Levitsky A. P., Malinovskii V. A. Structural classification of vitamins P. Journal of Education, Health and Sport. 2025;83:64284. eISSN 2391-8306. https://dx.doi.org/10.12775/JEHS.2025.83.64284
https://apcz.umk.pl/JEHS/article/view/64284
https://zenodo.org/records/16561929

The journal has had 40 points in Minister of Science and Higher Education of Poland parametric evaluation. Annex to the announcement of the Minister of Education and Science of 05.01.2024 No. 32318. Has a Journal's Unique Identifier: 201159. Scientific disciplines assigned: Physical culture sciences (Field of medical and health sciences);
Health Sciences (Field of medical and health sciences). Punkty Ministerialne 40 punktów. Załącznik do komunikatu Ministra Nauki i Szkolnictwa Wyższego z dnia 05.01.2024 Lp. 32318. Posiada Unikatowy Identyfikator Czasopisma: 201159. Przypisane dyscypliny naukowe: Nauki o kulturze fizycznej (Dziedzina nauk medycznych i nauk o zdrowiu); Nauki o zdrowiu (Dziedzina nauk medycznych i nauk o zdrowiu).© The Authors 2025;
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The authors declare that there is no conflict of interests regarding the publication of this paper.
Received: 26.05.2025. Revised: 06.06.2025. Accepted: 17.06.2025. Published: 30.06.2025.

UDC 577.16+615.07+616.3+616.08+612.3

STRUCTURAL CLASSIFICATION OF VITAMINS P

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Abstract

It is proposed to classify the family of flavan-containing compounds depending on their chemical structure into 8 groups of vitamin P. Group I – flavanols, II – flavanones, III – flavones, IV – flavon-3-ols, V – anthocyanidins, VI – isoflavones, VII – chalcones, VIII – flavanlignans. Common properties for all groups of vitamin P are: increasing capillary resistance, antioxidant, anti-inflammatory and antimicrobial activity. It is necessary to study the dependence of biological and therapeutic and prophylactic properties of different groups of vitamin P on the features of the chemical structure.

Key words: vitamin P; structural classification of the vitamin P family.

Vitamin P was discovered by the Hungarian biochemist Albert Szent-Györgyi in 1936 [1, 2]. While studying the therapeutic effect of vitamin C (ascorbic acid) in experimental scurvy, he discovered the ability of flavonoid compounds to significantly increase the therapeutic activity of vitamin C. Therapeutic effectiveness was assessed by the ability to reduce bleeding, that is, to reduce the permeability of histohematic barriers.

This work by A. Szent-Györgyi was appreciated by the Nobel Committee by awarding him the Nobel Prize. Numerous studies conducted over several decades in different countries [3-6] have shown the presence of P-vitamin activity in almost all compounds based on the three-membered flavan ring (Fig. 1).

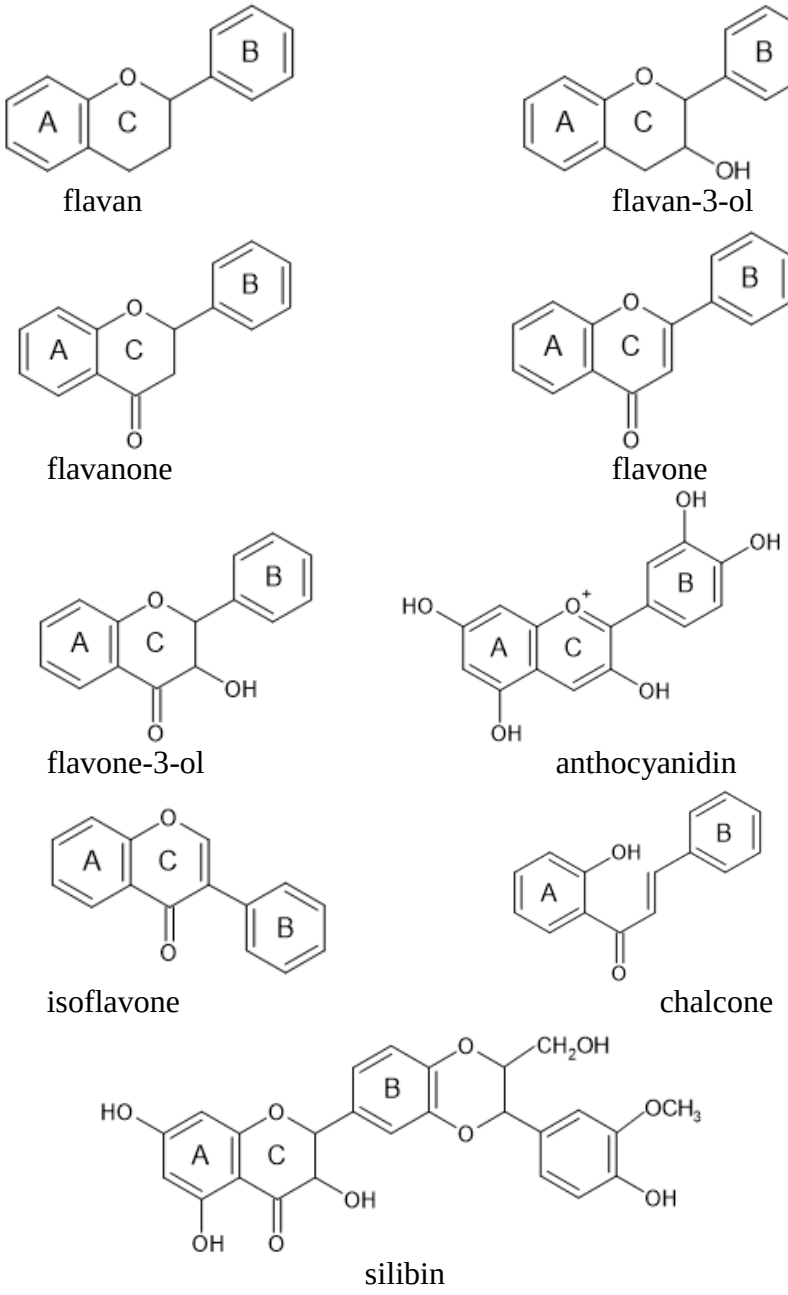

Fig. 1. Chemical structure of flavonoids

Very often, all flavan-containing compounds are called bioflavonoids [7]. It has been established that the spectrum of biological action of bioflavonoids is much wider than the effect on capillary permeability. All bioflavonoids have antioxidant properties [8-10], exhibit antimicrobial activity [11], and have an anti-inflammatory effect [12, 13].

One of the most important causes of inflammation development is stress [14, 15] (Table 1). Almost all flavan-containing compounds have an anti-stress effect [16-18].

Table 1. Etiological classification of human and animal diseases

№№	Group of diseases	Etiological factor	Condition of the body
1	Infectious	Pathogenic bacteria and viruses	immunodeficiency
2	Alimentary	Inadequate nutrition of the macroorganism and endogenous microbiota	deficiency of essential compounds in food, hyperphagia
3	Hereditary	Genetic disorders	deficiency of beneficial genes, excess of pathogenic genes
4	Stress induced	Stress	trauma, pain, intoxication, inadequate living conditions, excessive emotions

Based on the fact that the biological properties of any chemical compound depend on its structure, we propose dividing all flavan-containing compounds with P-vitamin activity into 8 groups depending on the structure of the flavan-containing compound (Table 2, Fig. 1).

Table 2. Structural classification of vitamins P (flavonoids)

Group of vitamins P	Chemical structure	Main representatives
P_1	flavanols	catechins
P_2	flavanones	hesperitin (hesperidin), naringenin (naringin)
P_3	flavones	apigenin, luteolin, chrysin
P_4	flavon-3-ols	quercetin (rutin), kaempferol
P_5	anthocyanidins	cyanidin, delphinidin
P_6	isoflavones	genistein (genistin), daidzein (daidzin)
P_7	chalcones	phloretin
P_8	flavanlignans	silybin, isosilybin, silicristi

In the future, much work remains to be done to study the biological and therapeutic and prophylactic properties of different groups of vitamin P depending on their chemical structure.

Author Contributions

The authors agree to equal distribution of partial participation.

Funding

This study received external funding.

Informed Consent Statement

Informed consent was obtained from all subjects who participated in the study.

Data Availability Statement

All information is in the public domain and specific graphic data can be obtained upon request from the corresponding senior author.

Conflicts of Interest

The authors declare that they have no conflicts of interest.

Acknowledgments

The study was carried out by the authors themselves without any outside assistance.

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