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Gas chromatography-mass spectrometry analysis of bioactive compounds against snake venom in the hydroethanolic extract of *Schumanniophyton magnificum* stem bark

Eba Obam Yannick, Edoun Ebouel Ferdinand Lanvin, Baleba Roger, Nnanga Nga and Mpondo Mpondo Emmanuel

Abstract
Schumanniophyton magnificum is a member of the Rubiaceae family, with several secondary metabolites. In Cameroon, this plant is traditionally used to treat several diseases such as malaria, typhoid fever and even snake bites. The aim of this study was to identify the bioactive compounds that would account for the various ethno pharmacological properties against snake venom attributed to this plant. To this end, Gas Chromatography-Mass Spectrometry (GC-MS) of the hydroethanolic extract of *Schumanniophyton magnificum* trunk bark was carried out. Bioactive compounds were identified using the National Institute Standard and Technology (NIST) database of over 62,000 compounds and the National Institute of Health (NIH). The results showed that *Schumanniophyton magnificum* stem bark extract possesses several compounds with anti-inflammatory, anti-hemorrhagic, Cytotoxic, Antimyotoxic, anti-allergic and many other pharmacological effects.

Keywords: *Schumanniophyton magnificum*, snake venom, Bioactive compounds, pharmacological properties, Gas Chromatography- Mass Spectrometry.

Introduction
Plants possess secondary metabolites with numerous pharmacological properties, including anti-inflammatory, anti-cancer, anti-malarial, anti-hypertensive and antifungal [1]. Several of the compounds identified have been presented as safe and effective [2]. Over 80% of the world's population [3] and over 90% of people in developing countries rely on medicinal plants for their health care. Medicinal plants play an important role in drug research and development [4]. All plant parts: leaves, flowers, fruit, seeds, bark and roots are potential reservoirs of secondary metabolites [5]. Gas chromatography-mass spectrometry is an important technique that has been adapted to evaluate the different phytoconstituents present in various plant extracts, along with their structures. This technique has superior separation power, enabling it to produce a highly precise and accurate chemical fingerprint. In addition, GC-MS provides quantitative data as well as a coupled mass spectral database, which is extremely useful for correlating bioactive compounds with their pharmacological applications [6].

Materials and Methods
Plant materials
Schumanniophyton magnificum bark was collected in Nkoleteto in August 2022. The plant was identified at the National Herbarium, and the barks were dried under permanent ventilation for two weeks, then pulverized using an electric grinder.

Extract preparation and derivatization
5g of sample powder was weighted and mix with hydroethanolic solvent to a total volume of 20 ml. The mixture was shacked manually for 5 min, then vortex for 1 min. After Centrifugation at 1000 rpm during 1 min, the supernatant was collected. 150 mg MgSO4+ + 50 mg C18 + 50 mg PSA was added to the supernatant, and centrifuged again. The new supernatant was collected and transferred to injection tubes.

Gas chromatography-mass spectrometry analysis

Analysis of the hydroethanolic extract of the plant powder of *Schumanniophyton magnificum* was carried out using an Agilent Technologies system, 7890A GC-System, 5975C insert XL EI/CI MSD with triple-axis detector. Chromatograph interfaced to a mass spectrometer (GC-MS) equipped with a VF-5ms MS capillary column (30 m x 0.25 mm id, 0.25 µm). For GC-MS detection, an electron ionization system operating in fast atomic bombardment mode with an ionization energy of 70 eV. Helium gas (99.999%) was used as the carrier gas at a constant flow rate of 1 mL/min, and an injection volume of 1 µL was used (a split ratio of 10:1). The injector temperature was maintained at 220 °C, the ion source temperature was 180°C, the oven temperature was programmed at 50°C (isothermal for 2 min), increasing by 10°C/min to 60 °C. C, then 20 °C/min to 80 °C, with a 3 min isotherm at 80 °C, then 10 °C/min to 90 °C with a 2 min isotherm at 90 °C, then 30 °C/min to 120 °C, with a 3 min isotherm, then 30 °C/min to 150 °C, with a 5 min isotherm, then 100 °C/min to 250 °C, with a 10 min isotherm at 250 °C, then 50 °C/min to 300 °C, ending with a 5 min isotherm. Mass spectra were taken at 70 eV an analysis interval of 0.5 s for the mass of all fragments. Solvent delay was 0-2 min and total GC/MS run time was 70 min. Bioactive compounds were identified using the National Institute Standard and Technology (NIST) database of over 62,000 compounds and the National Institute of Health (NIH).

Data analysis

Data analysis was performed using the Agilent Mass Hunter Qualitative Analysis Software application, which facilitated the identification of active compounds by comparing molecular mass obtained with and the standard molecular mass of compounds. To support the analysis, biological activity data were sourced from the National Institute of Standards and Technology Chemistry (NIST) and the National Institute of Health (NIH) databases and literature review.

Results

The hydroethanolic extract of *Schumanniophyton magnificum stem* was subjected to GC-MS analysis, as shown in Figure 1.

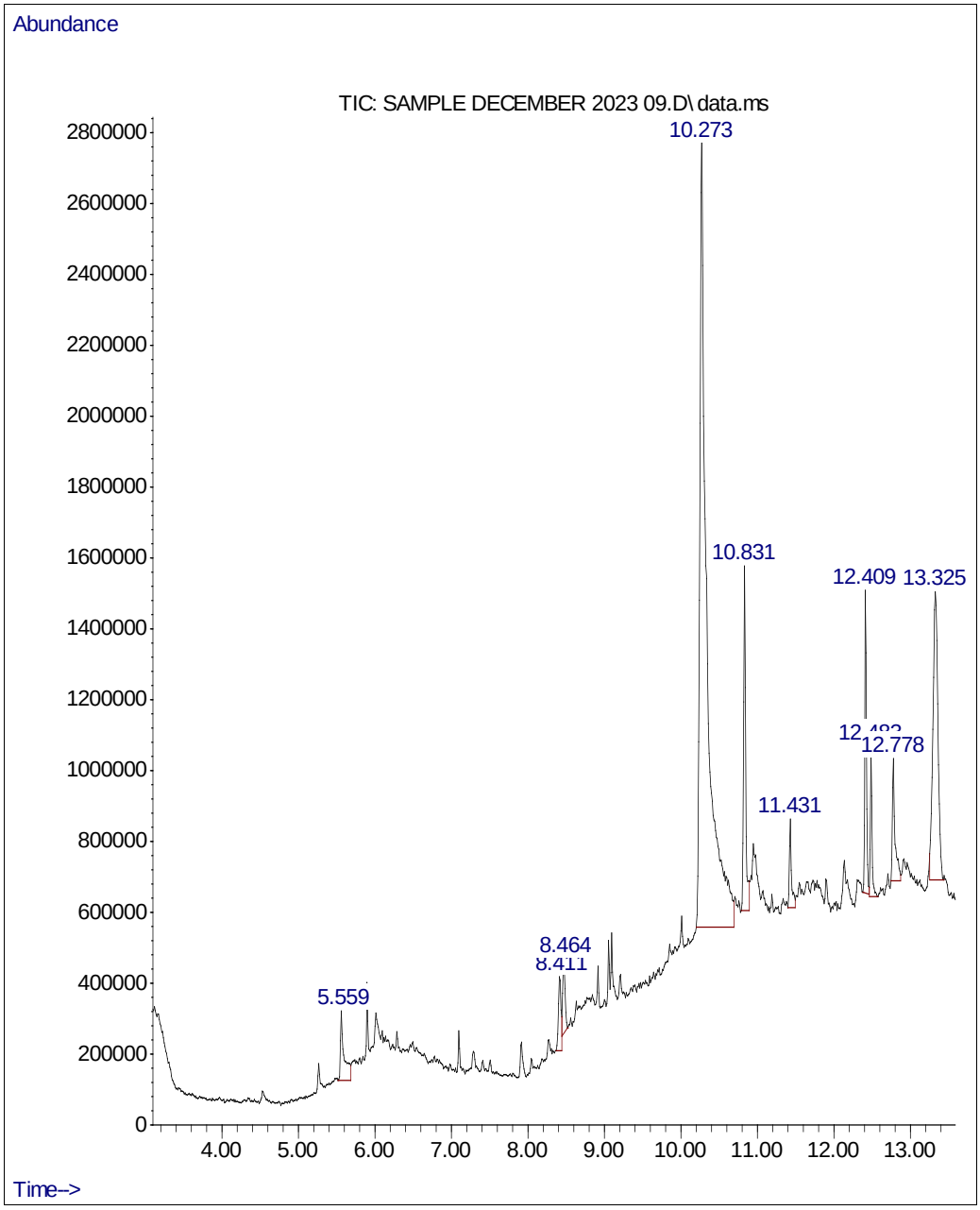


Fig 1: GC-MS Chromatogram of hydroethanolic extract of *Schumanniophyton magnificum*

Table 1: Compounds obtained with GC-MS analysis of the hydroethanolic extract of *Schumanniophyton magnificum*

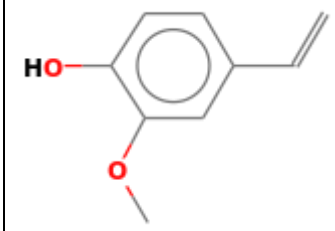
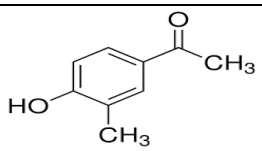
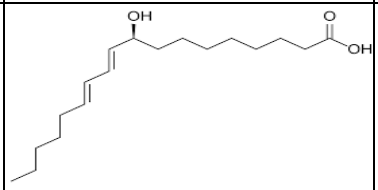
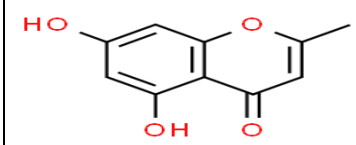
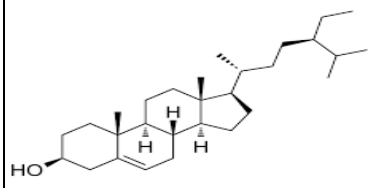
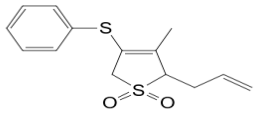
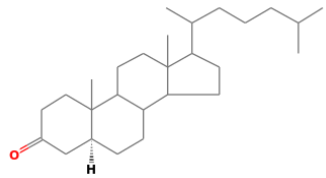
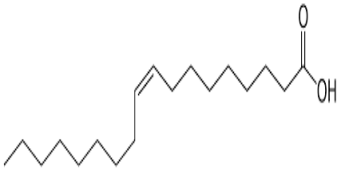
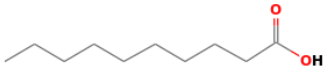
N°Pic	RT (min)	Hit Name	Quality	Mol Weight (AMU)
1	5,559	2-Methoxy-4-vinylphenol	96	150,068
		4-Hydroxy-3-methylacetophenone	81	150,068
		4-Hydroxy-3-methylacetophenone	74	150,068
		4-Hydroxy-3-methylacetophenone	68	150,068
		2-Propanone, 1-phenoxy-	53	150,068
		Benzene, 1-methoxy-4-(1-methylethyl)-	50	150,104
		Phenol, 2-(1,1-dimethylethyl)-	49	150,104
		Phenol, m-tert-butyl-	49	150,104
		1,3-Cyclopentadiene, 1,3-bis(1-methylethyl)-	49	150,141
		Phenol, 3,5-diethyl-	49	150,104
		Benzene, 1-methoxy-4-(1-methylethyl)-	45	150,104
		Phenol, 2-methyl-5-(1-methylethyl)-	43	150,104
		Phenol, 2,3,5,6-tetramethyl-	43	150,104
		3-Methoxyacetophenone	43	150,068
		Benzene, isothiocyanato-	43	135,014
		Benzene, isothiocyanato-	43	135,014
		Hexestrol	42	270,162
		Adamantane-1-carboxylic acid (1-oxo-1,3-dihydroisobenzofuran-5-yl) amide	35	311,152
		4-Amino-2,6-dimethyl-3-pyridyl 1-adamantanecarboxylate	25	300,184
		N-1-Adamantyl-p-methylbenzalimine	18	253,183
2	8,411	Methyl 4-O-methyl-d-arabinopyranoside	59	178,084
		Decanoic acid, 3-methyl-	55	186,162
		Silane, ethyltrimethyl-	38	102,086
		Thiophene, tetrahydro-2-methyl-	35	102,05
		2,2,4-Trimethyl-3-pentanol	27	130,136
		Hydrazine, 1,1-diethyl-2-(1-methylethyl)-	27	130,147
		Trimethylsilyl 23-acetoxy-3,6,9,12,15,18,21-heptaoxatricosan-1-oate	22	498,25
		Heptanoic acid, propyl ester	22	172,146
		2-[2-(2-Butoxyethoxy) ethoxy] ethyl acetate	22	248,162
		4-Heptanol, 3,4-dimethyl-	22	144,151
		4-(4-Chloro-2-methylphenoxy) butyric acid, hexyl ester	20	312,149
		Cyclopropanepentanoic acid, 2-undecyl-, methyl ester, trans-	18	310,287
		Undecanone, 2-methyl oxime	14	199,194
		3-Aza-2-oxabicyclo [2.2.2) oct-5-ene, 3-acetyl-7-endo-dimethylamino-8-exo-acetoxy-	14	254,127
		(2-Methyl-[1,3] dioxolan-2-yl)-acetic acid [1-(4-methoxy-3-nitro-phenyl)-ethylidene]-hydrazide	14	337,127
		Cyclohexene, 3R-acetamido-4cis,6cis-bis(acetoxy)-5trans-dimethylamino-	14	298,153
		4-(4-Chloro-2-methylphenoxy)butyric acid, butyl ester	14	284,118
		Ethanol, 2-phenoxy-, acetate	14	180,079
		Dimethoate	14	229
		Borane, bis-(1-trimethylsilylvinyl) ethyl-	11	238,174
3	8,464	L-Galactose, 6-deoxy-	35	164,068
		alpha.-d-Riboside, 1-O-dodecyl-	35	318,241
		n-Decanoic acid	27	172,146
		Carbonic acid, 2-ethylhexyl pentadecyl ester	27	384,36
		3-Methyl-4-(phenylthio)-2-prop-2-enyl-2,5-dihydrothiophene 1,1-dioxide	20	280,059
		2-(2-Hydroxyethylthio)propionic acid	14	150,035
		Undecanoic acid, 10-bromo-	14	264,072
		Octadecanoic acid	14	284,272
		Cyclopropane, 1-(2-methylbutyl)-1-(1-methylpropyl)-	14	168,188

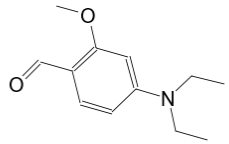
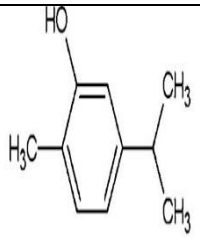
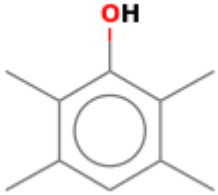
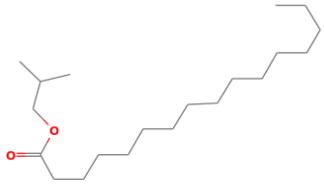
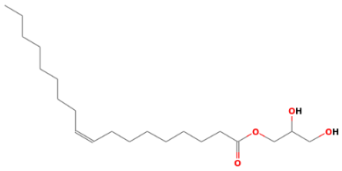
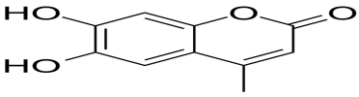
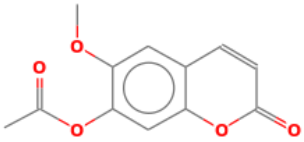
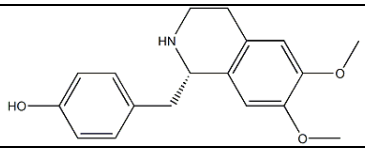
		Cyclooctane	11	112,125
		N-Methyl-3-hydroxymethylpyrrolidin-2-one	11	129,079
		Cyclohexanone, 4-methyl-	11	112,089
		Cyclohexanone, hydrazone	11	112,1
		Pentadecafluorooctanoic acid, dodecyl ester	11	582,162
		2-Trifluoroacetoxytridecane	10	296,196
		2-Chloropropionic acid, decyl ester	10	248,154
		Lactose	10	342,116
		Pentadecafluorooctanoic acid, decyl ester	10	554,13
		Methoxyacetic acid, tetradecyl ester	10	286,251
		Silane, trimethyl-1,2-propadienyl-	10	112,071
4	10,273	9-Octadecenoic acid	99	282,256
		cis-Vaccenic acid	99	282,256
		trans-13-Octadecenoic acid	99	282,256
		cis-13-Octadecenoic acid	99	282,256
		9-Octadecenoic acid, (E)-	96	282,256
		Oleic Acid	96	282,256
		Oleic Acid	96	282,256
		Oleic Acid	93	282,256
		Butyl 9-octadecenoate or 9-18:1	70	338,318
		n-Propyl 9-octadecenoate	68	324,303
		Cyclohexane, 1-(1,5-dimethylhexyl)-4-(4-methylpentyl)-	64	280,313
		trans-9-Octadecenoic acid, pentyl ester	55	352,334
		Heptadecanolide	55	268,24
		6-Octadecenoic acid, (Z)-	46	282,256
		11-Tetradecen-1-ol, (E)-	46	212,214
		Oleic Acid	42	282,256
		5-Eicosene, (E)-	42	280,313
		11-Dodecen-1-ol trifluoroacetate	41	280,165
		1,6-Octadiene, 5,7-dimethyl-, (R)-	30	138,141
		Methyl octadecyl ether	30	284,308
5	10,831	4H-1-Benzopyran-4-one, 5,7-dihydroxy-2-methyl-	76	192,042
		4-Methylesculetin	47	192,042
		Bis[1,2,4] triazolo[1,5-a:5',1'-c] pyrazine-2,9-diamine, 5,6-dihydro-	43	192,087
		2,4(1H,3H)-Pteridinedione, 1,3-dimethyl-	43	192,065
		Anthracene, 9-methyl-	38	192,094
		Anthracene, 9-methyl-	35	192,094
		5,6-Dimethoxy-1-indanone	35	192,079
		Anthracene, 1-methyl-	35	192,094
		3-(Trifluoromethyl)-5H,6H,7H,8H-[1,2,4] triazolo[4,3-a] pyrimidine	35	192,062
		4H-1-benzothiopyran-4-one, 2,3-dihydro-3-(hydroxy methylene)-	35	192,025
		Scopoletin, O-acetyl-	35	234,053
		Naphtho[1,2-b] norbornadiene	35	192,094
		1,2,3,4,5,8-Hexahydroisoquinoline, N-formyl-1-[3-hydroxybenzyl]-6-metho	32	299,152
		1,1'-Bis(bicyclo [2.2.1) hept-5-yl) ethyl ethenylamine	27	259,23
		Isoquinoline, 1,2,3,4-tetrahydro-6,7-dimethoxy-1.beta.-(4-hydroxybenzyl)-	27	299,152
		5-[5-Methylfurfurylidene]hydantoin	27	192,053
		4-Methyldaphnetin	25	192,042
		benzaldehyde, 4-(diethylamino)-2-methoxy-	25	207,126
		4-Methylesculetin	22	192,042
		3H-[1,2,4]triazolo[1,5-a]pyrimidin-8-ium, 7-hydroxy-2-methyl-5-propyl-, inner salt	22	192,101
6	11,431	Oleoyl chloride	38	300,222

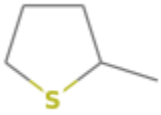
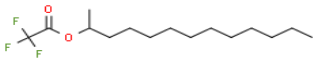
		15-Hydroxypentadecanoic acid	30	258,219
		12-Hydroxydodecanoic acid	27	216,173
		3-Pentenal, 4-methyl-	25	98,073
		Cyclohexanecarboxylic acid, 4-(1,1-dimethylethyl)-, trans-	25	184,146
		Cyclohexanone, 4-(1,1-dimethylethyl)-	25	154,136
		Octane, 2,3-dimethyl-	22	142,172
		2-Piperidinone, 6-methyl-	22	113,084
		Cyclohexane, methyl-	22	98,11
		2(5H)-Furanone, 5-methyl-	22	98,037
		2H-Pyran, 3,4-dihydro-6-methyl-	22	98,073
		2(5H)-Furanone, 5-methyl-	22	98,037
		1-Octyn-3-ol, 4-ethyl-	22	154,136
		Oxazole, 4,5-dihydro-2,4,4-trimethyl-	22	113,084
		Cyclohexanone	22	98,073
		3-Methyl-3-hexene	22	98,11
		Oxacyclotridecan-2-one	22	198,162
		Cyclohexanepropanenitrile, 2-oxo-	22	151,1
		1-Octyn-3-ol, 4-ethyl-	22	154,136
		1-Nonene, 2-ethyl-3-(methoxymethoxy)	22	214,193
7	12,409	2-Hydroxy-tetracosanoic acid, pyrrolidide	43	437,423
		2-Hydroxy-docosanoic acid, pyrrolidide	38	409,392
		Cyclohexanecarboxylic acid, nonyl ester	38	254,225
		Cyclohexanecarboxylic acid, undecyl ester	30	282,256
		N-Decanoylmorpholine	20	241,204
		9-Octadecenoic acid (Z)-, 2-hydroxy-1-(hydroxymethyl)ethyl ester	20	356,293
		2,6-Difluoroaniline	18	129,039
		Oleic Acid	18	282,256
		Goitrin	18	129,025
		Pentanoic acid, morpholide	18	171,126
		Borinic acid, (2-cyclohexylidene-1,1-diethylpropyl)ethyl-, trimethylsilyl ester	18	308,271
		n-Propyl 11-octadecenoate	15	324,303
		9-Octadecenoic acid (Z)-, 2,3-dihydroxypropyl ester	15	356,293
		Oleic Acid	15	282,256
		Methyl pentadecyl ether	15	242,261
		2-Methoxy-6,10-dimethyl-dodeca-2E,6Z,10Z-trienoic acid, 12-acetoxy-, methyl ester	14	324,194
		2,5,6-Tri-O-acetyl-3,4-di-O-methyl-D-mannonitrile	14	331,127
		Cyclododeca[b]furan-3-carbonitrile, 2-amino-4,5,6,7,8,9,10,11,12,13-decahydro-	11	246,173
		1H-Imidazole, 2-ethyl-4,5-dihydro-	11	98,084
		9-Octadecenoic acid (Z)-, 2-hydroxyethyl ester	11	326,282
8	12,483	Acetonitrile, 2,2'-iminobis-	59	95,048
		3H-Naphth[1,8a-b]oxiren-2(1aH)-one, hexahydro-	45	166,099
		1-Pentanol, 5-(methylenecyclopropyl)-	43	140,12
		Spirohexan-4-one, 5,5-dimethyl-	38	124,089
		Cyclopropane, (1-methylethylidene)-	32	82,078
		Oxonin, 4,5,6,7-tetrahydro-, (Z,Z)-	32	124,089
		Cyclopropane, methylmethylene-	32	68,063
		Cyclohexanone, 2-(2-propenyl)-	32	138,104
		Butanenitrile, 4-(cyanomethylimino)-	23	121,064
		cis-13,16-Docasadienoic acid	14	336,303
		Butyl 9.cis.,11.trans.-octadecadienoate	12	336,303
		4-Cyclopentylaminomethylene-2-(4-fluoro-phenyl)-5-propyl-2,4-dihydro-pyrazol-3-one	12	315,175
		4(1H)-Pyrimidinone, 2-(ethylthio)-	10	156,036

		Cyclohex-2-enone, 3-(2H-tetrazol-5-ylamino)-	10	179,081
		N-Cyano-2-methylpyrrolidine	10	110,084
		4(1H)-Pyrimidinone, 2-(propylthio)-	10	170,051
		1-Methoxy-3-(2-hydroxyethyl)nonane	10	202,193
		1H,1H,2H,2H-Perfluorohexan-1-ol	9	264,02
		5,10-Undecadienoic acid, 2-methylene-, methyl ester	9	208,146
		Z,Z-6,26-Pentatriacontadien-2-one	9	502,511
9	12,778	Hexadecanoic acid, 2-hydroxy-1-(hydroxymethyl)ethyl ester	49	330,277
		Glycerol 1-palmitate	46	330,277
		Hexadecanoic acid, 2-hydroxy-1-(hydroxymethyl)ethyl ester	38	330,277
		2-Piperidinone, 6-methyl-	22	113,084
		Methanesulfonyl fluoride	11	97,984
		2-Furanmethanol	10	98,037
		Fumaric acid, cyclobutyl decyl ester	10	310,214
		Heneicosane, 5-methyl-	10	310,36
		9-Oxabicyclo[6.1.0]nonan-4-one	10	140,084
		Pyrimido[4,5-d]pyrimidine-2,7-dione, decahydro-1,3,6-triacetyl-4,5-dimethyl-	10	324,143
		2-Heptanol, 6-methyl-	10	130,136
		2-Heptanol, 5-methyl-	9	130,136
		Pyrazole-1-methanol	9	98,048
		N,O-Bis(heptafluorobutyryl)serine propyl ester	9	539,041
		Palmitic acid vinyl ester	9	282,256
		Dicyclopropyl carbinol	9	112,089
		5-Acetoxy-6-methyl-12,13-dioxa-tricyclo[7.3.1.0(1,6)]tridecane-10-carboxylic acid	9	298,142
		Tridecane-3,5,9,11-tetraone, 2,2,12,12-tetramethyl-	9	296,199
		Hexadecanoic acid, 2-methylpropyl ester	9	312,303
		1-Phenanthrenecarboxylic acid, 1,2,3,4,4a,4b,5,9,10,10a-decahydro-1,4a-dimethyl-7-(1-methylethyl)-, ethyl ester, [1R-(1.alpha.,4a.beta.,4b.alpha.,10a.alpha.)]-	9	330,256
10	13,325	.beta.-Sitosterol	91	414,386
		.gamma.-Sitosterol	89	414,386
		17-(1,5-Dimethylhexyl)-10,13-dimethyl-4-vinylhexadecahydrocyclopenta[a]phenanthren-3-ol	87	414,386
		.gamma.-Sitosterol	43	414,386
		Cholest-7-en-3-ol, 4,4-dimethyl-, (3.beta.,5.alpha.)-	42	414,386
		.beta.-Sitosterol	41	414,386
		4-Oxatricyclo[20.8.0.0(7,16)]triaconta-1(20),7(16)-diene	30	414,386
		Cholestan-3-one, 4,4-dimethyl-, (5.alpha.)-	12	414,386
		Stigmastan-7-one	12	414,386
		1-Methoxy-3-(2-hydroxyethyl)nonane	11	202,193
		Carbobenzoxy-l-O-methylthreonyl-l-O-methylthreonine benzyl ester	11	472,221
		2,2-Dimethylhex-4-enylamine	10	127,136
		Cholestan-3-ol, 5-chloro-6-nitro-, (3.beta.,5.alpha.,6.beta.)-	9	467,317
		N-Trifluoroacetylimidazole	9	164,02
		Dihydrosarsasapogenin-5,17(20)-dien	9	414,313
		(3S,8S,9S,10R,13R,14S,17R)-17-((2R,5R)-5-Ethyl-6-methylheptan-2-yl)-3-methoxy-10,13-dimethyl-2,3,4,7,8,9,10,11,12,13,14,15,16,17-tetradecahydro-1H-cyclopenta[a]phenanthrene	9	428,402
		Ethanol, 2-bromo-	9	123,952
		2,2-Dibromocholestanone	9	542,176
		Ergost-25-ene-3,5,6-triol, (3.beta.,5.alpha.,6.beta.)-	8	432,36
		2H-Pyran-5-carboxamide, 2-oxo-N-(2,3-dimethylphenyl)-	7	243,09

Table 2: *Schumanniophyton magnificum* compounds with anti-snake venom activity

N°	Structures	RT (Min)	Name of Compounds/Activités	Molecular Formula and Weight	Referencies
1		5,559	2-Methoxy-4-vinylphenol Class: Phenols Exhibit antioxidant and anti-inflammatory activities. Anti-inflammatory effects by inhibiting LPS-induced NO, PGE, iNOS, COX-2 [7]	$C_9H_{17}O_2$ M=150.1745g/mol	Jeong *et al.*, 2011 [7]
2		5,559	4-Hydroxy-3-methylacetophenone Class: Phenols Anti-inflammatory effects by inhibiting the cytokines productions [8]	$C_9H_{17}O_2$ M=150.1745g/mol	He *et al.*, 2022 [27]
3		10,273	9-Octadecenoic acid Class: Fatty acids Exhibit activity against snake venom with an antiphospholipasic A_2 activity [9]	$C_{18}H_{32}O_{3s}$ M=282.4614g/mol	Carvalho *et al.*, 2013 [9]
4		10,831	4H-1-Benzopyran-4-one, 5,7-dihydroxy-2-methyl- (Neurogin) Class: Derivate of quercetin flavonoids Anti-inflammatory effect [10, 11, 25]	$C_{10}H_8O_4$ M=192.17 g/mol	H. Zou *et al.*, 2021 [10] Salvan da R., 2019 [11] Amen Y *et al.*, 2021 [25]
5		13,325	β-Sitosterol or Stigmast-5-en-3-ol Class: Phytosterols Antihemorrhagic and Antimyotoxic effects Inhibitor of PLA2 Inhibited lethal toxicity induced by venom [9, 12, 21)	$C_{29}H_{50}O$ M= 414.7067g/mol	Carvalho *et al.*, 2013 [9] Bhavya J *et al.*, 2021 [12] Phatangare *et al.*, 2017 [21]
6		8,464	3-Methyl-4-(phenylthio)-2-prop-2-enyl-2,5-dihydrothiophene 1,1-dioxide Class: NI Ant-inflammatory and Cytotoxic effects [13]	$C_{14}H_{16}O_2S_2$ M=280.059 g/mol	Suraiya K *et al.*, 2024 [13]
7		13,325	(5alpha)-4,4-dimethyl-Cholestan-3-one Class: Steroids Antihemorrhagic effects Anti-inflammatory activity [14]	$C_{29}H_{50}O$ M= 414.7 g/mol	https://www.biosynth.com/p/FC10508/566-88-1-5-a-cholestan-3-one. Accessed on 21/01/2023 at 5 pm 43 min.
8		10,273	Acid oleic Class: Fatty acids Exhibit activity against snake venom with an Antiphospholipasic A_2 activity Inhibition of proinflammatory cytokines [9,15]	$C_{18}H_{34}O_2$ M=282.5 g/mol	Carvalho *et al.*, 2013 [9] Othman AR *et al.*, 2015 [15]
9		8,464	n-Decanoic acid Class: Fatty acids Anti-Inflammatory Property [16]	$C_{10}H_{20}O_2$ M= 172.2646/mol	Vasudevan A *et al.*, 2012 [16]

10		10,831	Benzaldehyde, 4-(diethylamino)-2-methoxy- Class: NI Anti-inflammatory effects against the activities and expressions of four key inflammatory mediators *viz.*, cyclooxygenase, prostaglandin E_2, inducible NO synthase, and nuclear factor Kb [17]	$C_{12}H_{17}NO_2$ M=207.27 g/mol	Haroon R *et al.*, 2019 [17]
11		5,559	Carvacrol (2-methyl-5-(1-methylethyl)-phenol) Class: Monoterpene phenolic Exhibit anti-inflammatory, anti-oxidant, antitumor, also it activates peroxisome proliferator-activated receptor and suppresses COX-2 inflammation [18, 19]	$C_{10}H_{14}O$ M=150, 217 g/mol	Kirimer *et al.*, 1995 [18] Hotta *et al.*, 2010 [19]
12		5,559	2,3,5,6-tetramethyl-Phenol Class: Phenols Have anti-inflammatory properties and used as an antioxidant agent [20]	$C_{10}H_{14}O$ M=150, 217 g/mol	Baba *et al.*, 2021
13		12,778	Hexadecanoic acid, 2-methylpropyl ester Class: Fatty Acids Anti-inflammatory properties [22]	$C_{20}H_{40}O_2$ 312.5304 g/mol	Sreewardhini *S et al.*, 2023 [22]
14		12,778	Palmitic acid vinyl ester also called Hexadecanoic acid Class: Fatty Acids Anti-inflammatory activity through competitive inhibition of PLA2 [23]	$C_{18}H_{34}O_2$ 282.4614 g/mol	Vickers CE *et al.*, 2009 [23]
15		12,409	9-Octadecenoic acid (Z)-, 2,3-dihydroxypropyl ester Class: Fatty acids Anti-inflammatory [24]	$C_{21}H_{40}O_4$ 356,293 g/mol	Fadzir *et al.*, 2018 [24]
16		10,831	4-Methylesculetin Class: Coumarins Anti-inflammatory activity [26]	$C_{10}H_8O_4$ M=192.17 g/mol	Aline W *et al.*, 2010 [26]
17		10,831	Scopoletin, O-acetyl- Class: Coumarins Anti-inflammatory [27]	$C_{12}H_{10}O_5$ M= 234.2048 g/mol	He BT *et al.*, 2022 [27]
18		10,831	Isoquinoline, 1,2,3,4-tetrahydro-6,7-dimethoxy-1.beta.-(4-hydroxybenzyl)- Class: Alkaloids Anti-inflammatory properties [28]	$C_{18}H_{21}NO_3$ M=299.36424 g/mol	Khan AY *et al.*, 2015 [28]

19		8,411	Thiophene, tetrahydro-2-methyl- Class: NI Anti-inflammatory, antiallergic activities [29]	$C_5H_{10}S$ M=102.198 g/mol	Zahidah *et al.*, 2020 [29]
20		8,464	2-Trifluoroacetoxytridecane Class: NI Anti-inflammatory effect [30]	$C_{15}H_{27}F_3O_2$ M=296.37 g/mol	Tallei *et al.*, 2022
	NI= Not Identified				

Discussion

Potential bioactive compounds with their retention time (RT), molecular formula, molecular weight (MW) are presented in Table 1. These bioactive compounds were present in the GC-MS analysis carried on hydroethanolic extract of Schumanniophyton *magnificum.* 20 compounds were reported to possess anti-inflammatory effect by inhibiting phospholipase A2 activity, Antihemorrhagic, Antimyotoxic and antioxidant effects. Many of these compounds belong to the family of phenolics, fatty acids, steroids, alkaloids, monoterpenes, glycoside derivatives and coumarins. Among phenolic compounds with anti-inflammatory activity: 2-Methoxy-4-vinylphenol, 4-Hydroxy-3-methylacetophenone, 2,3,5,6-tetramethyl-Phenol [7, 8, 20]; phytosterol compound like β-Sitosterol or Stigmast-5-en-3-ol, derivate of quercetin flavonoids [9, 12, 21] which is 4H-1-Benzopyran-4-one, 5,7-dihydroxy-2-methyl-have been identified. Fatty acids: 9-Octadecenoic acid, Acid oleic, n-Decanoic acid, Hexadecanoic acid, 2-methylpropyl ester, Palmitic acid vinyl ester also called Hexadecanoic acid, 9-Octadecenoic acid (Z), 2,3-dihydroxypropyl ester have been identified to exhibit activity against snake venom with an Antiphospholipasic A2 activity by Inhibition of proinflammatory cytokines [9, 15, 16, 22, 24]. Coumarins: Scopoletin, O-acetyl-,4-Methylesculetin have been reported to have anti-inflammatory activity [27]. Flavonoids: 4H-1-Benzopyran-4-one, 5,7-dihydroxy-2-methyl-have an anti-inflammatory effect [10, 11, 25]. Steroid: with Antihemorrhagic effect and anti-inflammatory activity has been reported: (5alpha)-4, 4-dimethyl-Cholestan-3-one [14]. Phenolic monoterpene: Carvacrol (2-methyl-5-(1-methylethyl)-phenol) possesses anti-inflammatory, anti-oxidant, antitumor effect. Alkaloids: Isoquinoline, 1,2,3,4-tetrahydro-6,7-dimethoxy-1-beta-(4-hydroxybenzyl)-has anti-inflammatory properties [28]; 2-Trifluoroacetoxytridecane, Thiophene tetrahydro-2-methyl-, Benzaldehyde,4-(diethylamino)-2-methoxy-,3-Methyl-4-(phenylthio)-2-prop-2-enyl-2,5-dihydrothiophene 1,1-dioxide have been reported to possess ant-inflammatory and Cytotoxic effects [13, 17, 29, 30].

Conclusion

GC-MS analysis has permit to identify 20 active compounds from the hydroethanolic extract of *Schumanniophyton magnificum*. These compounds were identified using the from the National Institute of Standards and Technology Chemistry (NIST) and the National Institute of Health (NIH) databases and literature review which showed their beneficial biological activity. The stem bark of this plant is presented as possessing anti-inflammatory, anti hemorragic, antioxidant, anti-cytotoxic and Antimyotoxic effect. This plant is used as a medicinal plant for the treatment of snake bites, malaria, typhoid due to the biological activities of its compounds. The multitude of compounds contained in this plant remains a wide field of research to elucidate its various uses in traditional medicine in Cameroon.

Conflict of Interest

The authors declare no conflict of interest.

Authors' Declaration

The authors hereby declare that the work presented in this article is original and that any liability for claims relating to the content of this article will be borne by them.

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