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Research Article

Quantum Method of Pharmacological studies of Biologically active substances (bav) of Medicinal plants with Antiviral and Endothelioprotective Properties

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Abstract

In this work, a comprehensive study of all medicinal plants with the yellow color of flowers is carried out. This morphologically valuable feature is color, associated with electromagnetic radiation (absorption), as the main factor in the formation of secondary metabolites (BAV). As a result of comparative analysis and quantum research methodology, we identified plant species that have a characteristic therapeutic characteristic - antiviral and have endothelioprotective properties.

Key words: medicinal plant, yellow color, quantum technique, medical characteristic.

Introduction

The specific characteristics of the metabolism of various plant species have determined their selective ability to accumulate chemicalsthat have high physiological activity at low concentrations - the so-called Biologically active substances (BAS). The physiological activity of substances can be considered both from the point of view of the possibility of their pharmacological study and medical use [1] , and from the point of view of maintaining the normal functioning of the human body [2] or giving a group of organisms special properties [3]. For example, *flavicin* (natural flavonoids) possessing endothelialprotective properties [4].

Secondary metabolites are the most important physiologically active compounds in the plant world. Their number, investigated by pharmacological science, is increasing every year. At the moment, only about 15% of all plant species have been studied for the presence of these substances.

Compounds of secondary metabolism, unlike primary metabolites, have functional significance not only at the level of the cell, but at the level of the tissue and cell of the whole plant. Most often, these substances perform "ecological" functions, i.e., protect the plant from various pests and pathogens, participate in the reproduction of plants, giving color and smell to flowers. and fruits, provide interaction of plants with each other and with other organisms in the ecosystem.

In this particular case, we consider flavonoids as compounds of secondary metabolism in the plant. The natural functions of flavonoids are poorly understood. It was assumed that due to the ability to absorb ultraviolet radiation (330-350 *nm**) and part of the visible light (520-560*** *nm**), they protect plant tissues from excess radiation. In mammals, flavonoids are able to change the activity of many metabolic enzymes [5].***

It has been established that in the irus SARS-CoV-2 is sensitive to ultraviolet irradiation with a dose of at least 25 mJ / cm^2 [6] In this range, absorption of ultraviolet light by a medicinal plant with yellow light is observed.

Numerous studies on the study of angioprotective and antioxidant properties of natural flavonoids, including diabetic micro- and microangiopathy, have revealed that flavonoids are among the promising groups with endothelialprotective effects. [7]

The aim of our study was to study the effect of flower color as specific characteristics of the metabolism of different plant species, which determined their ability to accumulate the chemicalM, the main flavonoid. Which flavonoids, in turn, have specific pharmacological properties.

Materials and Methods

The object of the study was any medicinal plants with a yellow color of flowers, as well as yellow - yellow, with the addition of a different color. **Yellow** - colors of electromagnetic radiation with wavelengths from 550 to 590 ***nm*** [8]

We take electromagnetic radiation (**absorption**) as the main factor in the formation of secondary metabolites, to which we apply the Quantum Research Methodology.

According to the special theory of relativity (SRT), there is a connection between mass and energy, expressed by Einstein's famous formula:

$$\boldsymbol{E = m. c_0^2} \qquad (1)$$

Where: $\boldsymbol{E}$ is the energy of the system; $\boldsymbol{m}$ is its mass; $\boldsymbol{c_0}$ **is** the speed of light in a vacuum.

In a vacuum, the energy and momentum of a photon depend only on its frequency ($\boldsymbol{v}$) equivalent, on the wavelength ($\boldsymbol{\lambda}$):

$$\boldsymbol{E_f = h_p . v} \qquad (2)$$

Where: - Photon (light) energy; $\boldsymbol{E_f h_p}$ - Planck's constant (6.624. **10^{-34} *j.s***); $\boldsymbol{v}$ - Wave frequencies

I consider the mass () $\boldsymbol{m_f}$ of a photon (officially, a term that goes out of use in quantum physics) to be equal to:

$$\boldsymbol{m_f = \frac{E_f}{{c_0}^2}} \qquad (3)$$

See: **Table 1** [9]

The pressure of electromagnetic radiation, **the pressure of light () is** the $\boldsymbol{P}$ pressure exerted by light (and in general electromagnetic) radiation incident on the surface of a body. [9]

The pressure of electromagnetic radiation [10] is a consequence of the fact that it, like any material object with energy$\boldsymbol{E}$ and moving at speed, also has $\boldsymbol{v}$a momentum:$\boldsymbol{p = E. v/c_0^2}$.

And since for electromagnetic radiation,$\boldsymbol{v = c_0}$

$$\boldsymbol{p = E/c_0}$$

Experimentally, light pressure was first studied by P. N. Lebedev in 1899. In electrodynamics, the pressure of electromagnetic radiation is described by the energy-pulse tensor of the electromagnetic field [11].

To calculate the pressure of light in the normal drop of radiation and the absence of scattering, the following formula can be used:

$$\boldsymbol{P = \frac{I}{c_0}\,(1 - k + \rho)} \qquad (4)$$

Where: I - intensity of incident radiation;

$\boldsymbol{c_0}$ - speed of light; $\boldsymbol{k}$ - transmittance;

$\boldsymbol{\rho}$ - Reflection coefficient.

The results of the experiment are satisfactorily consistent, but no longer with formula (4), but with its simplified (5) modification (!):$\boldsymbol{\rho = 0}$

$$\boldsymbol{P = E/c_0} \qquad (5)$$

Can be recorded: $\boldsymbol{P_{\text{отр}} = 2. P_{\text{пог}}}$ (6)

Where: $\boldsymbol{P_{\text{отр}}}$ - pressure reflective surface;

$\boldsymbol{P_{\text{пог}}}$ - pressure absorbing surface

We compare (5) with (6), you can write:

$$\boldsymbol{\frac{E_{\text{отр}}}{c_0} = 2. \frac{E_{\text{погл}}}{c_0} E_{\text{отр}} = 2. E_{\text{погл}}} \qquad (7)$$

Where: - energy $\boldsymbol{E_{\text{отр}}}$reflecting surface; $\boldsymbol{E_{\text{погл}}}$ **-** Energy absorbing surface

RESULTS AND DISCUSSION

According to the formula (1), (2) and (3), we will compile Table 1. From Table 1 - row "Color" "Yellow" we will make Table 2.

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Color	**Wavelength range** (***λ***), [***nm***]	Wave frequency range(***ν***), [***Hz***]1. **10^{14}**	Range Mass of photons **(m)** [**kg**]1. 10^{-36}	Photon **energy** range (***E***) [***eV***]
Infrared	770 - 40 000	**< 3,00**	2,206 - 0,3577	**< 1.24**
Red	**625- 740**	**4,05-4,8**	**3,52 - 2,99**	**1,68 - 1,98**
Orange	590 -625	**4,8-5,1**	3,74-3,52	**1,98 - 2,10**
Yellow	**565 – 590**	**5,1-5,3**	**3,89-3,74**	**2,10 - 2,19**
Green	500 – 565	**5,3-6,0**	4,14-3,89	**2,19 - 2,48**
Blue	485 – 500	**6,0-6,2**	4,56-4,14	**2,48 - 2,56**
Blue	440 – 485	**6,2-6,8**	5,01-4,56	**2,56 - 2,82**
Violet	380 – 440	**6,8-7,9**	5,81-5,01	**2,82 - 3,26**
Ultraviolet	0,1- 400	2,998.10^4- 7,50	22 071,1 – 5,511	**12 398–3,1**

Table 1 - Correspondences of lengths, frequencies, mass and energy of electromagnetic radiation and colors

Latin	**Name**	**Latin**	**Name**
1. Achillea clypeolata S.S.	Yarrow yellow shield-shaped)	60. Jasminum fruticans L.	Jasmine shrub
2. Adonis vernalis L.	Adonis spring	61. Kickxia spuria (L.) Dum.	Kixia real
3. Agrimonia eupatoria L.	Common turnip	62. Lactuca serriola L.	Compass lettuce
4. Ajuga chamaepitys (L.) Schreb.	Tenacious elut	63. Lathyrus pratensis L.	Meadow chin
5. Anemone ranunculoides L.	Buttercup windmill	64. Lepidium perfoliatum L.	Pierced bedbug
6. Anethum graveolens L.	Garden dill	65. Linaria vulgaris Mill.	Common flaxseed
7. Anthemis tinctoria L.	Pupavka dye	66. Lotus corniculatus L.	Lyadvenets horned
8. Anthyllis would violate L.	Common ulcer	67. Melilotus officinalis (L.) Pall.	Donnik officinalis
9. Aristolochia clematitis L.	Kirkazon	68. Oenothera biennis L.	Biennial donkey

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10. Artemisia absinthium L.	Wormwood	69. Parsnip sativa L.	Parsnip
11. Asparagus officinalis L.*	Pharmacy asparagus	70. Potentilla anserina L.	Goose lapchatka
12. Astragalus glycyphyllos L.	Astragalus sweet-leaved	71. Potentilla erecta L.	Lapchatka erecta
13. Barbarea vulgaris R. Br.	Common meadowsweet	72. Potentilla reptans L.	Creeping lapchata
14. Berberis vulgaris L.	Common barberry	73. Prangos ferulacea (L.) Lindl.	Prangos
15. Bidens tripartite L.	Three-part series	74. Primula etalior Hill.	Primrose tall
16. Brassica (Sinapis) nigra Koch	Black mustard	75. Primula vulgaris Huds. (P. acaulis Jacq.)	Common primrose
17. Brassica juncea (L.) Czern. et Coss.	Sarepta mustard	76. Primula veris L. (P. officinalis Jacq.)	Spring primrose
18. Bryonia alba L.	Step white	77. Pulicaria vulgaris Gaertn.	Bloshnica
19. Bupleurum rotundifolium L.	Round-leaved volodushka	78. Radiola rosea L.	Radiola pink
20. Caltha palustris L.	Swamp koluzhnitsa	79. Ranunculus acris L.	Buttercup caustic
21. Carthamus lanatus L.	Woolly Safflower	80. Ranunculus repens L.	Creeping buttercup
22. Cerinthe minor L.	Small waxer	81. Ranunculus would be L. (It would be verna Huds.)	Chistyak
23. Chelidonium majus L.	Celandine large, warthog	82. Reseda luteola L.	Reseda dye, cerva
24. Chrisosplenium alternifollum L.	Common spleen	83. Reseda lutea L.	Reseda yellow
25. Cnicus benedictus L.	Cnikus blessed	84. Rhinanthus minor L.	Small rattle

26. Colutea arborescens L.	Tree bladderwort	85. Rorippa pyrenaica (L.) Rchb.	Zherushnik Pyrenees
27. Cornu's mas L.	Common dogwood	86. Rubia tinctorum L.	Madder dye
28. Cotinus purpose coggygria.	Leather mackerel	87. Graveolens route L.	Fragrant rue
29. Descurainia sofia (L.) Webb.	Discurainiia of Sofia	88. Salix alba L.	White willow, vetla, whitewash
30. Digitalis grandiflora Mill.	Large-flowered bridge	89. Salix fragilis L.	Willow brittle
31. Digitalis lanata Ehrh.	Woolly obere	90. Sambucus racemosa L.	Elderberry tassel
32. Doronicum columnae Ten.	Doronicum	91. Scabiosa columbaria L.	Scabiosa pigeon
33. Erysimum diffusium Ehrh.	Jaundice spreading	92. Sedum acre L.	Ochitok caustic
34. Erysimum crepidifolium Rchb.	Jaundice toothed	93. Sedum maximum Suter	Big spruce, hare cabbage
35. Erysimum repandum L.	Jaundice notched-toothed	94. Senecio nemorensis L.	Oak crossbill
36. Euphorbia cyparissias L.	Milkweed cypress	95. Senecio jacobaea L.	Jacob's Cross
37. Filago arvensis L.	Field toad	96. Senecio vulgaris L.	Common crossbill
38. Filago vulgaris Lam.	Small toad	97. Sempervivum ruthenicum Schn.	Molodilo Russkoe
39. Foeniculum vulgare Mill.	Fennel vulgaris	98. Sideritis montana L.	Zheleznitsa gornaya
40. Galium verum L.	Real underbrush	99. Sideritis scardica Grsb.	Railway
41. Galium cruciatum Purpose.	Cruciform underbrush	100. Silena otites (L.) Wibel.	Smolevka long-eared
42. Genista tinctoria L.	Woodwax	101. Sisymbrium officinale (L.) Purpose.	Gulyavnik officinalis

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43. Genista segittalis L.	Drock lancet	102. Solidago virgaurea L.	Common goldenrod
44. Gentiana lutea L.	Gentian yellow	103. Stachys straight L.	Chisel Straight
45. The dotted gentian L.	Pinpoint gentian	104. Stachys annua L.	Annual cleaner
46. Geum montanum L.	Mountain gravilate	105. Tanacetum vulgare L.	Feverfew maiden, golden-flower maiden
47. Geum urbanum L.	Urban Gravilate	106. Taraxacum officinale Webber	Pharmacy dandelion
48. Glaucium flavum Cr.	Glaucium yellow	107. Telekia speciosa Bmg.	Telekia the Beautiful
49. Gnaphalium uliginosum L.	Sushenitsa topyana	108. Tilia grandifolia Ehrh.	Linden heart-leaf
50. Helychrisum arenarium Moench	Sandy cumin	109. Tilia parvifolia Ehrh.	Small-leaved linden
51. Heracleum sibiricum L.	Hogweed	110. Tilia tomentosa Moench	Lime pushy, lime voylocha
52. Hieracium pilosella L.	Hairy hawk	111. Thalictrum minus L.	Basilisk minor
53. Hyoscyamus niger L.	Black belena	112. Tragopogon pratensis L.	Meadow goat
54. Hypericum perforatum L.	St. John's wort perforated	113. Tribulus terrestris L.	Tribulus creeping
55. Hypochaeris maculata L.	Speckled grouse	114.Tussilago farfara L.	Coltsfoot
56. Inula germanica L.	Elecampane Germanic	115. Verbascum phlomoides L.	Woolly mullein
57. Inula britannica L.	Elecampane British	116. Verbascum thapsiforme Schrad.	Tupsoid mullein, tall mullein
58. Inula helenium L.	Elecampane high	117. Veratrum album L.*	Chemerica white
59. Iris pseudacorus L*	Yellow killer whale	118. Viscum album L.	White mistletoe

Table 2 - A complete list of plants with yellow flower flowers

Findings

1. Biologically active substances (BAV) of all medicinal plants Table 2, have high pharmacological antiviral, bactericidal, anti-inflammatory, antiseptic and insecticidal activity.

2. Looking at the equations (4), (5), (6), and (7) it turned out that the plants emitted yellow color of the flowers (in the energy range: 2.10 - 2.19 eV) absorb infrared light (in the energy range: < 1.24 eV), which light possesses some properties like: increasing the diameter of the vessels and improving blood circulation (improving endothelial function); activation of cellular immunity (antiviral activity) ; removal of tissue swelling and inflammation (improvement of endothelial function); relief of pain syndromes; improvement of metabolism; removal of emotional stress; restoration of water-salt balance; normalization of hormonal levels.

3. Quantum mechanisms and biological structures are related – their properties are uniform and/or supplemented. This connection can be established by creating a mathematical-physical-biological model, and in the future by studying their pharmacodynamic and pharmacokinetic properties, and behavior, through this model.

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QUANTUM METHOD FOR STUDYING THE PROPERTIES OF BIOLOGICALLY ACTIVE SUBSTANCES (BAS) IN MEDICINAL PLANTS

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Key words: medicinal plant, yellow color, quantum technique, medical characteristic.

Summary: In this work, a comprehensive study of all medicinal plants with yellow flowers is carried out. This morphologically valuable feature is color, associated with electromagnetic radiation (absorption), as the main factor in the formation of secondary metabolites. As a result of comparative analysis and quantum research methods, we have **identified** plant species that have the same therapeutic characteristics.