{1/y} 2.48 (m) ^{1/y} KZ-R6 KZ-R7 CH ₂ 46.9 3.65 (br s) ^u KZ-R7 KZ-R8 C 156.4 C 156.4 KZ-R10 C 156.4 C 117.9 C 145.5 KZ-R10 KZ-R11 CH ₃ 2.0.8 ^v (m) ⁰ 2.48 (m) ^{1/y} 2.48 (m) ^{1/y} KZ-R12 KZ-R13 CH ₂ 46.9 3.65 (br s) ^u 2.48 (m) ^{1/y} KZ-R14 CH ₂ 46.9 3.65 (br s) ^u 2.48 (m) ^{1/y} 2.48 (m) ^{1/y}	J4-A5 .I4-A6				СН	127.4	$7.27 (m)^{x}$ 7.30 (m) ^{/x}			
KZ-R1 KZ-R2 KZ-R3CH3 20.8^{w} $0.90 (m)^{v}$ CH 24.8 24.8 $1.83 (m)^{s}$ $2.12 (m)^{n}$ $2.12 (m)^{n}$ $2.12 (m)^{n}$ KZ-R4CH2 65.8 $2.12 (m)^{v}$ $2.12 (m)^{v}$ $2.48 (m)^{t/v}$ $2.48 (m)^{t/v}$ $2.48 (m)^{t/v}$ $3.65 (br s)^{u}$ KZ-R5CH2 52.8 $2.48 (m)^{t/v}$ $2.48 (m)^{t/v}$ $3.65 (br s)^{u}$ KZ-R6CH2 56.4 C CKZ-R7C 156.4 C CKZ-R8C 117.9 C CKZ-R9C 117.9 CKZ-R10CH1 91.3 CH2KZ-R11CH3 CH2 20.8^{u} $2.48 (m)^{v/v}$ $2.48 (m)^{v/v}$ KZ-R12CH2 46.9 CH2KZ-R13CH3 CH2KZ-R14CH2 $2.82 (48 (m)^{v/v})$ $2.48 (m)^{v/v}$ KZ-R14CH2 $52.8 (2.48 (m)^{v/v})$ $2.48 (m)^{v/v}$	J4-A7				СН	128.0	7.23 (m) ^{tx}			
KZ-R2 CH 24.8 1.83 (m) ⁵ KZ-R3 CH ₂ 65.8 2.12 (m) ⁿ KZ-R4 CH ₂ 52.8 2.48 (m) ⁴ ^y KZ-R5 CH ₂ 52.8 2.48 (m) ⁴ ^y KZ-R6 CH ₂ 65.9 3.65 (br s) ^u KZ-R7 CH 94.0 6.51 (s) KZ-R8 C 156.4 KZ-R9 C 156.4 KZ-R8 C 156.4 KZ-R10 C 156.4 KZ-R10 C 117.9 KZ-R11 C 145.5 KZ-R12 CH ₃ 0.84 (m) ⁶⁷ KZ-R13 CH ₃ 20.8 ^v 0.84 (m) ⁶⁷ KZ-R14 CH ₂ 46.9 3.65 (br s) ^u	KZ-R1							CH₃	20.8 ^w	0.90 (m) ^r
KZ-R3 CH2 65.8 2.12 (m) ⁿ KZ-R4 CH2 52.8 2.48 (m) ⁴ ⁿ KZ-R5 CH2 46.9 3.65 (br s) ^u KZ-R6 C 156.4 3.65 (br s) ^u KZ-R7 C 156.4 52.8 KZ-R9 C 156.4 52.8 KZ-R9 C 156.4 52.8 KZ-R10 C 156.4 52.8 KZ-R11 C 117.9 7.7 KZ-R13 CH3 20.8 ^v 0.84 (m) ^a KZ-R13 CH3 20.8 ^v 0.84 (m) ^a KZ-R14 CH2 52.8 2.48 (m) ^{bv}	KZ-R2							CH	24.8	1.83 (m) ^s
KZ-R4 CH2 52.8 2.48 (m) ⁴ /v KZ-R5 CH2 46.9 3.65 (br s) ⁴ KZ-R6 C 156.4 KZ-R7 CH 94.0 6.51 (s) KZ-R9 C 156.4 KZ-R9 C 156.4 KZ-R9 C 156.4 KZ-R10 C 156.4 KZ-R11 C 145.5 KZ-R12 CH3 0.77 (s) KZ-R13 CH3 20.8 ^o KZ-R14 CH2 3.65 (br s) ^{on}	KZ-R3							CH ₂	65.8	2.12 (m) ⁿ 2.12 (m) ⁿ
KZ-R5 2.48 (m) ⁴ y KZ-R6 CH2 46.9 3.65 (br s) ⁴ KZ-R6 C 156.4 KZ-R7 CH 94.0 6.51 (s) KZ-R9 C 156.4 KZ-R9 C 156.4 KZ-R10 C 145.9 KZ-R11 C 145.5 KZ-R13 CH3 20.8 ^y KZ-R13 CH3 20.8 ^y KZ-R14 CH2 46.9	KZ-R4							CH ₂	52.8	2.48 (m) ^{t,y}
KZ-R5 CH2 46.9 3.65 (br s) ^u KZ-R6 C 156.4 KZ-R7 CH 94.0 6.51 (s) KZ-R9 C 156.4 KZ-R9 C 117.9 KZ-R10 C 145.5 KZ-R12 CH 91.3 6.77 (s) KZ-R13 CH2 2.88 2.48 (m) ⁴ y KZ-R14 CH2 46.9 3.65 (br s) ^u									-	2.48 (m) ^{́t,y}
KZ-R6 C 156.4 KZ-R7 CH 94.0 6.51 (s) KZ-R8 C 156.4 KZ-R9 C 145.5 KZ-R10 CH 91.3 6.77 (s) KZ-R12 CH3 20.84 (m) ⁹ KZ-R13 CH2 52.8 2.48 (m) ⁹ KZ-R14 CH2 46.9 3.65 (br s) ^u	KZ-R5							CH ₂	46.9	$3.65 (br s)^{u}$
KZ-R7 CH 94.0 6.51 (s) KZ-R8 C 156.4 KZ-R9 C 145.5 KZ-R10 CH 91.0 6.77 (s) KZ-R12 CH 91.3 6.77 (s) KZ-R13 CH2 52.8 2.48 (m) ^{4y} KZ-R14 CH2 46.9 3.65 (br s) ^u	K7-R6							C	156.4	3.65 (Dr s)"
KZ-R8 C 1564 KZ-R9 KZ-R10 C 117.9 KZ-R11 C 145.5 KZ-R12 CH 91.3 6.77 (s) KZ-R13 CH3 20.8° 0.84 (m)° KZ-R14 CH2 46.9 3.65 (br s)"	KZ-R7							Сн	94.0	6.51 (s)
$ \begin{array}{cccc} KZ-R9 \\ KZ-R10 \\ KZ-R10 \\ KZ-R11 \\ KZ-R12 \\ KZ-R13 \\ KZ-R13 \end{array} \qquad \qquad \begin{array}{cccc} C & 117.9 \\ C & 145.5 \\ CH & 91.3 & 6.77 (s) \\ CH_3 & 20.8^{v} & 0.84 (m)^{q} \\ CH_3 & 20.8^{v} & 0.84 (m)^{q} \\ CH_2 & 52.8 & 2.48 (m)^{4y} \\ & 2.48 (m)^{4y} \\ KZ-R14 \end{array} \qquad \qquad \begin{array}{cccc} CH_2 & 46.9 & 3.65 (brs)^{u} \\ CH_2 & 2.65 (brs)^{u} \\ CH_2 & 2.65 (brs)^{u} \end{array} \right. $	KZ-R8							c	156.4	
KZ-R10 C 145.5 KZ-R11 CH 91.3 6.77 (s) KZ-R12 CH ₃ 20.8 ^o 0.84 (m) ^o KZ-R13 CH ₂ 52.8 2.48 (m) ⁱ ^j KZ-R14 CH ₂ 46.9 3.65 (br s) ^u	KZ-R9							С	117.9	
KZ-R12 CH 91.3 6.77 (s) KZ-R13 CH ₃ 20.8° 0.84 (m)° KZ-R14 CH ₂ 52.8 2.48 (m) ⁴ KZ-R14 CH ₂ 46.9 3.65 (br s)"	KZ-R10							C	145.5	6 77 (a)
KZ-R13 CH2 52.8 2.48 (m) ⁴ / ² KZ-R14 CH2 46.9 3.65 (br s) ⁴	KZ-R11 KZ-R12							CH∘ CH∘	91.3 20.8º	0.77 (S) 0.84 (m) ^q
KZ-R14 2.48 (m)*y CH ₂ 46.9 3.65 (br s) ^u	KZ-R13							CH ₂	52.8	2.48 (m) ^{t,y}
KZ-R14 CH ₂ 46.9 3.65 (br s) ^u								1		2.48 (m) ^{t,y}
	KZ-R14							CH ₂	46.9	3.65 (br s) ^u

Table S4. ¹H and ¹³C chemical shifts of Kang A, J4, and KZ.^a

^{a 1}H and ¹³C NMR data were obtained at 600 and 150 MHz, respectively, at 25 °C on a Bruker Avance NMR with a TCI triple resonance cryoprobe. Solvents used were: CD_2Cl_2 (Kang A), $CDCl_3$ (J4), and $DMSO-d_6$ (KZ).

^b Numbering of J4 and KZ carbon atoms is shown in Figure S12. Numbering of KZ carbon atoms has been modified from the numbering system for rifalazil presented in: Mae *et al.*, Isolation and identification of major metabolites of rifalazil in mouse and human, *Xenobiotica*, 1999, 29, 1073-1087.

[°] KZ exhibited broad ¹H peaks in a number of common NMR solvents, possibly due to a conformational exchange process as previously reported for other benzoxazinorifamycins (Gill *et al.*, Structure-based design of novel benzoxazinorifamycins with potent binding affinity to wild-type and rifampin-resistant mutant *Mycobacterium tuberculosis* RNA polymerases, *J Med Chem*, 2012, 55, 3814-3826). Low temperature experiments were attempted in an effort to improve the spectra, but were unsuccessful. The dataset presented here was collected at 25 °C in DMSO-d₆, which yielded the sharpest peaks of the conditions tested. While the presence of the KZ synthetic modification is apparent in the signals for KZ carbons R1 to R14 and their associated protons, the broadness of the proton peaks resulted in some ambiguity in multiplicity analysis and in peak assignments at other parts of the molecule.

^{*d-u*} overlapping ¹H signals.

^{*v*,*w*} overlapping ¹³C signals.

^{x,y 1}H signal overlapped with solvent peak.

^{*z* ¹³C signal overlapped with solvent peak.}





Figure S14. 13 C NMR spectrum of Kang A in CD₂Cl₂.



Figure S15. HMQC spectrum of Kang A in CD₂Cl₂.



Figure S16. HMBC spectrum of Kang A in CD₂Cl₂.



Figure S17. COSY spectrum of Kang A in CD_2Cl_2 .



Figure S18. ¹H NMR spectrum of J4 in CDCl₃.



Figure S19. ¹³C NMR spectrum of J4 in CDCl₃.



Figure S20. HSQC NMR spectrum of J4 in CDCl₃.



Figure S21. HMBC NMR spectrum of J4 in CDCl₃.











Figure S26. HMBC NMR spectrum of KZ in DMSO-d₆.



Figure S27. COSY NMR spectrum of KZ in DMSO-d₆.