A new chalcone and antimicrobial chemical constituents of *Dracaena stedneuri* Engl.

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Figure S1. HRESI-MS of compound **1**

Figure S2. ^{1}H-NMR spectrum of compound **1**

Figure S3. ^{13}C NMR spectrum of compound **1**

Figure S4. ^{1}H-^{1}H COSY spectrum of compound **1**

Figure S5. HSQC spectrum of compound **1**

Figure S6. HMBC spectrum of compound **1**

Table S1. MIC and MBC (in µg/mL) of isolated compounds and chloramphenicol against gram-positive bacterial strains.

Table S2. Table S2. Characteristics of microorganisms used

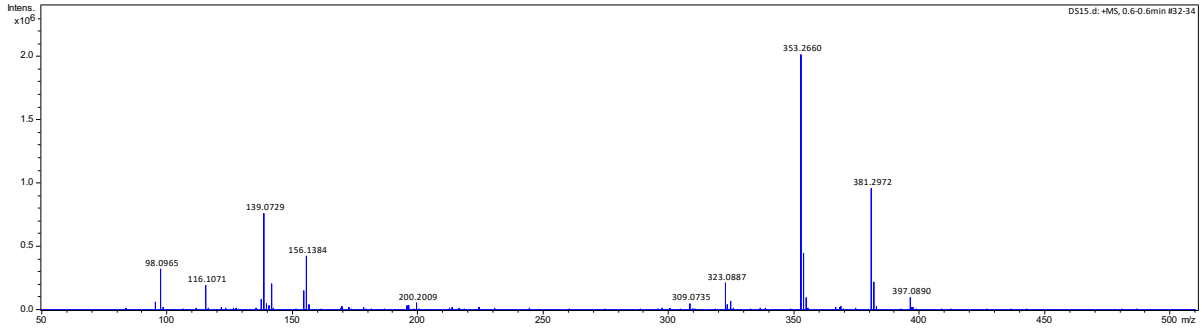

Figure S1. HRESI-MS of compound **1**

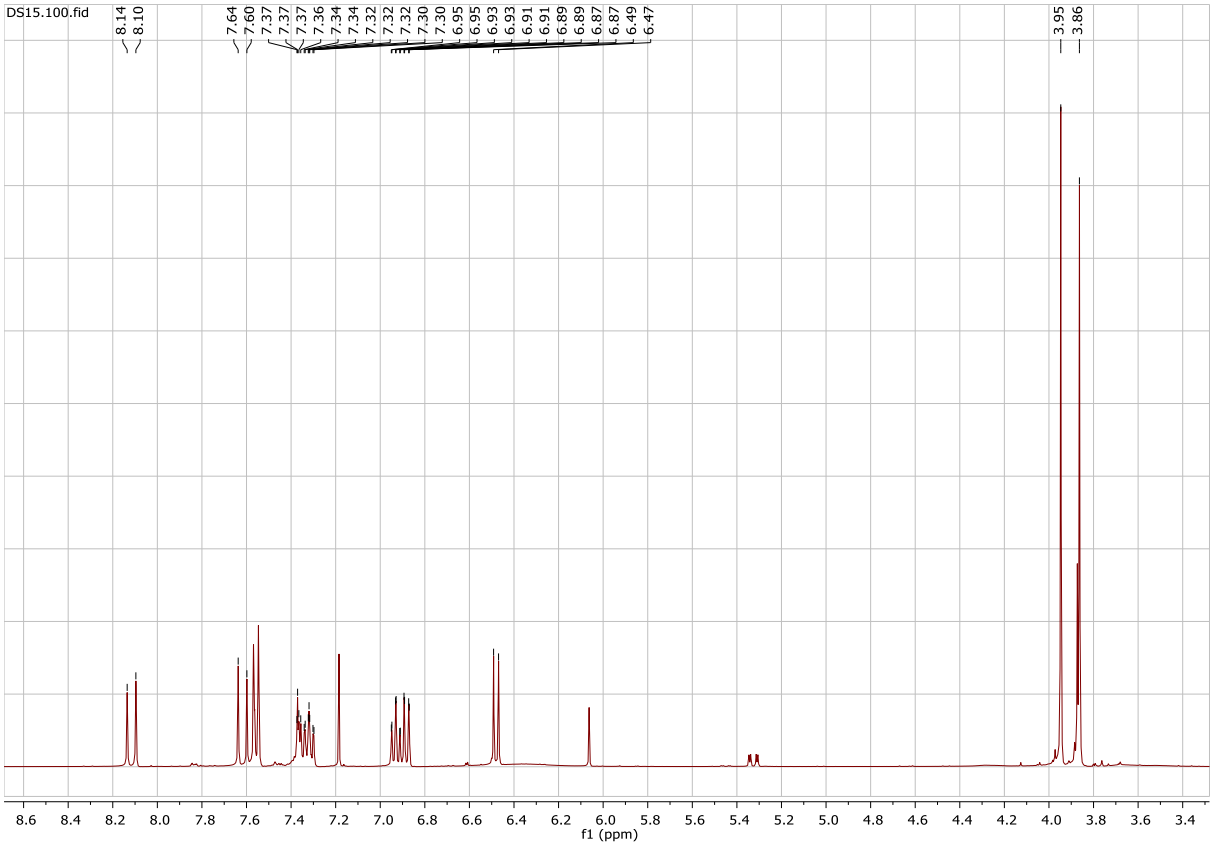

Figure S2. ^{1}H-NMR spectrum of compound **1**

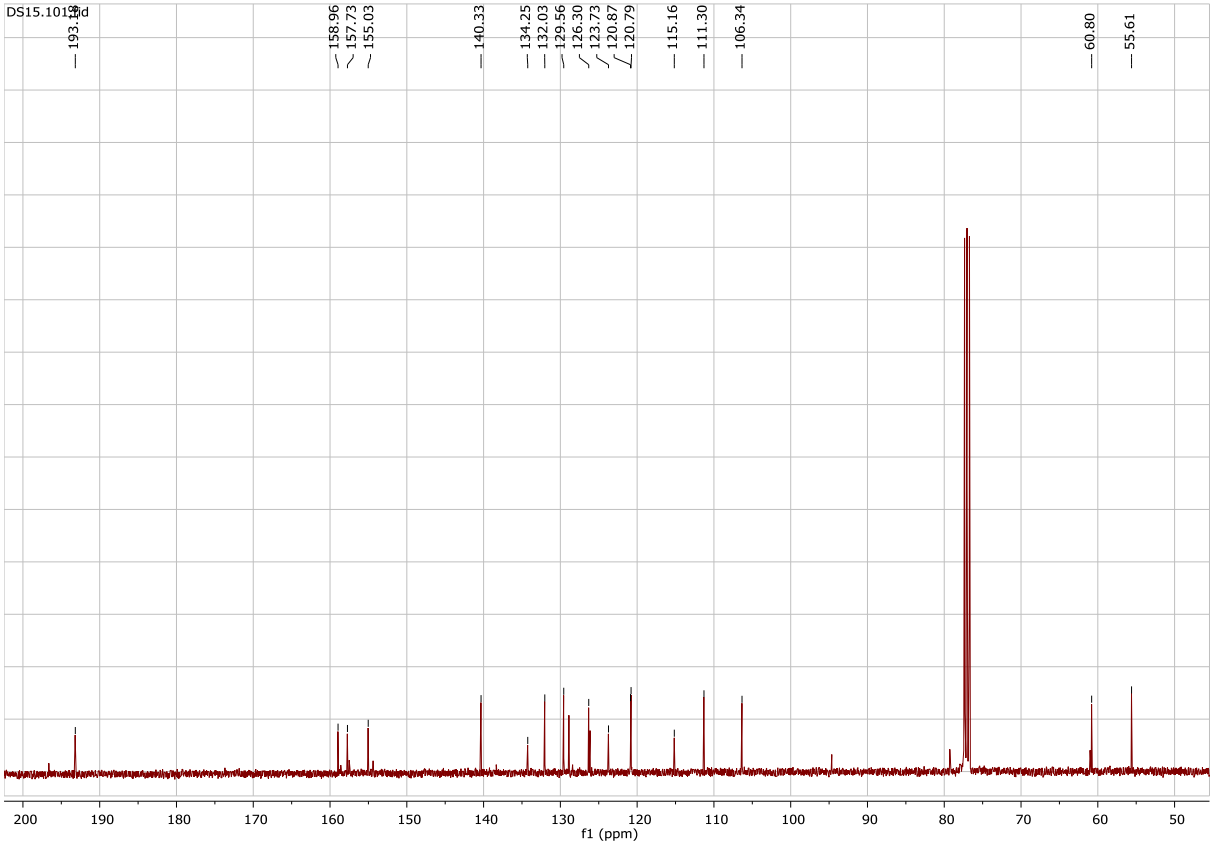

Figure S3. ^{13}C NMR spectrum of compound **1**

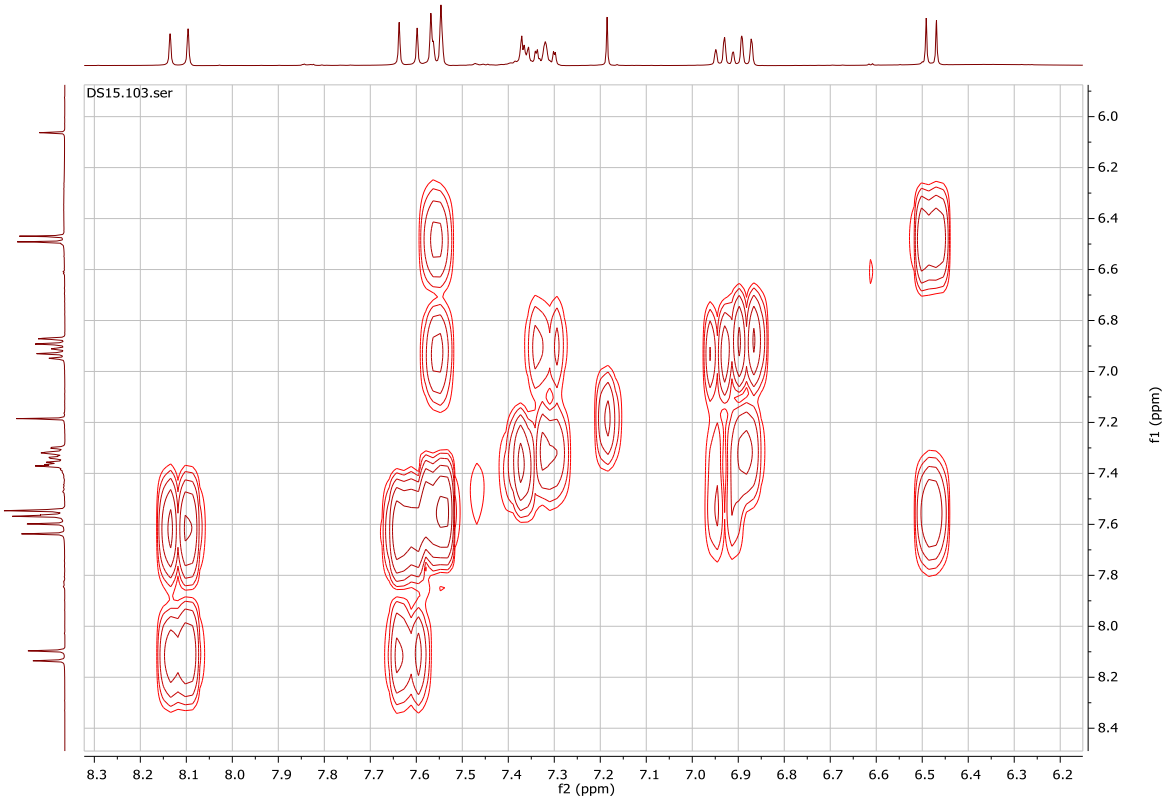

Figure S4. ^{1}H-^{1}H COSY spectrum of compound **1**

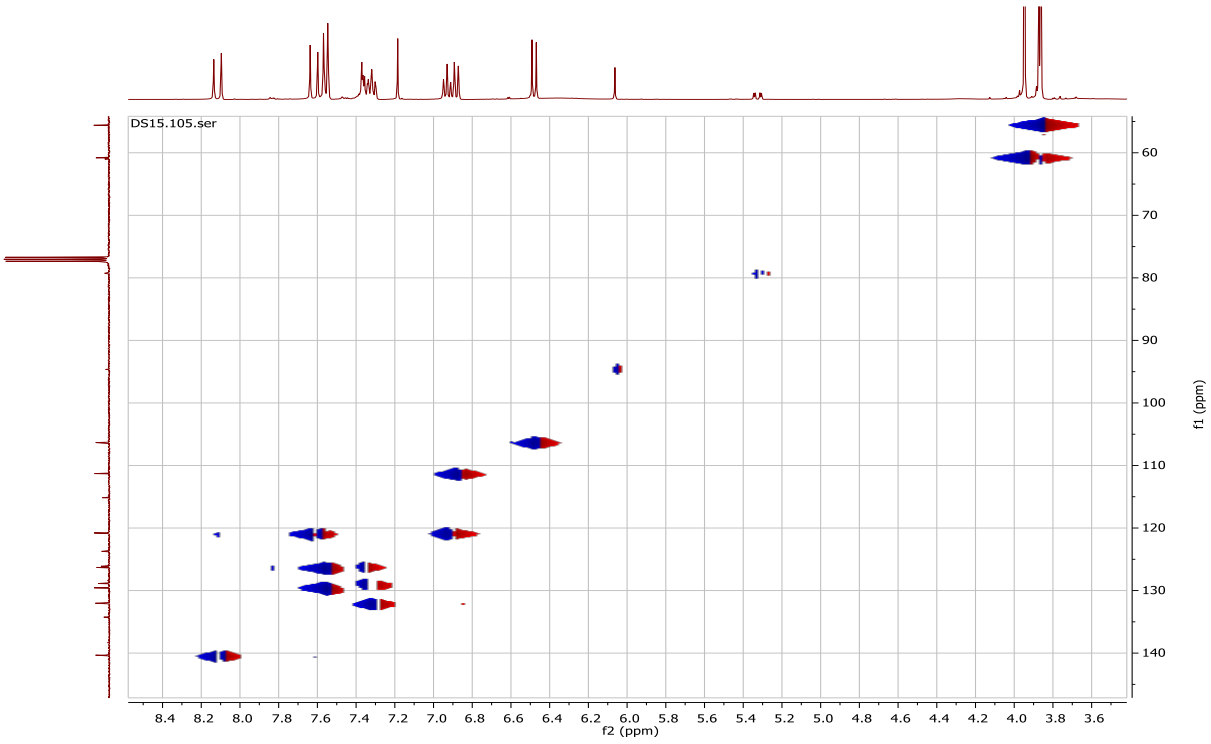

Figure S5. HSQC spectrum of compound **1**

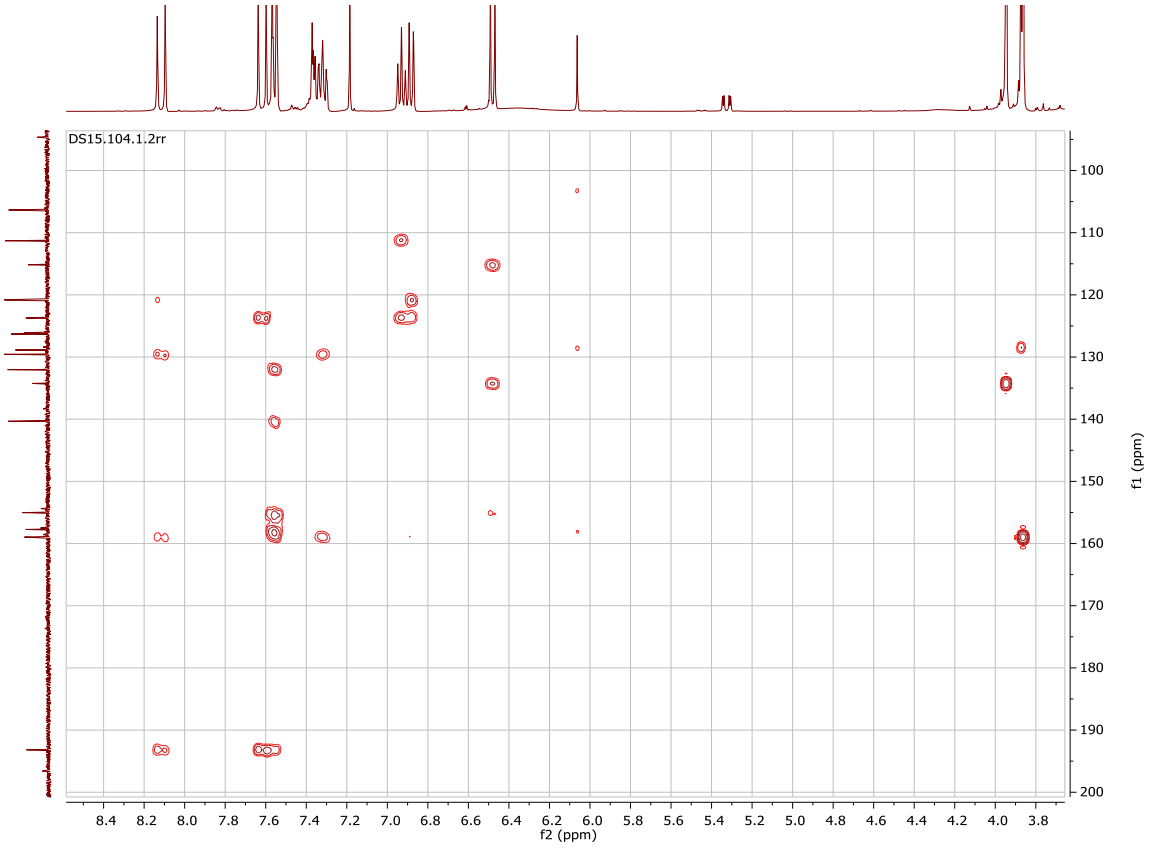

Figure S6. HMBC spectrum of compound **1**

Table S1. MIC and MBC (in µg/mL) of isolated compounds and chloramphenicol against gram-positive bacterial strains.

Bacterial strains	**3**		**4**		**5**		**6**		**9**		**11**		**12**		**13**		**CHL**	
	MIC (MBC)	**R**	**MIC (MBC)**	**R**	**MIC (MBC)**	**R**	**MIC (MBC)**	**R**	**MIC (MBC)**	**R**	**MIC (MBC)**	**R**	**MIC (MBC)**	**R**	**MIC (MBC)**	**R**	**MIC (MBC)**	**R**
S. aureus																		
ATCC25923	8 (64)	8	4 (32)	4	8 (64)	8	16 (64)	4	8 (32)	4	4 (32)	8	16 (64)	4	64 (-)	-	1 (1)	1
MRSA3	4 (32)	8	16 (64)	4	8 (32)	4	8 (32)	4	16 (64)	4	16 (64)	4	16 (64)	4	16 (64)	4	1 (4)	4
MRSA6	8 (32)	4	16 (64)	4	4 (32)	8	16 (64)	4	8 (32)	4	16 (64)	4	32 (-)	-	64 (-)	-	2 (16)	8

MIC: minimal inhibitory concentration; MBC: minimal bactericidal concentration; R: MBC/MIC ratio (a sample is considered as bacteriostatic or bactericidal when R >4 or ≤4 respectively); (-): MIC or MBC >512 µg/mL.

Table S2. Characteristics of microorganisms used.

Bacteria strains		Characteristics	References
Escherichia coli	**ATTC 10536**	Reference strain	*(Kuete et al., 2010)*
	AG 102	AG 100 over expressing *Acr AB* pumps	*(Chevalier et al., 2000)*
Enterobacter aerogenes	**ATCC 13048**	Reference strain	*(Kuete et al., 2010)*
Klebsiella pneumoniae	**ATCC11296**	Reference strain of *Klebsiella pneumoniae*	*Collection of the UMR-MD1 laboratory of the University of the Mediterranean, Marseille, France (Kuete et al., 2010).*
	Kp 55	Clinical strain: TET^r, AMP^r, ATM^r, CEF^r	
P. stuartii	**PS2636**	*AcrAB-TolcC* associated with porin types OMPF and OMPC	
Pseudomonas aeruginosa	**PA 01**	Reference strain	*Collection of the UMR-MD1 laboratory of the University of the Mediterranean, Marseille, France (Kuete et al., 2010 ; Lorenzi et al., 2009)*
Staphylococcus aureus	**ATCC 25923**	Reference strain	*(Paudel et al., 2012 ; Dzoyem et al., 2013)*
	MRSA3	Clinical isolate: Ofxar, Kanr, Tetr, Ermr	
	MRSA6	Clinical isolate: Ofxar, Flxr, Kanr, Tetr, Cypr, IM/Csr, Chlr, Genr, Nisr, Ampr	

AMP^r, ATM^r, CEF^r, CHL^r, KAN^r, NAL^r, NOR^r, STR^r et TET^r, resistant to: ampicillin, aztreonam, cefepime, chloramphenicol, kanamycine, nalidixic acid, norfloxine, streptomycine and tetracyclin, respectively; *AcrAB-TolC, MexAB-OprM :* Efflux pomp.

References

Chevalier, J.; Pages, J.M. ; Eyraud, A. ; Mallea, M. Membrane permeability modifications are involved in antibiotic resistance in *Klebsiella pneumoniae*. Biochem. Biophys. Res. Commun. **2000**, 274, 496–499.

Dzoyem, J.P.; Hamamoto, H.; Ngameni, B.; Ngadjui, B.T.; Sekimizu, K. Antimicrobial action mechanism of flavonoids from *Dorstenia* species. Drug Discov. Ther. **2013**, *7*, 66–72.

Kuete, V.; Ngameni,B.; Tangmouo, G.J.; Bola, J.M.; Alibert-Franco, S.; Ngadjui, T.B.; Pages, J.M. Efflux pumps are involved in the defence of gram-negative bacteria against the natural products isobavachalcone and diospyrone. *Antimicrob. Agents Chemother*. **2010**, *54*, 1749–1752.

Lorenzi, V.; Muselli, A.; Bernardini, A.F. ; Berti, L. ; Pages, J.M. ; Amaral, L. ; Bolla, J.M. Geraniol restores antibiotic activities against multidrug-resistant isolates from gram-negative species. Antimicrob. Agents Chemother. **2009,** *53*, 2209–2211.

Paudel, A.; Hamamoto, H.; Kobayashi, Y. ; Yokoshima, S.; Fukuyama, T.; Sekimizu, K. Identification of novel deoxyribofuranosyl indole antimicrobial agents. J. Antibiot. **2012**, *65*, 53–57.