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Development of Rare and Endangered Medicinal Material Resources in Southwest China—A Case Study of Bioactivity of Active Compounds from Several Species of Blumea Balsamifera Plants

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Abstract: *The rare and endangered medicinal materials in Southwest China are the treasures of medical resources in China, among which Blumea balsamifera is the most valuable. In this paper, the economic and social development and the status quo of rare and endangered medicinal materials in southwest China were briefly described, and several common Blumea balsamifera plants and their pharmacological characteristics were analyzed. This paper mainly introduces the main research methods and techniques used in the extraction and separation of active components from Blumea balsamifera plants, and analyzes the chemical constituents of Blumea balsamifera plants. By analyzing the chemical active components (including hair oil, flavonoids, terpenoids, phenylpropanoids, steroids, etc.) in Blumea balsamifera, it was found that the volatile oil, flavonoids and sesquiterpenoids have high medicinal value, which is worth further research and exploration. Due to the author's limited academic ability, there are inevitably some shortcomings in this paper.*

Keywords: *Blumea balsamifera plants, Compound composition, Bioactivity study*

1. Introduction

The southwest region is a minority dwelling area of China, where Yunnan alone has 25 minorities. Constrained by such multifaceted factors as difficult transportation and ecological vulnerability in mountainous regions, economic development in the minority regions of the Southwest has been lagging behind, and a large number of people are still below the poverty line. Poverty alleviation has always been the work focus and difficult point for local governments. How can we develop a precise poverty alleviation, develop economy and achieve a well-being life for the whole population while preserving the eco nature is an urgent problem. At present, the rapid development of health industry in our province has led to the large development of Chinese medicine industry. With the aggravation of aging, as well as the increasing awareness and preference for natural medicines for healthy health preservation of people, traditional medicine focusing on individualization and emphasizing overall mastering of a healthy state has been gradually respected, and the demand for raw medicinal materials has increased tremendously due to the boom of traditional medicine. At the same time, traditional medicine carries forward the characteristics of untreated disease and derives health care efficacy from a single clinical diagnosis and treatment; Because of its flexible treatment modalities, variable manipulation practices, and emphasis on physical and mental health, based on adaptation to social needs, we further expand the list of relevant services such as traditional Chinese medicine (TCM) health promotion, health care physiotherapy, health management, rehabilitation services, health tourism, and health product development. The considerable expansion of the involved areas has led to an increase in the demand not only for raw medicinal materials as a material basis, but also for the quality and variety of raw medicinal materials to have higher requirements. This strong force, driven by demand, promotes the development of the Chinese medicine industry in the direction of high quality, efficiency, high-tech content and high production added value, and will surely drive the rapid progress of the Chinese medicine industry.

2. Cyclic adenosine monophosphate (cAMP) with forskolin (FSK)

Cyclic adenosine monophosphate (cAMP) is a protein kinase activator, a derivative of tethered nucleotides. It is a kind of important substance with physiological activity widely in the human body, which is generated by adenosine triphosphate under the catalysis of adenylyl cyclase and can regulate multiple functional activities of cells, and is an important direction of antitumor drug development. [1] Camp is involved in regulating substance metabolism in the cell and can change the function of the cell membrane, promote calcium ions into the muscle fiber, and can promote the activity of respiratory chain oxidases. In addition, it plays an important role in sugar and fat metabolism, regulation of nucleic acid and protein synthesis, and is the ― second messenger ‖ in the transmission of information to life. Can promote the survival of cardiomyocytes and enhance the ability of cardiomyocytes to resist injury, resist ischemia, and hypoxia; Promotes the flow of calcium ions into cardiomyocytes, enhances phosphorylation, promotes excitation contraction coupling, improves cardiomyocyte contractility, and increases cardiac output; At the same time, it also dilates peripheral blood vessels, reduces cardiac ejection impedance, reduces pre - and afterload on the heart, increases cardiac output, and improves cardiac function. [2] Thereby, it exerts trophic effects on the heart, relaxing blood vessels, antiplatelet aggregation, and antiarrhythmic effects. [3] It is also useful for induction of remission in acute leukemia in combination with chemotherapy. In addition, it has some curative effects on elderly patients with chronic bronchitis, various kinds of hepatitis and psoriasis. Adenylyl cyclase (AC) is a membrane integral protein with both its amino - and carboxy terminus oriented toward the cytoplasm. [4] AC has two catalytic domains on the cytoplasmic face of the membrane, as well as two membrane integral regions, each with six membrane spanning α helices. In the cAMP signaling pathway, extracellular signals bind to the corresponding receptors, regulating adenylyl cyclase activity to convert extracellular signals into intracellular signals through changes in second messenger cAMP levels. Model of GS regulation: when cells are not hormonally stimulated, GS is in an inactive state and the α subunit is bound to GDP, at which point adenylyl cyclase is inactive; When a hormone ligand binds to RS, it leads to the conformational change of RS, exposing the site for binding to GS, which enables the hormone receptor complex to bind to GS, the α-subunit conformational change of GS, thereby repelling GDP, binding GTP and activating, allowing the trimeric Gs protein to dissociate the α- and βγ-subunit complex, and exposing the binding site of the α-subunit for adenylyl cyclase; The GTP bound α subunit binds to adenylyl cyclase, makes it active, and converts ATP to camp. [5-6] The activating effect of adenylyl cyclase is terminated as the hydrolyzed α subunit of GTP returns to its original conformation and results in dissociation from adenylyl cyclase. The chain of reactions involved in this signaling pathway may be represented as: hormone → G protein coupled receptor → G protein → adenylyl cyclase → camp → camp dependent protein kinase a → gene regulatory protein → gene transcription GI regulation. This AC is an effector in G-protein-coupled systems because of its ability to convert ATP to camp to elicit a signaling response from the cell. [7] In recent years, the regulatory substances and mechanisms of AC are an important hotspot in innovative drug research and development. The regulators of AC currently include forskolin (FSK), G-protein, Ca2 + / calmodulin and phosphorylation of proteins, among others. Forskolin diterpenoids, to the best of our knowledge the only strongest activator of adenylyl cyclase derived from plants.

FSK plays a wide range of regulatory roles in vivo by directly agonizing adenylyl cyclase (AC), elevating the concentration of cyclic adenosine monophosphate (cAMP) within the cells of a variety of tissues, and thus participating in the regulation of multiple cellular functions,. It is clinically used for the treatment of congestive heart failure, tumor metastasis, glaucoma, asthma, skin diseases, etc. FSK is a semiturane type diterpenoid isolated and identified by Indian scholars in the late 70s from coleusforskahlii extract from India. Due to the excellent and broad-spectrum biological activities of forskolin based compounds, a boom in the research of this class of compounds was once lifted. In order to obtain this type of medicine with independent intellectual property rights, Chinese scholars have launched inquiry and research efforts on plants containing forskolin diterpenoids, but to date no other alternative plants containing this type have been found, and only a small amount of forskolin was found on the wild slopes of Fengze County, Yunnan, China, which is defined as a rare plant variety by domestic botanists.

3. Introduction to the study of the common genus euphratica

See cream yellow (B. laceradc), Asteraceae, genus aenaevum, also known as yellow flower ground urchin head, the extracts of which are active against human gastric cancer cells (AGS); Intestinal cancer cell; (colon: HT-29) and breast cancer cells (MDA-MB-435S) showed strong cytotoxic activity (IC50: 0.01-0.08 mg/ml). "Clearing heat and detoxifying, anti-inflammatory, curing pediatric pneumonia,

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tonsillitis, mumps, stomatitis, innominate swelling and itching skin" was recorded in Yunnan herbal medicine. [8]

Shanfeng (B. Blumea balsamiferatica), Asteraceae, aenaexiang genus, stout herbaceous or sub bush like, school name Fu Fang AI Na Xiang, also known as Xiang AI. Efficacy on rheumatic arthritis, eczema, skin itching and so on exact Japanese scholar takashiohtsuki received 4.6 mg of a half day anthocyanin skeleton structured diterpenoid, austroinulin, in 2004 from the 189 g Thai produced genus blumeaglomerata (also known as polygonatum, distributed in Yunnan, Guizhou, Guangxi, Guangdong). It showed some inhibitory activity on hepatoma HeLa cells (22.3 μ g / ml), and its target needs further exploration. Thus, it can be concluded that the study of the active components of the genus euphratica is not sufficiently systematic and needs to be further mined. From the source to source relationship, it is also possible that they may contain secondary metabolites similar to mountain wind, especially the possibility is higher that some anakinra plants with anticancer or blood activating efficacy contain forskolin type diterpenoid components. That is, it is also possible to find forskolin type diterpenoid compounds from these plants.

In total, more than 80 plant species in the genus Asteraceae are distributed in tropical and subtropical Asia, Africa and Oceania, 32 species in China, and 16 species have medicinal records, which are mainly distributed in southeast to southwest, of which Guangxi is one of the main producing regions. [9] In addition to winds and arthropod IR, there are many more resource rich plants, e.g B. blasamifera, commonly used for rheumatic bone pain, invigorating blood circulation and eliminating stasis, and regulating blood stasis, B. riparia, B. megacephala, and so on are widely distributed in Guangxi. In medicinal Panax species, studies are more in-depth. In 2012 SAIFUDIN, a. a series of sesquiterpenoids with complexine phosphatase inhibitory activity were obtained from Blumea produced from Indonesia. A series of sesquiterpenoids with anti-inflammatory activity were also obtained in AI Nan Xiang by Jing Xu et al., School of Pharmaceutical Sciences, Nankai University, China. Based on the raw material of Blumea balsamifera or its active ingredients, some new drugs have been developed and listed. For example, pharyngeal Lixin dripping pill with eina Blumea balsamifera oil as the main ingredient; Nacre liquor, coronin Suzuki tablets, etc., in which borneol in ahnasu is the main ingredient, were used. Pseudodongfeng grass, i.e., B. riparia, has a long history of medication use in Guangxi Province. As the main raw materials of , Yunnan GuiGui ianxiang capsules ʿ and Chinese patent medicine , wuxuekangʿ, they are mainly used to treat disorders such as internal resistance to stasis, miscarriage caused by dysmenorrhea (or postpartum) due to unclean uterine bleeding (or retention of cachexia), and current research considers their main active ingredients to be acid phenolic compounds. [10] In 2013, Indian scholar Upadhyay h. C. et al reported that the extracts of B. membranacea. DC and B. eriantha had strong inhibitory activity against sickle Plasmodium, but there was no report on the chemical composition.

Thus, it can be concluded that the study of the active components of the genus euphratica is not sufficiently systematic and needs to be further mined. From the source to source relationship, it is also possible that they may contain secondary metabolites similar to mountain wind, especially the possibility is higher that some of the genus euphratica with anticancer or blood activating efficacy contain active ingredients. To this end, we would like to carry out the active chemical components detection, isolation and structure identification of ainaceous plants such as Shanfeng and gangnodei red on the basis of the already established compound database in the previous period, followed by uplc-qtof-esims tracking detection, to explore their structure-activity relationships, to provide lead compounds for the development of innovative drugs, and to do a good job for the study of further pharmacological mechanisms.

4. Major research methods and techniques used in the extraction and isolation of active ingredients

Targeted isolation was performed to identify the active compounds in ainajuma plant such as mountain wind, nodule red and see frost Huang under the guidance of uplc-qtof-esims analysis. Relevant medicinal herbs were subjected to each of the following studies: in addition to two plants that had been identified to contain forskolin type diterpenoids, two to three plants that were both active and possibly contained forskolin type diterpenoids were screened from other species of aequorin by uplc-qtof-esims analysis and cyclic adenosine monophosphate triphosphatase activating activity screening. A large number of samples (10-50 kg each) were collected and immersed in methanol at room temperature (7 d × 3 times), and the solvent was recovered under reduced pressure followed by sequential extraction with petroleum ether, ethyl acetate, and n-butanol (three times each). [11]

(1) Industrial preparation HPLC: equipped with a column loader with three packing changes: MCI,

ODS, polyamide (200-300 mesh), crude staging is mainly performed with a contamination resistant MCI, without detector and flow cell (to prevent contamination) to achieve high pressure, rapid crude separation.

(2) In trial production preparative HPLC: it is suitable for the separation of compounds that are difficult to separate by hand and have a larger sample size.

(3) Solvent leaching method: the target medicinal materials were extracted by soaking with ethanol (85%) respectively, and the total infusions were recovered.

(4) Solvent extraction: the total extracts were subjected to liquid-liquid extraction to obtain petroleum ether and ethyl acetate extracts, based on the differences in the solubility of different constituents in organic solvents such as water and petroleum ether or ethyl acetate.

(5) Polyamide column chromatography: the column with polyacrylamide, which can be eluted with a normal phase elution system (chloroform methanol system, chloroform loaded column), but also with a reverse solvent system (water methanol system, water used as solvent loaded column). Mainly used for the separation of acid phenolic compounds and the separation of aqueous phase.

(6) MCI column chromatography: mainly using the characteristic of strong adsorption of pigments such as chlorophyll in the MCI resin column, methanol water is used as the eluent, which can be used to remove pigments such as chlorophyll, and can also achieve a preliminary crude.

(7) Silica gel column chromatography: choose a particle size 100-200 mesh or 200-300 mesh silica gel column (optional dry or wet column loading), optional dry or wet loading, the specific choice depends on the amount of sample and its solubility, polarity and size difference. The ratio of sample to silica gel is used for visual separation purposes, and the ease of separation is determined by (sample quality / silica gel quality: From 1:6-1:30 or even 1:100). Selection of eluent: the appropriate eluent was selected by TLC detection combined with the experience of local climatic characteristics (mainly affected by humidity, air temperature).

(8) Reversed phase silica column chromatography: choose C-18 or C-8 alkyl silica column, the ratio of sample to reversed-phase material from 1:20 to 60, depending on the difficulty of separation. Choice of solvent system, detectable by reverse phase TLC, generally in water methanol or water acetonitrile systems.

(9) Gel sephadexlh-20 column chromatography: it is mainly used for the separation of different types of compounds, especially the compounds of acid phenolic nature with steroids and terpenoids, and it is relatively good, and it is generally used to subdivide the stages, and the solvent system can be optional acetone, chloroform methanol (1:1, V / V), methanol, methanol water.

(10) Preparation TLC: thin layer preparation for separation of two point (up to three points) components only, 40 cm × 40 cm preparative chromatography plates can be loaded with 10 mg-80 mg of the sample, which can be applied by the secondary unfolding method. The key point is that the sample bands be uniform and as narrow as possible.

(11) Preparative HPLC: suitable for the separation of compounds that are difficult to separate by hand and have low sample volumes

5. Analysis of the phytochemical composition of eicosa spp

Aequorin contains several chemical components, including volatile oil, flavonoids, terpenoids, phenylpropanoids, steroids, etc., of which volatile oil, flavonoids, and sesquiterpenoids are the most abundant and are the main chemical components of aequorin.

5.1. Volatile oils

Volatile oils, also known as essential oils, are the collective term for a class of volatile oily constituents present in plants that have an Blumea balsamiferatic odor and can be distilled off with water vapor without being miscible with water. At home and abroad scholars have separated more than 90 volatile components from Blumea balsamifera using gas chromatography-mass spectrometry. The main constituents include gentio, trans caryophyllene γ- Eucalyptol α- Cineole, zanthol, caryophyllene oxide, camphor, etc. Although the categories of volatile components in ahnae Blumea balsamifera were similar due to the differences in origin, harvesting time, and extraction methods, the contents of specific components were somewhat different. [12]

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5.2. Flavonoids

Table 1: Flavonoids in Blumea balsamifera

Number	Compound name	Position
1	North american sage herb	Leaf
2	North america shengcao-7-7 methyl ether	Leaf
3	Liquiritigenin	Stem, leaf
4	5,7,3', 5'- tetrahydroxydihydroflavones	Aerial parts
5	Epoprostenol	Aerial parts
6	(2s)-5,7,2', 5'- tetrahydroxydihydroflavones	Aerial parts
7	Isoscutellarin	Aerial parts
8	(2r, 3r)-5- methoxy -3,5,7,2'- tetrahydroxydihydroflavones	Aerial parts
9	(2r, 3r)-7.5'- dimethoxy -3,5,,2'- trihydroxydihydroflavones	Aerial parts
10	5.4'- dyhydroxy -3,7,3'- trimethoxydihydroflavones	Stem, leaf
11	(2r, 3r)- dihydroquercetin-4 '- methyl ether	Aerial parts
12	(2r, 3r)dihydroquercetin-4 '- dimethyl ether	Leaf
13	7- methoxytaxifolin	Leaf
14	3,3',5,5', 7- pentahydroxydihydroflavones	Branch, leaf
15	Dihydroquercetin	Leaf
16	(2r, 3r)-(一)-4'- methoxy dihydroquercetin	Aerial parts
17	5,7,3',4'-tetrahydroxy-2-methoxy-3,4-tlavandione 3-hydrare	Branch, leaf
18	Luteolin	Leaf
19	Luteolin-7-methyl ether	Leaf
20	Velutin	Leaf
21	5,4'-dihydroxy-7-methoxy-flavone	Stem, leaf
22	Geranylgeranyl	Branch, leaf
23	Chrysin	Branch, leaf
24	Quercetin	Aerial parts
25	Pokeweed	Leaf
26	Sulfasalazine	Leaf
27	Rhamnocitrin	Leaf
28	3,5,7-- trihydroxy-3', 4'-dimethoxyflavone	Branch, leaf
29	3,5,7- dihydroxy-3', 4', 7-trimethoxyflavone	Branch, leaf
30	7.5'- dimethoxy-3,5, 2'- trihydroxydihydroflavone	Aerial parts
31	Chrysosplenol C	Branch, leaf
32	Hyperoside	Branch, leaf
33	Quercetin-3'- methoxy-3-o- β- d-galactopyranoside	Branch, leaf
34	Isoquercetin	Branch, leaf
35	Ayanm	Branch, leaf
36	Quercetin-3,7,3'- trimethylether	Leaf
37	Warfarin	Stem, leaf
38	Quercetin-3,7-dimethyl ether	Leaf
39	Quercetin-3, 3'4'- trimethylether	Aerial parts
40	4',5,7-trihydroxy-3,3' - dimethoxyflavone	Leaf
41	Quercetin-3,4'- dimethyl ether	Leaf
42	3,4,5,7- tetrahydroxy-3-trimethoxyflavone	Branch, leaf
43	Catechol	Aerial parts
44	Davidigenin	Aerial parts
45	Davidioside	Aerial parts
46	Glycyrrhizin	Stem, leaf
47	Isoliquiritigenin	Stem, leaf
48	3-o-7''-lxluteolin	Leaf
49	7,4'',4'''-tri-o-methylamentotlavone	Aerial parts

Flavonoid component is one of the main components of Blumea balsamifera, which is closely related to its pharmacological activity. At present, scholars have isolated a total of 49 flavonoids from different parts of ilax, including dihydroflavones (compounds 1-7), dihydroflavonols (compounds 8-17), flavonoids (compounds 18-23), flavonols (compounds 24-42), flavanols (compounds 43), chalcones (compounds 44, 45), pterostaloids (compounds 46, 47), and xanthone dimers (compounds 48, 49).[13] Among them, compounds 5, 11-13 were found to be highly abundant in Blumea balsamifera. Flavonoids in aequorin are shown in Table 1.

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5.3. Fold sesquiterpenoids

At present, a total of 49 sesquiterpenoids including guaiac type (compounds 50-81), gimarane type (compounds 82-85), eucalyptone type (compounds 86-92), caryophyllene derivatives (compounds 93, 94) and other sesquiterpenoids (compounds 95-98) have been isolated from ahnaek. Among them, guaiac type is the main sesquiterpenoid component in Blumea balsamifera, compounds 71-79 exhibit epoxy bridges at C6 and C10, and compounds 80 and 81 form lactones at C8 and C12. In addition, compounds in this class possess multiple chiral carbons, and the absolute configuration of compounds 56, 66, 67, 71, 95, 98 was determined from electronic circular dichroism (ECD) data, and that of compound 97 was determined from X-ray single crystal diffraction data. Sesquiterpenoids in Blumea balsamifera are shown in Table 2.[14]

Table 2: Terpenoid constituents in Blumea balsamifera

Number	Compound name	Position
1	Blumeaene A	Aerial parts
2	Blumeaene B	Aerial parts
3	Blumeaene C	Aerial parts
4	Blumeaene D	Aerial parts
5	Blumeaene E	Aerial parts
6	Blumeaene F	Aerial parts

5.4. Hemiterpenoids

Five hemiterpenoids (compounds 99-103) were isolated from ahnaexiang, of which compounds 101-103 were hemiterpenoid glycosides. (see Table 2) 5.5 diterpenoids to date, scholars have obtained a total of five semiscutellarin diterpenes (compounds 104-108) from ahnakan, of which compound 108 is a bisnorditerpene, and the absolute configuration of compound 105 was determined by reference to the ECD data. The diterpenoids in Blumea balsamifera are shown in Table 2.

5.5. Diterpenoids

Up to now, five diterpenoids (compounds 104~108) have been isolated from Blumea balsamifera, of which compound 108 is a dinorditerpene. And the absolute configuration of compound 105 was determined by ECD data. The diterpenoids in Blumea balsamifera are shown in Table 2.

5.6. Triterpenoids

Two Ursane type triterpenoids 109, 110 were isolated from the aerial parts of ahnasu, and the details are shown in Table 3.

Table 3: Triterpenoids in Blumea balsamifera

Number	Compound name	Position
56	Blumpene B	Leaf
57	Blumeaene K	Leaf
58	Epiblumeaene K	
59	Blumeaene E1	
60	Blumeaene E2	
61	Blumeaene L	
62	Blumeaene M	
63	Balsamiferine E	
64	Balsamiferine F	
65	Balsamiferine G	
66	Blumpene C	
67	Blumpene D	
68	Blumeaene G	
69	-	
70	Blumeaene N	
71	Balsamiferine N	
72	Balsamiferine O	

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73	Blumeaene I	
74	Blumeaene J	
75	Blumeaene H	
76	Balsamiferine H	
77	Balsamiferine I	
78	Balsamiferine J	
79	Balsamiferine K	
80	Inuchinenolide B	
81	Neogaillardin	
82	Blumealactone A	
83	Blumealactone B	
84	Blumealactone C	
85	-	
86	Cryptomeridiol	
87	Balsamiferine D	
88	Samboginone	
89	Balsamiferine B	
90	Balsamiferine C	
91	1β, 4β, 7α-trihydroxyeudesmane	
92	6,15α-epoxy-1β, 4β-dihydroxyeudesmane	
93	B-caryophyllene-8R,9R-oxide	
94	(4R, 5R)-4,5-dihydroxycaryophyll-8(13)-ene	
95	Balsamiferine P	
96	Balsamiferine Q	
97	Balsamiferine A	
98	Balsamiferine R	
99	2,6-dimethy-octa-1,7-diene-3,6-diol	
100	(一)-borneol	

5.7. Phenylpropanoids

Fourteen simple phenylpropanoids (compounds 111-124) and one coumarin compound (compound 125) were isolated from ahnaexiang, in which simple phenylpropanoids exist as esters or glycosides. The phenylpropanoids in Blumea balsamifera are shown in Table 4. [12-13]

Table 4: Phenylpropanoids in Blumea balsamifera

Number	Compound name	Position
111	3,5-O- Dicaffeoyl quinic acid ethyl ester	Leaf
112	3,5-O- Dicaffeoyl quinic acid ethyl ester	Leaf
113	3,4-O- Dicaffeoyl quinic acid ethyl ester	Leaf
114	3,4-O- Tricaffeoylquinic acid	Leaf
115	3,5-O- Tricaffeoylquinic acid	Leaf
116	1,3,5-O- Tricaffeoylquinic acid	Leaf
117	Ethyl caffeate	Leaf
118	Trans-p-hydroxycinnamic acid	Leaf
119	Caffeic acid docosate	Stem, leaf
120	Caffeic acid	Leaf
121	Tanshinol methyl ester	Aerial parts
122	Balsamiferoside A	Branch, leaf
123	Eugenyl-O-β-D-glucoside/citrusin C	Leaf
124	5-allyl-2,6-dimethoxypuenol glucoside	Leaf
125	6,7- Dihydroxycoumarin	Leaf

5.8. Others

Steroids were isolated from eicosan, including β- Sitosterol (compound 126), stigmasterol (compound 127), carotene (compound 128), peroxyergosterol (compound 129), 4,22-dien-3-one stigmastane (compound 130), zanthol (compound 131), 2,4-dihydroxy-6-methoxyacetophenone (compound 132),

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5,7-dihydroxychromogenin (compound 133), p-hydroxybenzoic acid (compound 134), and Gentisic acid (compound 135), phytol (compound 136), icthyotheranol acetate (compound 137) β- Carotene (compound 138), lutein (compound 139), protocatechuic aldehyde (compound 140), protocatechuic acid (compound 141), grasshopper ketone (compound 142), bis (4-hydroxybenzyl) ether (compound 143), 3 - (hydroxyethyl) indole (compound 144), triundecane (compound 145) and other compounds.

6. Conclusion

In this paper, a systematic analysis of the phytochemical constituents of the genus eicosa has been carried out using a variety of research and analytical experimental methods, and the results showed that there are mainly volatile oils, flavonoids, terpenes, phenylpropanoids, steroids, etc., in the plant. Among them, the content of volatile oils in the functional leaves and young branches of eicosan is high, and the main components are gentian, camphor, etc., which have a good bactericidal and anti-inflammatory effect. Aequorin showed significant inhibitory effects on Staphylococcus aureus, Escherichia coli, Pseudomonas aeruginosa, Candida albicans and so on; Amentoflavone significantly inhibited lipid peroxidation, mitochondrial lipid peroxidation in homogenized tissues; It has excellent biological activities such as antitumor, hepatoprotective, antioxidant, and antibacterial and antiviral activities. Looking forward, the plant related development of ahnaka remains highly promising and warrants further analytical studies.

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