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Plants of the *Amaryllidaceae* Family in Roman Veterinary Medicine Part 1: The Leeks (*Allium porrum* L.)

STRESZCZENIE

Rośliny z rodziny *Amaryllidaceae* w rzymskiej weterynarii Część 1: Pory (*Allium porrum* L.)

W Basenie Morza Śródziemnego pory były popularnym warzywem wykorzystywanym zarówno w kuchni, jak i medycynie. Wielu autorów wypowiedziało się na temat właściwości dietetycznych oraz medycznego zastosowania rośliny. Doceniano także jej walory smakowe, co potwierdzają liczne przepisy na dania z pora. W weterynarii por nie był wykorzystywany zbyt często niemniej w IV-wiecznych traktatach weterynaryjnych pojawiły się recepty leków zawierających sok z pora lub samą roślinę. Zgodnie z zaleceniami dodawano go m.in. do leków dla zwierząt cierpiących z powodu chorób układu oddechowego, w tym różnego rodzaju kaszlu, w przypadku obrzęków, zranień, krwawień, krwawych wymiotów lub problemów z oddawaniem moczu. W przypadku pora rodzaje chorób leczonych z jego wykorzystaniem przez weterynarzy nie odbiegały od tych leczonych u ludzi. Antyczni medycy podkreślali m.in. skuteczność rośliny w odniesieniu do chorób układu oddechowego, wskazywali działanie antykrwotoczne, pozytywne oddziaływanie na zmiany skórne itd. Sposób stosowania rośliny przez weterynarzy oraz medyków pokrywa się z ówczesną oceną zakresu jej działania. Różnica między jej stosowaniem w przypadku ludzi i zwierząt, widoczna jest jedynie w diecie. Ówczesni ludzie jedli pory często, pod różną postacią, natomiast zwierzętom hodowlanym podawano je jedynie w celach medycznych, nie wchodziły one w skład ich typowej, codziennej diety.

Słowa kluczowe: weterynaria antyczna, por, choroby, sok z pora, Wegecjusz Renatus, Pelagoniusz

ABSTRACT

IN the Mediterranean Basin, leeks were a popular vegetable used in cooking and medicine. Many authors have commented on the dietary properties and medical uses of the plant. Its taste was also appreciated, which is confirmed by the numerous recipes for dishes made with leek. In veterinary medicine, leek was not used very often, but veterinary treatises, prescriptions of medicines containing leek juice or the plant itself appeared in the 4th century. According to the recommendations, it was added, among others, to medicines for animals suffering from respiratory diseases, including various types of cough as well as in cases of swelling, wounds, bleeding, bloody vomiting or problems with urination. The types of diseases treated by veterinarians with the help of leek did not differ from those treated in humans. One of the aspects emphasized by ancient medics was the effectiveness of the plant for treating respiratory diseases, which was indicated by anti-haemorrhagic activity, a positive effect on skin lesions, *etc.* The method of using the plant by veterinarians and medics coincides with the assessment of its scope of activity at that time. The difference between its use in humans and animals is only visible in dietetics. At the time, people ate leeks often, and in various forms, while animals were only given leeks for medical purposes, as they were not part of the typical, daily diet of farm animals.

Keywords: ancient veterinary, leek, diseases, leek juice, Vegetius Renatus, Pelagonius

Leek (*Allium porrum* L.) is a species of biennial plant in the amaryllis family (*Amaryllidaceae*) and the garlic subfamily (*Allioideae*)¹. In the wild it is found in Asia Minor, but over time it has spread throughout the world. The biennial plant, including the inflorescence stem and umbels composed of white or white-pink flowers, grows up to two meters in height. It is usually grown as an annual plant for its stem and leaves. The plant contains many valuable components, including calcium, zinc, copper, iron, magnesium and potassium, as well as a number of compounds such

¹ *The Amaryllis family (Amaryllidaceae) are a family of monocotyledonous perennials. In the late 20th and early 21st centuries, the systematics of this family underwent significant changes. In systematic terms, APG III and APG IV include as the subfamilies: Amaryllidoideae, Allioideae and Agapanthoideae, previously treated as separate families. Cf. M.A. Ruggiero et al., A Higher Level Classification of All Living Organisms, "PLOS One" 2015, vol. X, no. 4, pp. 1–54; M.W. Chase, J.W. Reveal, M.F. Fay, A Subfamilial Classification for the Expanded Asparagalean Families Amaryllidaceae, Asparagaceae and Xanthorrhoeaceae, "Botanical Journal of the Linnean Society" 2009, vol. CLXI, pp. 132–136.*

as flavonoids (kaempferol), oligosaccharides, folic acid, vitamins C, E and K, antioxidants (lutein and zeaxanthin) and nicotinic acid. Sulfur compounds, which can be as high as 0.5% in the dry matter², are responsible for its characteristic smell. Unlike other plants of the *Amaryllidaceae* family, such as garlic (*Allium sativum* L.) and onions (*Allium cepa* L.), the leek has not yet been fully studied, but is nevertheless believed to be able to reduce oxidative stress problems³, leading to atherosclerosis, diabetes⁴, obesity⁵, rheumatism and allergies. Nowadays, it is also indicated to have positive effects in case of poisoning⁶, kidney stones⁷, urinary tract inflammation⁸,

² P. Dey, K.L. Khaled, *An Extensive Review on "Allium ampeloprasum". A Magical Herb*, "International Journal of Science and Research" 2015, vol. IV, no. 7, p. 373.

³ I. Arbi Nehdi, H.M. Sbihi, Ch. Ping Tan *et al.*, *Chemical Composition, Oxidative Stability and Antioxidant Activity of "Allium ampeloprasum" L. (Wild Leek) Seed Oil*, "Journal of Oleo Science" 2020, vol. LXIX, no. 5, pp. 413–421. Cf. J.D. Mladenović, P.Z. Mašković, R.M. Pavlović, *Antioxidant Activity of Ultrasonic Extracts of Leek "Allium porrum" L.*, "Hemijska Industrija" 2011, vol. LXV, no. 4, pp. 473–477; S.S. Moselhy, H.K. Ali, *Protective Effects of Allium Ampeloprasum Extract Against Carbon Tetrachloride Induced Oxidative Stress and Testis Injury in Rats*, "Biological Research" 2009, vol. XLII, pp. 93–98.

⁴ D. Deliorman Orhan, N. Orhan, *Assessment "In Vitro" Antidiabetic and Antioxidant Effects of "Helianthus tuberosus", "Cydonia oblonga" and "Allium porrum"*, "Turkish Journal of Pharmaceutical Sciences" 2016, vol. XIII, no. 2, pp. 181–188; S. Belemkar, K. Dhameliya, M.K. Pata, *Comparative Study of Garlic Species ("Allium sativum" and "Allium porrum") on Glucose Uptake in Diabetic Rats*, "Journal of Taibah University Medical Sciences" 2013, vol. VIII, no. 2, pp. 80–85.

⁵ A. Movahedian, H. Sadeghi, A. Ghannadi *et al.*, *Hypolipidemic Activity of "Allium porrum" L. in Cholesterol-fed Rabbits*, "Journal of Medicinal Food" 2006, vol. IX, no. 1, pp. 98–101; A. Movahedian, A. Ghannadi, H. Sadeghi *et al.*, *Study of Leek ("Allium porrum" L.) Extract on Cholesterol Plasma Levels in Hyperlipidemic Animal*, "Asia Pacific Journal of Clinical Nutrition" 2004, vol. XIII, pp. 102–103.

⁶ A. Mirzaei, H. Delaviz, M. Mirzaei, M. Tolooei, *The Effects of "Medicago sativa" and "Allium porrum" on Iron Overload in Rats*, "Global Journal of Health Science" 2015, vol. VII, no. 7, pp. 137–142.

⁷ M. Eidi, E. Hajian, H. Abbaspour, *Effect of Hydromethanolic Extract of "Allium porrum" L. Seed on Treatment of Ethylene Glycol-induced Kidney Stone in Male Rats*, "Journal of Sabzevar University of Medical Sciences" 2018, vol. XXIV, no. 6, pp. 63–69.

⁸ S.Z. Mosavian, A. Eidi, J.Z. Moghaddam, *Evaluation of the Diuretic Effects of Leek ("Allium porrum" L.) Extract in Adult Male Wistar Rats*, "Qom University of Medical Science Journal" 2015, vol. IX, no. 6, pp. 10–16.

cough and skin lesions⁹; its antiseptic and antibacterial effects¹⁰ have also been confirmed.

The plant was already known in ancient Mesopotamia¹¹, Egypt¹², and Phoenicia, and was a popular, widely cultivated vegetable in the Mediterranean¹³. The ancients harvested both wild plants¹⁴ and cultivated them. In antiquity, two methods of growing leeks were known: 1) one that propagated the white part of the stems, thus obtaining *porrum capitatum*, or the so-called leek head, and 2) one that obtained as many green leaves as possible – this was *porrum sectile*, or leafy leek¹⁵.

⁹ M. Alizadeh, S. Changizi-Ashtiyani, H. Hamidi, N. Gorji, *Topical Application of the Hydroalcoholic Extrat of "Allium porrum" L. as a Novel Treatment for Common Warts Based on Persian Medicine*, "Journal of Kerman University of Medical Sciences" 2018, vol. XXV, no. 1, pp. 93–100.

¹⁰ B. Radovanovic, J. Mladenovic, A. Radovanovic *et al.*, *Phenolic Composition, Antioxidant, Antimicrobial and Cytotoxic Activities of "Allium porrum" L. (Serbia) Extracts*, "Journal of Food and Nutrition Research" 2015, vol. III, no. 9, pp. 564–569; H.F.S. Akrayi, J.D. Tawfeeq, *Antibacterial Activity of Lepidum Sativum and Allium Porrum Extracts and Juices Against Some Gram Positive and Gram Negative Bacteria*, "Medical Journal of Islamic World Academy of Science" 2012, vol. XX, no. 1, pp. 10–16.

¹¹ S. Ermidoro, *Food Prohibition and Dietary Regulations in Ancient Mesopotamia*, "Aula Orientalis" 2014, vol. XXXII, no. 1, pp. 79–91; J. Bottéro, *The Cuisine of Ancient Mesopotamia*, "The Biblical Archaeologist" 1985, vol. XLVIII, no. 1, pp. 36–47.

¹² P. Ashok Shelke, S. Mansha Rafiq, Ch. Bhevesh *et al.*, *Leek ("Allium ampeloprasum" L.)*, [in:] *Antioxidants in Vegetables and Nuts – Properties and Health Benefits*, eds G.A. Nayik, A. Gull, Singapore 2020, pp. 309–331; K.R.M. Swamy, R. Veere Gowda, *Leek and Shallot*, [in:] *Handbook of Herbs and Spices*, vol. III, ed. K.V. Peter, Boca Raton 2006, pp. 365–389.

¹³ E. Birlouez, *Garlic, Onion and Other Alliaceae: Historical and Cultural Approach*, "Phytothérapie" 2016, vol. XIV, no. 3, pp. 14–148.

¹⁴ Leek is not found in the wild today. The ancients harvested the perennial herbaceous plant *Allium ampeloprasum holmense*, found on the eastern Mediterranean coast. Cf. Ch. Guenaoui, S. Mang, G. Figliuolo, M. Neffati, *Diversity in "Allium ampeloprasum": from Small and Wild to Large and Cultivated*, "Genetic Resources and Crop Evolution" 2013, vol. LX, pp. 97–114.

¹⁵ Iunius Moderatus Columella, *On Agriculturae and Trees*, eds H.B. Ash, E.S. Forester, E.H. Heffner, London–Cambridge 1941–1955 – hereinafter: Columella, *Rerum rusticarum* (Columella, *Rerum rusticarum*, 11.3.30–32); Pliny, *Natural History*, vol. V (*Books 17–19*), transl. H. Rackham, Cambridge 1950 – hereinafter: Pliny, *Historia Naturalis* (Plinius, *Historia Naturalis*, 19.33); Palladius, *Opus agriculturae. De veterinaria medicina. De Institutione*, ed. R.H. Rodgers, Leipzig 1975 – hereinafter: Palladius, *Opus agriculturae* (Palladius, *Opus agriculturae*, 3.24.11–12).

The ancient Greeks called the leek *práson* or *práson kefalotón*, while the Romans used the term *porrum*. The accounts of ancient authors preserved not only descriptions of the appearance of the plant or ways of growing it¹⁶, but also gave recipes for its preparation¹⁷ and described its dietary and medical properties¹⁸.

In antiquity, leeks were commonly used as ingredients in cooking. The green leaves were added to salads, eaten raw, as a side dish for bread, but also used as an ingredient in broths and many other dishes¹⁹. Leeks also played a significant role in medicine. Although they were believed to have some negative effects, such as weakening of eyesight²⁰, and not recommended for people suffering from kidney disease or urethra ulcers, leeks were nevertheless considered to have generally beneficial effects on the human body. They were believed to be good for the digestive system²¹ and respiratory system, including diseases of the chest, trachea and lungs²², for

¹⁶ Columella, *Rerum rusticarum*, 11.3.30–32; Palladius, *Opus agriculturae*, 3.24.11–12.

¹⁷ Apicius, *A Critical Edition with an Introduction and an English Translation of the Latin Recipe Text Apiciud*, eds Ch. Grocock, S. Grainger, Blackawton–Totnes 2006 – hereinafter: Apicius, *De re coquinaria* (Apicius, *De re coquinaria*, 3.10.1–4); Anthimus, *On the Observation of Foods. De observatione ciborum*, ed., transl. M. Grant, Blackawton–Totnes 2007 – hereinafter: Anthimus, *De observatione ciborum* (Anthimus, *De observatione ciborum*, 55).

¹⁸ Galeni *De alimentorum facultatibus libri III*, [in:] Claudii Galeni *Opera Omnia*, ed. C.G. Kühn, vol. VI, Lipsiae 1923 – hereinafter: Galen, *De alimentorum facultibus* (Galen, *De alimentorum facultatibus*, 658, 11–658.17); Oribasii *Collectionum medicarum reliquiae*, ed. I. Raeder, vol. I–IV, Lipsiae–Berolini 1928–1933 – hereinafter: Oribasius, *Collectiones medicae* (Oribasius, *Collectiones medicae*, 2.27.1.1–4.5); Paulus Aegineta, *Corpus Medicorum Graecorum vol. IX*, ed. I.L. Heiberg, vol. I–II, Lipsiae–Berolini 1921–1924 – hereinafter: Paulus Aegineta (Paulus Aeginatus, 1.76.1.16–19); *Geoponica sive Cassiani Bassi Scholastici de re rustica eologiae*, rec. H. Beckh, Lipsiae 1895 – hereinafter: Cassianus, *Geoponica* (Cassianus, *Geoponica*, 12.29).

¹⁹ M. Kokoszko, K. Jagusiak, *Warzywa w kuchni i dietetyce późnego antyku oraz wczesnego Bizancjum (IV–VII w.): perspektywa konstantynopolińska*, “Piotrkowskie Zeszyty Historyczne” 2011, vol. XII, no. 1, pp. 34–52. Cf. M. Kokoszko, *Leek*, [in:] *Dietetyka i sztuka kulinarna antyku i wczesnego Bizancjum (II–VII w.)*, part 2 (*Pokarm dla ciała i ducha*), ed. M. Kokoszko, Łódź 2014, pp. 208–212.

²⁰ Pedanii Dioscuridis Anazarbei *de materia medica libri V*, ed. M. Wellmann, vol. I–III, Berolini 1906–1914 – hereinafter: Dioskurydes, *Materia Medica* (Dioskurydes, *Materia Medica*, 2.149.2.6–3.1).

²¹ Q[uintus] Gargilius Martialis, *Medicinae ex holeribus et pomis*, ed. B. Maire, Paris 2002 – hereinafter: Gargilius, *Medicinae*. Gargilius mentioned speeding up digestion (Gargilius, *Medicinae*, 21.8).

²² Plinius, *Historia Naturalis*, 20.21; 20.22; Gargilius, *Medicinae*, 21.6; 21.15.

those suffering from tuberculosis²³, for people vomiting blood²⁴, for stopping hemorrhage²⁵, for diseases of the female reproductive system²⁶; they were said to bring relief in cases of bites by venomous or rabid animals²⁷, ear diseases²⁸, skin lesions²⁹, ulcers³⁰, lumbar pain³¹ and urinary problems³². They could also be used to purify blood³³. The cited opinions clearly show that the ancients attributed a very wide range of properties to this plant. Ancient medics agreed that leeks are by their nature pungent, they warm the body, dilute juices that are too thick and viscous, promote urine and blood production³⁴.

The purpose of this paper is to discuss an issue that has not been previously examined in source literature, namely the use of plants of the *Amaryllidaceae* family in Roman veterinary medicine. Due to the significant number of plants from this family that found use in ancient veterinary medicine, the topic will be presented as a series of articles. The first one concerns leek (*Allium porrum* L.), a plant which, as has been mentioned, belongs to the garlic subfamily (*Allioideae*). In the Mediterranean, leeks were once common both in the wild and as cultivated plants, so their potential application in animal treatment and nutrition was relatively easy and inexpensive. An interesting question is how leeks are used in veterinary medicine, identifying similarities and differences between diseases treated with them in animals and in humans. The similarities and possible differences in the treatments are interesting and important because ancient veterinary medicine

²³ Dioscurides, *Materia Medica*, 2.149; Gargilius, *Medicinae*, 21.19.

²⁴ Plinius, *Historia Naturalis*, 20.22; Gargilius, *Medicinae*, 21.2.

²⁵ Dioscurides, *Materia Medica*, 2.149.3; Plinius, *Historia Naturalis*, 20.21; Gargilius, *Medicinae*, 21.10–12.

²⁶ Hippocrates, *De morbum mulierum*, B II. C. 89; Plinius, *Historia Naturalis*, 20.22; Gargilius, *Medicinae*, 21.3; Paulus Aeginata, 1.47.1.1–5.

²⁷ Dioscurides, *Materia Medica*, 2.149; Plinius, *Historia Naturalis*, 20.21; Gargilius, *Medicinae*, 21.13–14; Aetius, *Libri medicinales*, 6.24.1–162.

²⁸ Dioscurides, *Materia Medica*, 2.149; Plinius, *Historia Naturalis*, 20.21; Gargilius, *Medicinae*, 21.16–17.

²⁹ Dioscurides, *Materia Medica*, 2.149; Plinius, *Historia Naturalis*, 20.21.

³⁰ Plinius, *Historia Naturalis*, 20.21; 20.22; Gargilius, *Medicinae*, 21.5.

³¹ Gargilius, *Medicinae*, 21.18.

³² Aetii Amideni *Libri medicinales I–VIII*, ed. A. Olivieri, Lipsiae–Berolini 1935–1950 – hereinafter: Aetius, *Libri medicinales* (Aetius, *Libri medicinales*, 5.129.1–31).

³³ Aetius, *Libri medicinales*, 3.56.1–2.

³⁴ M. Kokoszko, K. Jagusiak, *op. cit.*, pp. 34–52.

grew out of medicine, gradually becoming an independent discipline, with its own separate terminology and treatment methods. In many cases, the same plants or minerals were used differently to treat animals and humans, while others were used in the same way. Often the obvious differences were a direct result of the properties of certain substances, which, for example, were toxic to certain species of livestock, while having no such effects in humans. Nevertheless, in many cases such reasoning is inapplicable.

The primary sources for the study of issues relating to the diagnosis and treatment of animals in ancient Rome are agronomic or veterinary works. The first, very sparse, references to the treatment of animals were provided by Cato the Elder, but as far as the works by agronomists are concerned, the principal contributors to the study of the subject were Columella³⁵, followed by Palladius³⁶ and Gargilius Martialis³⁷. It was not until the 4th century that three works were written, which we can consider typical ancient veterinary textbooks. *Mulomedicina Chironis*³⁸, as well as the works by Pelagonius³⁹ and Vegetius Renuatus⁴⁰ presented animal diseases and treatments in a much broader context than any of the earlier works; nevertheless, unlike agronomic authors – who discussed diseases of most livestock species – these writers focused primarily on horses.

In veterinary medicine, leeks were used in a number of different forms. Leek juice was relatively popular. Mixed with olive oil and administered *per os*, it was part of the treatment recommended by Vegetius Renuatus for damage to the horse's shoulder blades⁴¹. A similar treatment was recommended by Pelagonius, who wrote: "et post triduum deinde usque in diem sextum porri sucus instar trium cyathorum mixtus cum olei hem faucibus per cornu infudatur"⁴². Mechanical injuries were relatively common, hence the numerous

³⁵ Columella, *Rerum rusticarum*, 11.3.30–32.

³⁶ Palladius, *Opus agriculturae*, 3.24.11–12.

³⁷ *Curae boum ex corpore Gargili Martialis ap[ud] P[ubli] Vegeti Renati digestorum artis mulomedicinae libri*, ed. E. Lommatzsch, Lipsiae 1903, pp. 307–310.

³⁸ Claudii Hermeri, *Mulomedicina Chironis*, ed. E. Oder, Lipsiae 1950 – hereinafter: *Mulomedicina Chironis*.

³⁹ Pélagonius Salonianus, *Recueil de Médecine Vétérinaire*, ed. V. Gitton-Ripolli, Paris 2019 – hereinafter: Pelagonius, *Ars Veterinariae*.

⁴⁰ P. Vegeti Renati, *Digestorum Artis Mulomedicinae Libri*, ed. E. Lommatzsch, Lipsiae 1903 – hereinafter: Vegetius, *Mulomedicina*.

⁴¹ Vegetius, *Mulomedicina*, 2.45.2.

⁴² Pelagonius, *Ars Veterinariae*, 43.

prescriptions for medicines used in such situations. In most cases, preparations were applied topically, so the administration of the remedy in the form of a drink was not that common. The preparation mentioned by Pelagonius and Vegetius could not realistically cure the animal, however, the beliefs of the ancients regarding the effectiveness of leek in stopping hemorrhages, nerve pains or skin problems may have contributed to such choice of ingredients.

Leek juice mixed with barley flour and oil was considered an effective remedy for old (persistent) cough in cows⁴³. A similar preparation, based on leek juice and oil, was also recommended by Palladius and Vegetius for long-term cough in horses⁴⁴. A drink prepared from the juice of the leafy part of leek with oil and wine was also part of the treatment recommended for a disease in steers, described by Palladius as lung abscess⁴⁵. According to the agronomist's beliefs, the last stage of the disease was tuberculosis. Leek juice as a method of treating cough was also suggested by Pelagonius⁴⁶. The recipes cited by Palladius, Pelagonius and Vegetius Renatus clearly recommend leek juice in cases of broad respiratory diseases in cattle and horses. The plant was also considered effective against such diseases by ancient medics, so the fact that it was also used in a similar way in animal husbandry and veterinary medicine should come as no surprise. The use of wine as one of the main ingredients was typical in antiquity, as the beverage was believed to have medicinal properties⁴⁷. Equally common in medicinal drinks was the use of oil, which – especially in the case of swallowing problems – facilitated the administration of the preparation.

Respiratory diseases in livestock still pose a significant problem today. Naturally, it is now difficult to identify clearly exactly what “disease” ancient authors mention. The drug was used to control long-lasting cough in both cattle and horses, nevertheless cough is not a disease in itself, but only a symptom of many respiratory conditions, including tuberculosis, which, according to Palladius,

⁴³ Vegetius, *Mulomedicina*, 4.7.

⁴⁴ Palladius, *Opus agriculturae*, 14.23.2; cf. Vegetius, *Mulomedicina*, 2.132.8.

⁴⁵ Palladius, *Opus agriculturae*, 14.14.2.

⁴⁶ Pelagonius, *Ars Veterinariae*, 108.

⁴⁷ M. Kokoszko, K. Jagusiak, *Galen o winie, czyli o śladach pewnej preferencji*, “Piotrkowskie Zeszyty Historyczne” 2019, vol. XX, no. 2, pp. 9–29; eorundem, *Woda, wino i tak dalej, czyli o napojach i trunkach w Konstantynopolu*, “Przegląd Nauk Historycznych” 2010, vol. IX, no. 1, pp. 25–54.

among others, was the last stage of lung disease. The recommended preparation was unlikely to cure the condition, especially if it was bacterial in origin, but the ingredients used may have contributed to diminishing the symptoms, due in part to the presence of oil having a positive effect on irritated mucosal tissue.

In case of a slight cough, the animal could also be given scoops prepared from boiled, well mashed leeks mixed with *herba parietaria*⁴⁸. Pelagonius also recommended a preparation of similar composition in case of light cough⁴⁹. The proposed method of treatment fits in with the use of leek considered effective in respiratory diseases. The method of administration seems somewhat unusual, since the ancients did not feed leeks to livestock. It is likely that the deviation arose from the medical purpose of the preparation.

A drink based on boiled leek heads, Carian figs, Alexandrian soda, wine and oil was recommended for a type of swelling referred to as *tumor*⁵⁰. Vegetius mentioned that the disease was characterized by swelling of the throat and head, said to resemble angina. Apparently it was so troublesome that it left animals unable to eat or drink. Treating respiratory diseases with leeks was popular in antiquity. Leeks have a bactericidal effect, so they may have provided relief for lighter inflammations. The oil added to the preparation probably made it easier to swallow, and wine was commonly believed to have medicinal properties. It is now known that heating leek diminishes the effect of its individual ingredients, so the method of preparation recommended by ancient authors definitely reduced the effectiveness of the mixture.

The juice from sliced leek was used for nostril bleeding in horses⁵¹. Vegetius cited excessive exertion due to running as its cause, which is very likely⁵². In addition, he mentioned, among other things, veins broken due to heat and exertion, so the diagnosis seems accurate, and rinsing the nostrils with leek juice may have yielded good results due to its bactericidal effect⁵³.

⁴⁸ Vegetius, *Mulomedicina*, 2.129.12. Scoops were coated in beaten egg and rose oil or honey and wine. They were administered for three days.

⁴⁹ Pelagonius, *Ars Veterinariae*, 76.

⁵⁰ Vegetius, *Mulomedicina*, 2.28.

⁵¹ *Ibidem*, 1.54.

⁵² A. Żak, N. Siwińska, A. Niedźwiedź, *Wyptyw z nosa u koni – diagnostyka różnicowa*, "Życie Weterynaryjne" 2016, vol. XCI, no. 6, pp. 428–435.

⁵³ H.F.S. Akrayi, J.D. Tawfeeq, *op. cit.*, pp. 10–16.

Leek juice mixed with *lixivium* and oil was also recommended when the animal vomited blood⁵⁴. Vomiting is only a symptom of many conditions. The presence of a large amount of fresh blood can indicate, among other things, bleeding from the upper gastrointestinal tract, inflammation of the esophagus, trauma, presence of a foreign body in the esophagus or throat, parasitic disease, stomach ulcers, *etc.* In such cases, it is necessary, first of all, to establish the cause and apply the appropriate treatment. Leeks were also administered to horses suffering from *impressione sanguinis*⁵⁵.

The use of this plant for bleeding in animals corresponds with the suggestions of ancient physicians and botanists who wrote about the properties of leeks. The ancients believed them to be effective in bleeding, nevertheless, in the cases described, the presence of blood was only a symptom of a condition. While if the bleeding resulted from minor injuries leek juice certainly did no harm, and due to its bactericidal effect could even be helpful, in the case of more serious conditions the treatment could not be successful.

In case of urination problems in a horse, one of the methods recommended by Vegetius was to squeeze the juice of cooked leeks, mix it with wine and oil and pour it into the animal's right nostril⁵⁶. Pelagonius made an identical recommendation in his work, stating: "porros decoques et sucum eorum exprimis ad sextarium et commisce vini veteris et olei acetabulum et dabis per narem deteram et daembulet"⁵⁷. Ancient medics, such as Aetius of Amida, also recommended leeks for urinary problems. In addition, modern research confirms the positive effects of the plant's juice on the urinary system, however, the procedure proposed by Vegetius and Pelagonius seems problematic due to the way the remedy is administered. Also important is the lack of a clear diagnosis. Urinary problems in horses can have many causes, including cystitis, lithiasis, *etc.* Without a specific indication of the cause, all attempts at treatment at best amounted to alleviating the symptom rather than curing the disease. Modern research, as mentioned, confirms the positive effect of leeks in urinary tract diseases, as well as their

⁵⁴ Vegetius, *Mulomedicina*, 2.77; cf. Pelagonius, *Ars Veterinariae*, 304.

⁵⁵ *Mulomedicina Chironis*, 243.

⁵⁶ Vegetius, *Mulomedicina*, 2.79.

⁵⁷ Pelagonius, *Ars Veterinariae*, 154.

bactericidal properties⁵⁸, but the plant needs to be properly prepared and administered. Moreover, such extracts or plant substances are nowadays introduced into treatment as an auxiliary method, rather than the primary medicine.

The juice of chopped leek mixed with water was given to horses suspected of experiencing kidney pain. The drink had to be administered after bloodletting from temporal vein. Among the symptoms of the disease, Vegetius lists cloudy urine, tense and hard bowels, raised tail and dragging of the hind legs. Leek juice mixed with water for kidney disease in horses was also recommended in *Mulomedicina Chironis*⁵⁹. The use of leek in such cases corresponds to the recommendations of ancient physicians.

Leek juice was also mentioned as an ingredient in a preparation recommended for *ad morbum*, meaning “an illness”⁶⁰. Pelagonius does not explain what kind of illness it is, nor does he cite any symptoms, thus we may presume that the proposed medicine belonged to the group of preparations administered at the appearance of any symptoms that might suggest a disease. In Roman veterinary medicine, there was a relatively large group of prescriptions of “medicines” considered effective for any disease, or recommended simply for an “illness” without specifying its precise name or at least its basic symptoms. The use of leek juice as an ingredient in the preparation should not come as a surprise, since, on the one hand, it was a readily available plant and, on the other, it was attributed a number of medicinal properties.

Ground leek with salt and horehound was considered an effective remedy for worms infesting neglected ulcers⁶¹. Cut leek was also included in a preparation applied to wounds in horses⁶². Its use, as an ingredient in a preparation for cleansing wounds, was also mentioned in *Mulomedicina Chironis*⁶³. The use of leek for ulcers and wounds in animals is very similar to its medical application. The aforementioned treatments were certainly not harmful, and in lighter cases could produce decent results, as leek has anti-septic and bactericidal properties, confirmed by modern research.

⁵⁸ S.Z. Mosavian, A. Eidi, J.Z. Moghaddam, *op. cit.*, pp. 10–16.

⁵⁹ *Mulomedicina Chironis*, 480.

⁶⁰ Pelagonius, *Ars Veterinariae*, 13.

⁶¹ Palladius, *Opus agriculturae*, 14.16.3; cf. Vegetius, *Mulomedicina*, 4.20.1.

⁶² Pelagonius, *Ars Veterinariae*, 317.

⁶³ *Mulomedicina Chironis*, 606.

Mulomedicina Chironis also suggested feeding leeks to horses diagnosed with the disease termed *insania*⁶⁴. The recommendation is very interesting, since the disease was also mentioned in other works, nevertheless none of the authors recommended feeding leeks to animals. In addition, the affliction, whose name we can translate as “insanity”, is difficult to identify. Considering the symptoms mentioned by ancient authors, rabies, a disease caused by ssRNA(-) virus of the *Rhabdoviridae* family⁶⁵, among others, should be taken into account. One of the reasons why *insani* can be associated with rabies is the fact that symptoms described by the ancients are identical to those linked to the disease termed *rabies* by the Romans⁶⁶. In addition, a number of diseases with central nervous system symptoms, which are still taken into account in the differential diagnosis to this day, including listeriosis, toxoplasmosis, Borna disease, Aujeszky’s disease, *etc.*, should be considered. All of the aforementioned diseases produce symptoms that can be mistaken for rabies in clinical diagnosis⁶⁷. An additional difficulty in diagnosis was the fact that both *Mulomedicina Chironis* and the work of Vegetius Renatus mentioned equine rabies. The disease is difficult to diagnose clinically because, among other reasons,

⁶⁴ *Ibidem*, 291.

⁶⁵ The virus exists in seven biotypes. The source of infection for terrestrial animals is primarily biotype one viruses, with other biotypes usually causing infections in bats. All biotypes are dangerous to humans. Cf. P.P. Liberski, J. Smoleń, T.J. Wąsik *et al.*, *Wścieklizna*, “Aktualności Neurologiczne” 2007, vol. II, no. 7, pp. 119–121; M. Sadowska-Todys, *Wścieklizna – aktualne problemy epidemiologiczne*, “Polski Przegląd Neurologiczny” 2006, vol. II, no. 1, pp. 37–42.

⁶⁶ Vegetius, *Mulomedicina*, 2.5; 2.11 (*rabies*). Cf. Vegetius, *Mulomedicina*, 2.12 (*insania*).

⁶⁷ Nowadays, despite much greater knowledge of rabies than in antiquity, clinical diagnosis based on history, evaluation of the epizootic situation and clinical symptoms is considered difficult and unreliable. For this reason, confirmation by laboratory testing is required. Cf. *Choroby zakaźne zwierząt z elementami epidemiologii i zoonoz*, eds Z. Głinski, K. Kostro, Warszawa 2011, p. 101. On the subject of diseases with symptoms similar to rabies, cf. Z. Głinski, A. Zmuda, *Choroba bornaska – tajemnicza choroba*, “Życie Weterynaryjne” 2021, vol. XCVI, no. 12, pp. 820–824; L. Adaszek, L. Mazurek, R. Janecki *et al.*, *Choroba Aujeszkyego (wścieklizna rzekoma) psów – mało znany problem*, “Weterynaria w Praktyce” 2019, vol. XVI, no. 9, pp. 62–65; Z. Głinski, K. Kostro, *Listerioza współczesnym zagrożeniem*, “Życie Weterynaryjne” 2012, vol. LXXXVII, no. 7, pp. 577–581; eorundem, *Choroba Aujeszkyego*, “Trzoda Chlewna” 2008, vol. XLVI, no. 11, pp. 94–96; J. Umiński, E. Cisak, J. Chmielewska-Badora, J. Zwoliński, *Toksoplazmoza u ludzi i zwierząt*, “Medycyna Weterynaryjna” 1999, vol. L, no. 12, pp. 589–591.

different animal species exhibit different symptoms and a different course⁶⁸. Interestingly, it was recommended that animals be given only leeks without any other additives, and that they should be fed that plant. Analyzing ancient agronomic accounts, we note that plants of the garlic subfamily, such as leeks, garlic and onions, for example, were not fed to livestock as fodder. To some extent, this may have been because animals were reluctant to eat them due to the taste and smell; moreover, these plants are simply harmful to some animals. Thus, the proposed treatment had no chance of success, both in the case of rabies – incurable to this day – and when symptoms were misinterpreted. The treatment is interesting, however, not least because a no such method was used for people diagnosed with rabies. The disease is still incurable⁶⁹, although

⁶⁸ Clinically, two forms of rabies are distinguished: 1) furious, presenting as strong aggression of the infected animal; 2) silent, also known as “paralytic”. The furious form is more common in dogs, cats and horses, while the silent form occurs in cattle and other ruminants. In the classic furious form, three stages of the disease are distinguished: 1) prodromal (onset) stage; 2) excitative (frenzied) stage; 3) paralysis. The silent form proceeds without the period of frenzied seizures. In the case of rabies, horses exhibit restlessness and gastrointestinal disorders similar to colic. The silent form resembles Borna disease in horses, while in the frenzied form the affected animals bite, kick and bump into stable walls. Muscle twitching, colic symptoms and frequent urination are also observed. In cattle, the initial stage of rabies has an unusual course and remains unrecognized even today. At this time, indigestion, decreased appetite, rumen atony, bloating, constipation and sometimes diarrhea are observed. Later, muscle twitching, rectal pushing, salivation, continuous and hoarse roaring, and paralysis of the hind limbs are evident. In the furious form, animals are anxious, attack obstacles and display excessive excitability. In sheep and goats, symptoms include restlessness, increased sex drive, hoarse bleating and collapsing. In pigs, rabies presents as anxiety and timidity, hoarse grunting, biting bedding, stupor and paralysis. Cf. *Choroby zakaźne zwierząt...*, pp. 99–100; Z. Gliniski, K. Kostro, *Choroby odzwierzęce w hodowli bydła. XI. Wścieklizna*, “Hodowca Bydła” 2005, vol. LV, pp. 44–46; E. Wiśniewski, *Niespecyficzne choroby koni podlegające obowiązki zwalczania. I. Wścieklizna*, “Magazyn Weteraryjny” 2001, vol. X, no. 6, pp. 40–41.

⁶⁹ Currently, there is no effective drug against rabies. In a person who has not developed symptoms, passive-active immunization is attempted, consisting of the administration of an antitoxin and a series of vaccines. A human who has developed symptoms is isolated and symptomatic treatment is administered. Animals infected with rabies are euthanized. In Poland, a total ban on treating animals suspected of having rabies is in force. Cf. P. Florczuk, J. Jarmuł-Pietraszczyk, *Wścieklizna ludzi i zwierząt – metody zapobiegania oraz wykorzystywanie szczepionki*, “Przegląd Hodowlany” 2016, vol. LXXXIV, no. 2, pp. 30–32; M.Z. Yousaf, M. Qasim, S. Zia *et al.*, *Rabies Molecular Virology, Diagnosis, Prevention and Treatment*, “Virology Journal” 2012, vol. IX, no. 1, pp. 1–5.

ancient texts provide numerous recommendations and prescriptions for potential remedies⁷⁰.

The cooked heads of leeks were also an ingredient in a preparation administered to mares after foaling. The preparation was used if it was suspected that the placenta did not come out in its entirety. The animal was not given any food for three days, only a medicine made from leek heads boiled in water with myrrh and wine⁷¹. The ingredients of the remedy are quite typical. After all, wine was widely regarded as effective in treating various health problems; myrrh was also added to many medicines⁷². Leek was used perhaps because of the belief that it helps to cleanse the body. Of course, in case of retained placenta, a possible bacterial infection required much stronger medications, unavailable in antiquity, as well as the removal of the remaining part of the placenta. In addition, in this case, cooking deprives the plant of most of its valuable properties.

Leeks were also added to the drink that Pelagonius and Vegetius recommended giving to horses during the summer⁷³. Pelagonius also mentioned leeks for a preparation given during the winter⁷⁴. It was also recommended that preparation made from leek heads should be brought while travelling⁷⁵. The green parts of the leeks, along with cumin and silphium, among others, were included in a medicine administered to horses suffering from dysentery⁷⁶. The presence of leeks in strengthening preparations is not surprising, since the ancients considered this vegetable to have a healthy, positive influence on the body.

⁷⁰ A. Bartnik, "Hydrophobia, λυσσα, λυπτα, rabies". *Kilka słów o tym, jak starożytni próbowali leczyć wściekliznę*, "Studia Antiquitatis et Medii Aevii Incohantis" 2016, vol. I, pp. 49–63.

⁷¹ *Mulomedicina Chironis*, 770.

⁷² M. Kokoszko, Z. Rzeźniczka, *Wino, ciemierzycza i mirra albo o lekarzach i ich pacjentach. Analiza fragmentu V księgi "De materia medica" Dioskurydesa*, "Przegląd Nauk Historycznych" 2018, vol. XVIII, no. 2, pp. 5–37; Z. Rzeźniczka, *Mirra w antycznej medycynie i kosmetyce na podstawie pism Dioskuridesa*, [in:] *Lek roślinny*, vol. VI (*Rośliny w lecznictwie, w środowisku naturalnym i w krajobrazie kulturowym*), eds B. Płonka-Syroka, A. Syroka, Wrocław 2017, pp. 53–65.

⁷³ Pelagonius, *Ars Veterinariae*, 371; cf. Vegetius, *Mulomedicina*, 1.57.

⁷⁴ Pelagonius, *Ars Veterinariae*, 388.

⁷⁵ *Ibidem*, 462.

⁷⁶ *Mulomedicina Chironis*, 429.

Analyzing the surviving accounts, we note that before the fourth century, leeks were virtually not mentioned as ingredients of veterinary medicines. A single piece of information was included only by Columella. An increased interest in this vegetable among veterinarians is evident only in the accounts of Palladius, Pelagonius, Vegetius Renatus and in the text titled *Mulomedicina Chironis*, although even in these works prescriptions of medicines containing leeks or leek juice are relatively scarce. In the case of animals, the plant was used as an ingredient in medicines for respiratory and urinary diseases, in case of bleeding or ulcers, which fits perfectly with the properties attributed to leek by ancient authors and the way it was used by physicians at the time. Undoubtedly, in the case of this vegetable, ancient farmers relied on the achievements of physicians and did not develop their own methods of using it. The possible effectiveness of some medicines that contained leek was largely counteracted by the way they were prepared. Most prescriptions recommended cooking the ingredients, which in the case of plants negatively affects their properties.

There is no doubt that doctors and veterinarians of the time used leeks in a similar way. The surviving prescriptions show no significant variations. What was different, however, was the treatment of this vegetable as food. In the Mediterranean Basin, leeks were very popular. They were eaten both raw and added to many dishes. In animal nutrition, despite its wide availability, leeks were not actually used. The few references to feeding the vegetable to animals are associated with medical procedures, rather than ordinary, everyday dietary recommendations. The absence of leeks in the diets of livestock probably has to do with the animals' reluctance to eat plants with a pungent taste. In addition, the aforementioned plants are harmful to some animal species, which excludes them from their diet. The popularity of leeks in the Roman diet may also have been a factor. Due to the high demand for this vegetable, it was irrational to feed animals a plant that could be sold at a considerable profit. Nowadays, plants of the garlic subfamily, among other things due to their antibacterial properties, are often added to fodder; still, these are usually granulations that do not affect the taste and smell of the food.

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