

Zh.Zh. Zhumagalieva¹, Sh.K. Yeleupaeva¹, V.I. Korchyn²¹*Ye.A. Buketov Karaganda State University;*²*Khanty-Mansiysk State Medical Academy, Russia**(E-mail: zharkyn.73@mail.ru)***Study the alkaloid composition in the rue (*Thalictrum foetidum*),
occurring in Karkaralinsk region**

The paper studied the plant (*Thalictrum foetidum*) (vaslistnika) collected Karkaralinskikom district of Karaganda region in the flowering stage. Aerial parts of the plant rue (*Thalictrum foetidum*) by chloroform extraction amount received extractives. Identification alkaloids conducted TLC. Structures of isolated alkaloid glaucine identified using modern physical and chemical methods and IR, PMR-spectra. ¹³C NMR spectra were recorded on spectrometers Vruker AC 200 [working frequency 200.13 (1H) and 50.32 MHz (¹³C)].

Key words: алкалоидтар, шикізат, глауцин, колонкалық хроматография, экстракт заттары, жер үсті бөлігі, хлороформ, спектр.

In general, about 70 % flora which grows on the surface of the earth comprises alkaloid plants. Mostly, alkaloids are spread in all zones of the Republic (forests, steppes, mountains and especially desert) or flora of Kazakhstan.

The physiological influence of alkaloids is great on human organism: it regulates the nerve and blood vessel system, breathing and digestion organs, increases the sensibility of nerve fiber, the tonus of muscle, etc. It has bacteriostatic and bactericidal effect. It is widely used to treat diseases of nervous system and internal organs, etc. In recent years, preparations in the type of precipitate, infusion, residue taken from plants consisting of alkaloids, having alkaloids in the structure, not having other derivatives in the structure are widely used [1].

Hydrogen bromide salt of diterpene alkaloid lapakonitin «Allapinin» preparation taken from plant has contraindication for arrhythmia and medicinal preparation with the highest activity in regulation of the beat of heart while making clinical research, on the basis of desoksipeganin medicinal preparation «Desoksipeganin hydrochloride» is made to treat the nerve system as the result of disturbance of the blood circulation and other preparations are used in medicine.

The separation of alkaloids from raw plant materials, investigation of them, the development of taking new effective medicinal preparations on the basis of chemical transformation are important considering the broad spectrum of physiological activity of alkaloids.

The small amount of natural and specially grown plants of abundant stock of Kazakhstani flora is used in medicine and investigation of their chemical structure is going to be the important problem. At present, taking new medicinal substances is developing on the basis of enormous chemical research work of plant structure [2].

In spite of it, conducting biochemical research work of the structure of the plant and taking biologically active derivatives with the use of chemical modification oriented on the materials separated from plant is very important and it is one of the actual problem from scientific and practical point of view. According to this, an interest is increased to the alkaloids representative of different structural types as perspective medicinal preparations providing the broad spectrum of biological activity. The highness of their reaction capacity is formed as the source of taking different compounds.

The above mentioned types of the sort of *Thalictrum fetid* related to the family of widely used *Ranunculaceae* in the world are used in folk medicine, and its medical properties are very high [3].

7 types from 9 *Thalictrum* which grows in Kazakhstan are researched: *Thalictrum alpinum* L., *Thalictrum flavum*., *Thalictrum foetidum* L., *Thalictrum isopyr*., *Thalictrum longip*., *Thalictrum minus*., *Thalictrum simplex* L.

Spread. Fetid *Thalictrum* — Eurasian type of diffusive-disjunctive areal. In Kazakhstan it is met in Ertys, the forest of Semey, shallow hills of East, Karkaraly, Altai, Tarbagatai, the regions of Zhongar Alatau, Ile Alatau, South Alatau, Kyrgyz Alatau. And in general, it is spread in European parts of CIS, Caucasus, West and East Siberia, Far East, Central Asia, Western Europe, Western Mediterranean sea, Balkan, Asia Minor, Turk Armenia, Iran, Western China, Mongolia, Tibet.

Fetid *Thalictrum* is mesophytic and petrophyte plant. It grows in forestry bushy subalpine belt and stone parts of mountains. Resources: its stock has not been counted, but it is mostly met in enormous slopes of Tien-Shan, in north part of Kazakhstan.

Preparation of raw material and gathering. The herb of *Thalictrum* is prepared in blossoming stage of the plant and after the dried dew. The stem of the plant is cut 20 sm. It is proposed that the raw material of the plant should be gathered only once from one place in 2 years. The dried raw material should be broken easily. It slightly smells with its leaves and buds. The taste of raw material should not be tasted, because Fetid *Thalictrum* is a poisonous plant.

Chemical structure. There are alkaloids (0,7 %), fetidin, magnoflorin, talfin, talfinin, 1 % flavonoids, coumarins, triterpenoid glycosides, organic acid, palmate herb in earth surface part.

The use in medicine. «Fetidin» residue and preparation is used in hypertonic diseases of 1 and 2 stage. Except this, fetidin alkaloid has an influence on inflammation and swelling [4].

The use method and amount. Precipitation of the herb is taken by 15–20 drop for 2–3 times a day in 70 % spirit in the early stages of hypertonic diseases. This precipitate positively influences in disturbance of angina and the circulation of blood.

As an infusion: 10 gr raw material of 1 glass is boiled in water, 1 tablespoon is taken 3–4 times a day in dyspepsia and stomachache, liver complaint and jaundice, different types of phlebotomize (nose, lung, uterus, etc.).

Precipitate: 1 glass of hot water is poured in 1 tablespoon of raw material, then kept 10–15 min., and it should be accepted 3–4 times a day until having a meal. It is also used in arthritis and arthrosis.

The use in folk medicine. It is used in internal and external phlebotomizes, treat wounds, rashes, purulent wounds.

As a basic object of our research *Thalictrum foetidum* L. plant is taken. Except this, 7 types of *Thalictrum* is met in the flora of Kazakhstan. There are curved thalictrum, heap thalictrum, general thalictrum, yellow thalictrum similar to the use in folk medicine, spread and chemical structure of *Thalictrum foetidum* L. plant. The height is 20–70 sm, covered by small hairs, it is the bushy plant of many years with negative smell. The stem of the root is short, located horizontally with a lot of small additional stems. The lower part of the stem is ash-colored, height is 15–65 sm, the basis of the stem does not have leaf, the middle and top parts have leaves. The form of leaves is triangle, the length is 20 sm, width is 15 sm, short grafted, complex striped, it has three and four pinnate. It has a lot of leaves with round-oval form.

The bunch of flowers is friable fringed broom with the length 30 sm and width 3–20 sm. The flowers are small, located in flower's graft with the length 0,5–4 sm, the number of flower's leaves is 4–5, like a form of egg with length 3–4 mm, width 1–2 mm ash-colored. It has a lot of stamen, they 2,5–3 times higher than the pistillum, it has yellow pollens. Fruit is like an egg or a nut in oval form as an egg, it is flattened out with the length 2–3,5 mm, width 1,5–2,3 mm, it has hairs, it is oval, the point of the fruit is vertical or slightly curved.

Common characteristics of Thalictrum foetidum L. plant

Ranunculaceae Juss

Thalictrum foetidum L.



Figure. *Thalictrum foetidum* L. plant

It blossoms in June-July, bears fruit in July and August. It expands by its fruit in a vegetative way. The results of the tests are presented in Table 1.

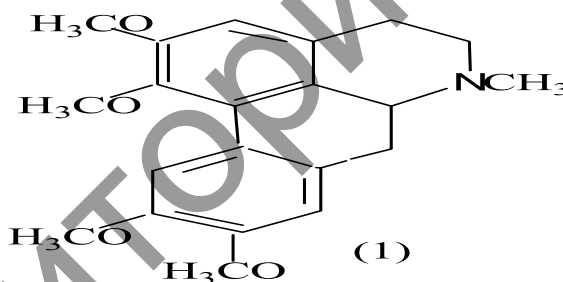
Table 1

The morphological peculiarities of *Thalictrum foetidum* L.

Parts of the plant	The name of the plant <i>Thalictrum foetidum</i> L.		The period of blossoming
Root	The stem of the root is located horizontally with a lot of small additional stems.	Complex flower family. Plant of many years with the height 25–35 sm It grows in forestry bushy sub-alpine belt and stone parts of mountains.	It blossoms in June-July. It bears fruit in July and August
Stem	The basic stem does not have leaf, and the middle and top parts have leaves.		
Leaf	The form of leaves is triangle, short grafted, complex striped, it has three and four pinnate.		
Flower	The flowers are small with the length 0,5–4sm, ash-colored. The number of flower's leaves is 4–5, oval like a form of egg.		

Isolation of alkaloid glaucine from the *Thalictrum foetidum* L. plant

The earth surface part of *Thalictrum foetidum* L. plant gathered in blossoming phase in Karagandy district, Karkaraly region is researched. Glaucine (1) *Thalictrum foetidum* L. plant is isolated from the earth surface part.



Aluminium peroxide (Active level II) is used for column chromatography, iodine evaporation, Silufol UV-254 and Silicagel on Aluminum, 20X. is used for thin layered chromatography.

The fuse temperature is defined in Boethius apparatus. IR-spectrum is reacted with Vektor-22 KBg in Fourier-spectrophotometer. NMR ^{13}C spectrums Bruker AC 200 [frequency of the work 50.32 MHz (^{13}C)] and Bruker DRX 500 [frequency of the work 125.76 MHz (^{13}C)] are reacted in 5 % CDCl_3 or CD_3OD liquid.

Rinsing a chloroform:

The earth surface part of 900gr raw material dried in an air is processed with sodium liquid. The raw material is rinsed four times with 200ml chlorophorm. The liquid of retrogressive deposition of chlorophorm is distilled in vacuum. The rest of retrogressive deposition is processed with 5 % 50ml sulphurous acid. Sulphurous compound is rinsed two times with 100ml chlorophorm, retrogressive deposition of chlorophorm is separated by separating funnel. The taken retrogressive deposition of chlorophorm is distilled in vacuum, 0,12gr (1,3 % to the raw material dried in air) extractive compound is separated (Table 2).

Consumption comprises 400 mg (0,05 %). Structure $\text{C}_{21}\text{H}_{25}\text{NO}_4$, fuse temperature 115–117°C. IR — spectrum (KBg ν , cm^{-1}): 846, 950, 975, 1005, 1121, 1161, 1200, 1228, 1318, 1392, 1440, 1535, 1595, 1600, 2850, 2930, 2958.

PMR-spectrum (200MHz, CDCl_3 , δ , m.d./Hz): 3.0, (3H, c., N- CH_3), 3.35 (2H, tr., J =6, H-5), 3.87, 3.96, 3.99, 4.0 (3H, c, OCH_3), 6.79, 6.98, 7.1, 7.23 (1H, c, H-3, H-8, H-11)

Table 2

Physical-chemical constants of glaucine and its derivatives

Natural source	Formula of Brutto	R _f	Fuse temperature	Consumption
<i>Thalictrum foetidum</i> L plant	C ₂₁ H ₂₅ NO ₄	0,3	115–117°C.	0,05 %

1. Absorbation of liquids in chromatographic paper

5x10 sm «Silufol» siliceous gel lamina is used to define the clearness of taken compounds. The length of 10 sm strip is cut from chromatographic lamina. The line 1–2 sm is drawn in two sides of the paper, 2–2,5 sm two dots are defined in succession. A small amount of liquids that defines with different microsyringe having the capacity 1mkl Hamilton is poured in these dots. Glaucine is poured in one dot, extractive object compound is poured in the second dot. After 1 drop poured in dot having been dried, the second dot is poured and it is dried in the current of air.

2. The location of chromatogram in chromatographic camera

Pipe from paper is made in order to take «high moving» chromatogram. The paper made as the pipe is located in poured side of standard liquid drops and defined side of chromatographic vessel. The bottom of vessel is filled with hexane and ethyl acetate (1:3) liquid. The paper should not be located near the wall of camera. The vessel is closed with glass cover. The isolation of compounds is conducted in ethyl acetate – hexane (3:1) system.

The appearance of chromatogram

In 10 minutes, 9 sm of dissolving lamina is risen to the earth. Chromatogram is taken from camera in definite time, and it is dried in air for 10 minutes. After this, chromatogram is put in camera with crystal iodine (5 minut). After that saturated KMnO₄ liquid is splashed with pulverizer to open chromatogram in lamina. Chromatogram is washed with water. The brown stain is appeared on its surface. It defines researched compounds comparing the condition of location of stains from standard alkaloid glaucine in researched extractive object compounds.

4. Isolation of the objects using column chromatography method:

The height is 70 sm and diameter 30 mm column is filled with 100 gr aluminum peroxide of second degree. 0,11 gr extractive object compound is put with 3gr aluminum peroxide. The column is eluted with ethyl acetate –hexane (1:2), fractions are gathered in 50ml retort. Paraffin is separated from the distillation of the first 4–5 fraction in retort. The colorless crystal object (1) is taken while eluting the column with ethyl acetate –hexane (3:1) compound. The consumption comprises 400 mg (0,05 %).

According to the information of IR-spectrum, it is proved that the connection related to methyl group, aromatic ring, methylated fragments in glaucine molecule is 2930, 1600, 1440, 2850, 2599, 2700 cm⁻¹. Comparing the physical-chemical constants and spectrum information (IR spectrum) with literature, it is defined that taken compound is alkaloid glaucine.

NMR ¹H (200MHz, CDCl₃, δ, m.d J/Hz): 3.13, 3.50 (3H, c., N-(CH₃)₂), 2.99 (2H, tp., J=13.5, H-5), 3.80 (1H, d., 1=5.0, H-6), 3.72, 3.87, 3.93, 3.94 (3H, c. OCH₃), 6.93, 7.06, 8.00 (1H, c, H-3, H-8, H-9) ¹³C-NMR spectrum data are shown in Table 3.

Table 3

Information of (1) ¹³C NMR spectrum of glaucine molecule (acetone –d₆, 125.76 mHz., δ/m.d., J/Hz)

The number of atom	δ/m.d.
1	2
C-1a	126.17
C-1B	126.96
C-3	111.99
C-3a	124.76
C-9	149.98
C-10	147.06
C-11	113.45
C-1	155.54
C-2	150.6
C-8	112.01

1	2
C-11a	120.72
C-6a	70.85
C-7	44.25
C-7a	128.62
OMe	55.55
	56.62
	56.80
	60.87
N-CH ₃	30.50

In conclusion, the earth surface part of *Thalictrum foetidum* L plant gathered in blossoming phase in Karagandy district, Karkaraly region is researched, the structure of taken compounds is defined. The method of rinsing a chloroform is used with the aim of taking extractive compounds from *Thalictrum foetidum* L plant. The isolation of separate objects from extractive compounds is realized using the method of column chromatography in siliceous gel.

References

- 1 *Машковский М.Д.* Лекарственные средства. — М.: Новая волна: Изд. Умеренков, 2012. — 216 с.
- 2 *Солдатенков А.Т.* Основы органической химии лекарственных веществ. — М.: Мир, 2007. — 107 с.
- 3 *Головкин Н., Руденская Р.Н., Трофимова И.А., Шретер А.И.* Биологически активные вещества растительного происхождения. — М.: Наука, 2001. — 764 с.
- 4 *Wu Yang-Ckang, Lu Sneng-Tek.* Aporphinoidnye Cytotoxic alkaloids from *Thalictrum sessile* // *Phytochemistry*. — 1988. — No. 27. — P. 1563–1564.

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Қарқаралы аймағында кездесетін марал оты (*Thalictrum foetidum*) өсімдігінің алкалоидтық құрамын зерттеу

Мақалада Қарағанды облысы Қарқаралы аймағында гүлдеу фазасында жиналған марал оты (*Thalictrum foetidum*) өсімдігінің жер үсті бөлігі зерттеліп, алынған қосылыстардың құрылысы анықталды. Марал оты өсімдік шикізатынан экстрактивті заттар қосындысын алу мақсатында хлороформды шаймалау әдісі қолданылды. Қосылыстардың тазалығы жұқа қабатты хроматографиямен «Silufol» пластинкасында бақыланды. Бөлініп алынған алкалоид глауциннің құрылысы қазіргі заманғы физика-химиялық әдістер және ИК, ПМР-спектрлері арқылы анықталған. ЯМР ¹³C спектрлері Bruker AC 200 құралында түсірілген.

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Изучение алкалоидного состава василистника (*Thalictrum foetidum*), встречающегося в Каркаралинском регионе

Изучено растение (*Thalictrum foetidum*) василистник, собранное в Каркаралинском районе Карагандинской области в фазе цветения. В надземной части василистника методом хлороформной экстракции были получены суммы экстрактивных веществ. Идентификация алкалоидов проведена тонкослойной хроматографией. Структуры выделенного алкалоида глауцина идентифицированы с привлечением современных физико-химических методов и ИК-, ПМР- спектров. Спектры ЯМР ¹³C, отмечено в статье, снимали на спектрометрах Bruker AC 200 [рабочие частоты 200.13 (¹H) и 50.32 МГц (¹³C)].

References

- 1 Mashkovskii M.D. *Drugs*, Moscow: Novaya volna: Umerenkov Publ., 2012, 216 p.
- 2 Soldatenkov A.T. *Basics of organic chemistry of medicinal substances*, Moscow: Mir, 2007, 107 p.
- 3 Golovkin N., Rudenskaya R.N., Trofimova I.A., Schroeter A.I. *Biologically active substances of plant origin*, Moscow: Nauka, 2001, 764 p.
- 4 Wu Yang-Ckang, Lu Sneng-Tek. *Phytochemistry*, 1988, 27, p. 1563–1564.

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