

Cardiac Glycosides and Their Practical Application in Reflection of a Number of Collectible Means

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Abstract

In this author's new research article, its author presents the obtained materials, conducted by him research, thematically devoted to the study of the issue, representation in the means of philately, philocart and numismatics, cardiac glycosides, including their representation in medicinal plants, as well as information about research scientists, including a number of famous practical doctors (from different countries of the world and different periods of history), directly engaged in the study of the issue of practical use of cardiac glycosides in their patients. The article presents: 86 philatelic screenshot copies; 36 philocart; 17 phaleristic, and 28 numismatic screenshot copies.

Aim of the article: The purpose of the research conducted by the author and the writing of his new research article based on the results obtained in it was to present the volume and quantity of thematic collection materials found (philatelic, philocart and numismatic), thematically dedicated to cardiac glycosides, in all their diversity, as well as the history of their discovery and practical application in medicine.

Research hypothesis : During the preparation of this thematic study, its author put forward a working hypothesis, the essence of which was that there may be a fairly significant number of the most diverse collection materials: philatelic, philocart, numismatic and phaleristic, which thematically may be devoted to a number of medicinal plants containing various cardiac glycosides, and images/portraits of a number of research scientists and practitioners who studied and used cardiac glycoside preparations in patients.

Method and materials of the study: In his research and writing this article, its author used such research methods as: literary-critical analysis of all available scientific and scientific-methodical materials, research articles of other authors, both domestic and foreign, also engaged in this issue, as well as Internet sites and Internet pages of philatelist collectors, philocartists, phalerists and numismatists engaged in collecting on medicine and medicinal plants, in particular. All found collection materials and their illustrative materials were transformed by the author of this research and article (using special computer programs) into black-and-white and color screenshot copies, which were subsequently used by the author as illustrative material in the appropriate places of the research article written by him. Also, the author, for strict observance of copyright, in the text of the article itself, placed appropriate links, places of borrowing (both text and illustrative), on the Internet.

Keywords: philately; philocart; numismatics; phaleristics; cardiac glucosides; medicinal plants; digitalis; corglycon, strophanthin; adonis vernalis; screenshot copies

Introduction

According to the author of this study, and the research article written based on its materials, all issues directly related to both medicine and pharmacy, their history and heroes, are always very relevant and in demand. The author devoted his new study thematically to the study of the issue of representation in a number of collecting tools (philately, philocart, phaleristics and numismatics), a number of medicinal plants, various cardiac glycosides, as well as the history of their discovery and practical application. For a better understanding of the nature and mechanism of action of cardiac glycosides, it is necessary to understand the nature of various cardiac glycosides contained in a number of different medicinal plants and to understand their mechanism of action and points of their application. Glycoside drugs

contained in a number of plants (45 species), as well as those obtained semi-synthetically or synthetically, have characteristic cardiotoxic activity and antiarrhythmic effect [1]. Cardiac glycosides are a group of drugs obtained from plant sources that have cardiotoxic and antiarrhythmic effects. They are used to treat heart failure and some types of arrhythmias, improving myocardial contractility and slowing the heart rate. Cardiac glycosides are complex, nitrogen-free compounds of plant origin that have cardiotoxic activity. They have long been used in folk medicine as decongestants. More than 200 years ago it was established that they selectively affect the heart, enhancing its activity, normalizing blood circulation, due to which they provide an anti-edematous effect [1]. The pharmacokinetic parameters of cardiac glycosides of different plants differ significantly. In particular,

cardiac glycosides such as digoxin and digitoxin are most often associated with foxglove and its species, spring adonis and lily of the valley. These glycosides are traditionally used in practical medicine, most often in cardiology, for the treatment of heart failure of varying severity and various types of arrhythmias. Also, in cardiological and pharmacological practice, there may be other types, for example, strophanthin from strophanthus or convalatoxin from lily of the valley [1]. Cardiac glycosides are able to inhibit the conduction of impulses along the cardiac conduction system, as a result of which the interval between contractions of the atria and ventricles is lengthened. By eliminating reflex tachycardia that occurs due to insufficient blood circulation (Wainbridge reflex), cardiac glycosides also help to lengthen diastole.

Cardiac glycosides primarily normalize hemodynamic parameters characterizing heart failure, while eliminating congestive phenomena: tachycardia and dyspnea disappear, cyanosis decreases, edemas are relieved. Diuresis increases [1]. Some cardiac glycosides have a sedative effect on the central nervous system (glycosides of adonis, lily of the valley). The diuretic effect of cardiac glycosides is mainly due to improved heart function, but their direct stimulating effect on kidney function is also important. The main indications for prescribing cardiac glycosides are acute and chronic heart failure, atrial fibrillation and flutter, paroxysmal tachycardia. An absolute contraindication is glycoside intoxication [1].

Adoniside preparations have a pronounced calming effect, in connection with which, Adoniside preparations are prescribed for neuroses, increased excitability (Bechterew's mixture). Strophanthus preparations are very well soluble in water, poorly absorbed from the gastrointestinal tract, therefore, taking them orally gives a weak, unreliable effect. They are loosely bound to blood plasma proteins, the concentration of free glycosides in the blood is very high. When administered parenterally, they act quickly and powerfully, do not linger in the body. Strophanthus glycoside - strophanthin, is usually administered intravenously (subcutaneous and intramuscular administration is possible). The effect is observed after 5-10 minutes; the duration of the effect is up to 2 days. Strophanthin is used for acute heart failure that occurs with decompensated heart defects, myocardial infarction, infections, intoxications [1]. Lily of the valley preparations are similar to strophanthus preparations in pharmacodynamics and pharmacokinetics. Korglikon contains a sum of lily of the valley glycosides and is used intravenously for acute heart failure (as strophanthin). Galenic preparation - lily of the valley tincture when taken orally has a weak stimulating effect on the heart and a calming effect on the central nervous system, can increase the activity and toxicity of cardiac glycosides [1].

The history of the discovery of cardiac glycosides is closely related to the study of the medicinal properties of various plants, such as foxglove (Digitalis). In 1775, William Withering, an English physician and botanist, described a case of successful treatment of dropsy (edema) with foxglove tincture. This became the starting point for further study and use of cardiac glycosides in medicine. By the end of the first third of the 20th century, the Russian scientist and physician B.E. Votchal isolated individual cardiac glycosides from plant materials, studied them, and began their widespread clinical use [1, 2]. In 1865, during an expedition deep into Africa, D. Livingstone and D. Kirk discovered the bradycardic effect of strophanthin, which Africans used as a poison, soaking arrows in it. The pharmacological effect of strophanthin on the heart was described by Professor E.V. Pelikan of the St. Petersburg Medical-Surgical Academy. The credit for the widespread introduction of strophanthin into the clinic (1904) goes to Frenhel, to whom a monument was erected for this in his homeland of Germany [1, 2].

Also, in the introduction of this article, I would like to define what cardiac glycosides are, what they contain, and also the object of their practical application. According to available historical data, digitoxin was isolated in 1875 from foxglove leaves by Oswald Schmiedeberg (1838-1921), a German pharmacist, professor of pharmacology, founder of the school of pharmacologists in Dorpat and Strasbourg. The drug "Korglikon" was developed in Kharkov by Professor Dmitry Grigorievich Kolesnikov (1904-1990). He also created the well-known drugs: "Raunatin", "Aymaline" and "Cordigit" [1, 2]. Strophanthin gained recognition faster than foxglove. Its march can be considered triumphant [1, 2]. A major center for the study of cardiac glycosides in Russia at the end of the 19th century was the clinic of S.P. Botkin, where the pharmacological laboratory was headed by I.P. Pavlov. It was he who actively studied the therapeutic effects of cardiac glycosides of lily of the valley, adonis, hellebore, studied Pavlov Ivan Petrovich (1849-1936). Lily of the valley "Herba Convallariae", containing cardiac glycosides. The medicinal properties of lily of the valley have been known since the 3rd-2nd millennium BC. Foxglove (purple, woolly, rusty) Digitalis purpurea, lanata, ferruginea. Foxglove was first described (c. 1550) by the Bavarian physician and professor of botany, Fuchs (Fuchsius) Leonard (1501-1566). The therapeutic effect of purple foxglove in congestive heart failure was discovered in 1785 by the English physician, Whithering William (1741-1799). A year later, he also described its toxic effect [1, 2]. In connection with these interesting facts, I would like to present several interesting artistic compositions dedicated to these famous Russian research scientists [3].



Figure 1: A selection of a number of compositions dedicated to scientists and doctors who studied cardiac glycosides and their effects

Results of the study and discussion

At the beginning of the presentation of the main materials of his research, the author considered it necessary to present a number of the most diverse collection (philately, philologist and numismatics) and short biographical materials dedicated to the famous doctor, diagnostician, researcher - Sergei Petrovich Botkin. Sergei Petrovich Botkin (September 17, 1832 - December

24, 1889) - Russian scientist, public figure, therapist, pathologist and physiologist, diagnostician and founder of clinical medicine. One of the first supporters of the doctrine of the integrity of the body [4]. This collection selection presents both philatelic and numismatic (commemorative table medals and coins), as well as phaleristic (commemorative award medals and badges) [5-13].



Figure 2: A selection of collection materials dedicated to S.P. Botkin

Further, in Figure 3, a small numismatic selection is presented, including silver and bronze medals, thematically dedicated to the memory of the English scientist-researcher, botanist, chemist, medical practitioner, who was actively engaged in the study of the properties of cardiac glycosides, William Withering [14, 15]. These are bronze and silver medals, presented both in the obverse and in the reverse, with a portrait of this scientist, face turned to the right and data about him, on the obverse, where his occupation, studying the properties of digitalis, is mentioned. And on the reverse of these

medals, a human heart is depicted, together with castings, stem and flowers of purple foxglove, which is written on the reverse of these commemorative medals [14-15]. Also in this same collection, on the obverse and reverse, is a silver Slovak medal with a portrait of William Withering on the obverse, and on the reverse, it is indicated that this commemorative medal was minted in memory of the symposium in honor of digitalization, which took place in Ljubljana, 17-18.11. 1966 [15].



Figure 3: Numismatic collection of commemorative medals dedicated to William Withering and his study of digitalis

Next, in Figure 4, I would like to present postage stamps from a number of countries around the world, thematically dedicated to *Digitalis purpurea*, *Digitalis lanata* and *Digitalis ambigua* [16-24, 84, 86, 87]. Род растений Наперстянка (*Digitalis*) относится к семейству подорожниковых (*Plantaginaceae*). Около 25 видов распространены в Европе, Северной

Африке и Западной Азии. Наперстянка красная (*Digitalis purpurea*), впервые описанная в 1753 году шведским натуралистом Карлом Линнеем, растет в Западной и Центральной Европе, а также в некоторых частях Северной Африки [97].



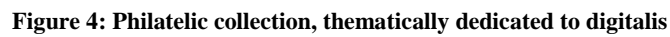
[illegible]



Figure 5: Digitalis purpurea as reflected in a number of philatelic means

Figure 6 shows a small numismatic collection, also thematically dedicated to foxglove (*Digitalis purpurea*), represented in the form of flowers of this medicinal plant on the obverse of these commemorative coins (thaler), and a silver Canadian coin, executed in the style of modern color printing (2017) [35, 36].



Figure 6: Numismatic collection dedicated to *Digitalis purpurea*

Further, in Figure 7, a small thematic philatelic (postage stamps and a block of postage) and philocartical (colored art card) collection of images of medicinal plants (flowers and stems, with leaves) containing *Strophanthus*

sarmentosus; *Strophanthus gratus*; *Strophanthus caudatus*; *Strophanthus hispidus*, as well as a substance found in the African liana [37-39] is presented.



Figure 7: Philatelic selection of medicinal plants containing strophanthin

Further, in Figure 8, philatelic, philocartic and numismatic collections of collection materials are presented, thematically dedicated to such a medicinal plant containing its own cardiac glycoside alkaloid as *Adonis vernalis* [40-55].



Figure 8: Collection selection dedicated to the spring adonis (*Adonis vernalis*)

Continuing my story about medicinal plants containing cardiac glycosides, one cannot fail to mention lily of the valley (*Convallaria majalis*), which contains corglycon [56]. Figure 9 shows a small philatelic and phaleristic

selection of postage stamps of artistic cards from different countries of the world and different years of their issue, on the front of which lily of the valley is depicted [57-77].

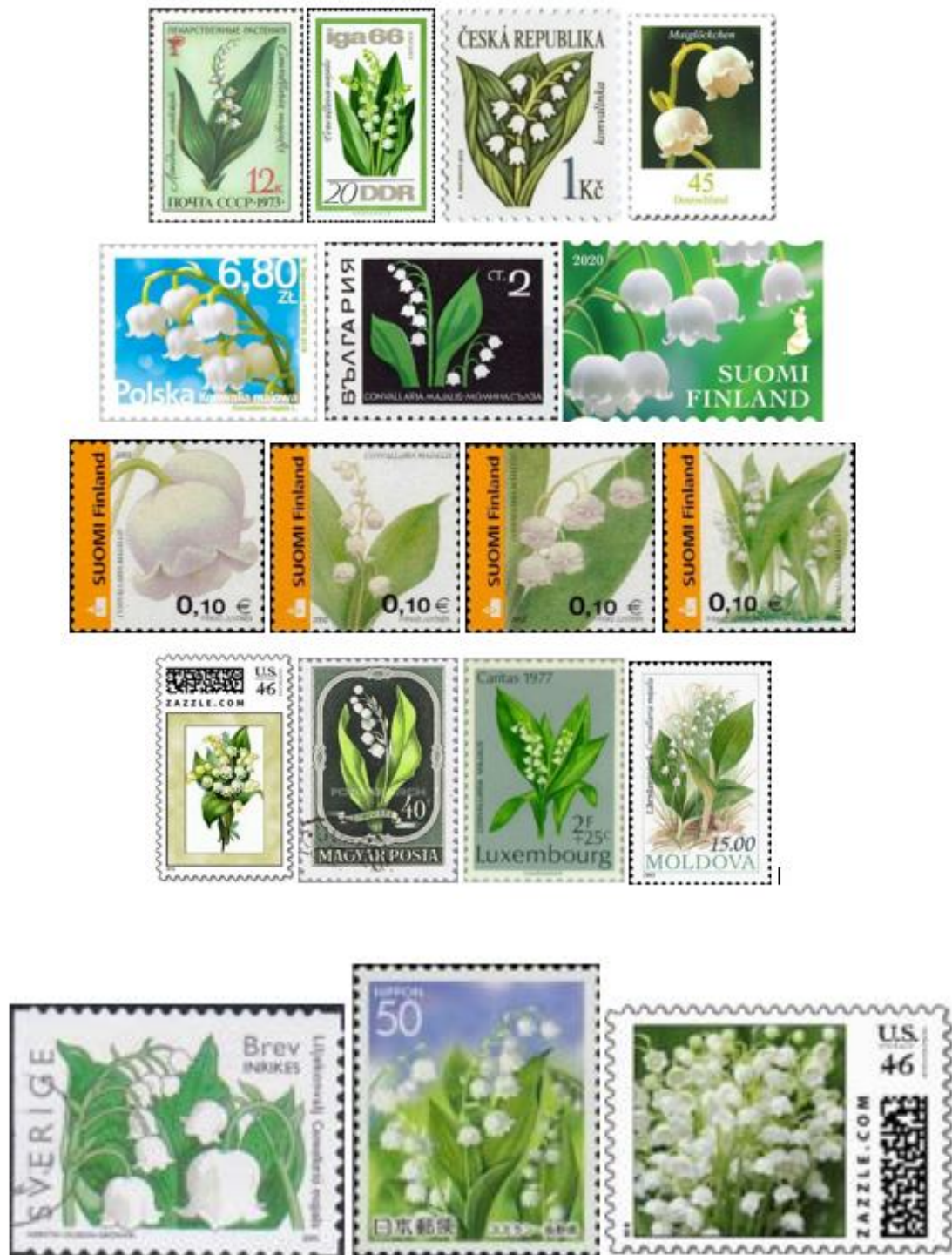






Figure 9: A selection of philatelic and philocartical materials dedicated to the lily of the valley

The following thematic figure 10 shows, in obverse and reverse, a small numismatic selection of coins with an image of the May lily of the valley (*Convallaria majalis*) on their front side [78-83].



Рисунок 10: Подборка нумизматических материалов, посвящённых ландышу майскому

Further, in Figure 11, a small phaleristic selection (thematic badges and brooches) is presented, with an image of the leaves and flowers of the lily of the valley [84-96].



Figure 11: Phaleristic selection dedicated to the lily of the valley

This concludes another author's research article, thematically devoted to both medical and pharmacological topics. The author is preparing a continuation of this topic, based on his new research.

Conclusions

1. The author of this article has quite fully, interestingly and fascinatingly covered a rather difficult topic for research,
2. The screenshots of postage stamps (postage stamps and envelopes), commemorative medals and phaleristic materials

concerning the issue of the representation of cardiac glycosides and a number of medicinal plants in which they are contained, as well as their practical application in practical medicine, in such means of collecting as philately, phaleristics, numismatics and philocarty.

(jewelry brooches) provided by the author as illustrations, as well as the presented selections of artistic, thematic cards, brightly and appropriately complemented the text of the article and decorated this research work.

3. Such auxiliary scientific and historical sciences as philately, phaleristics, numismatics and philocart, as well as a number of other methods and means of collecting, are quite capable of brightly, creatively, unconventionally, and in a fairly complete volume, presenting very interesting information, both for interested readers, and for those people who are seriously interested in various areas of collecting, and enriching their knowledge on the issue being studied.
4. In total, this article presents 167 collectible screenshot copies, including: 86 philatelic screenshot copies; 36 philocart; 17 phaleristic, and 28 numismatic screenshot copies.

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