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The Pre-Galenic Science of Milk and Dairy Products — Celsus and Dioscorides: Selected Aspects

1. An introduction to the theory on milk and dairy products

Although milk was a significant constituent of the Mediterranean diet[1], its values were also appreciated in other regions of the ancient

[1] Regarding the regions initially uninfluenced by the Greek and then Roman culture, cf. E. Bresciani, *Nourritures et boissons de l'Égypte ancienne*, [in:] *Histoire de l'alimentation*, eds. J.L. Flandrin, M. Montanari, Paris 1996, p. 63, 65, 67; J. Soler, *Les raisons de la Bible: règles alimentaires hébraïques*, [in:] *Histoire*..., p. 73–74, 79; A. Spanò Giammellaro, *Les Phéniciens et les Carthaginois*, [in:] *Histoire*..., p. 91, 96, etc. As far as the Greek-Roman territory of the basin of the Mediterranean Sea, cf. W.A. Oldfather, *Homerica: I. akrēton gala, i 297*, CP 8.2, 1913, p. 195–212; F.E. Robbins, *"Unmixed Milk", Odyssey ix, 296–98*, CP 10.4, 1915, p. 442–444; J.O. Lofberg, *"Unmixed Milk" Again*, CP 16.4, 1921, p. 389–391; J. André, *L'alimentation et la cuisine à Rome*, Paris 1961, p. 153–155; K.F. Vickery, *Food in Early Greece*, Chicago 1980, p. 61, 89; M.-C. Amouretti, *Villes et campagnes grecques*, [in:] *Histoire*..., p. 138, 143; M. Corbier, *La fève et la murène: hiérarchies sociales des nourritures à Rome*, [in:] *Histoire*..., p. 218, 221, 227; A. Dalby, *Siren Feasts. A History of Food and Gastronomy in Greece*, London–New York 1996, p. 65–66; G. Sassatelli, *L'alimentation des Etrusques*, [in:] *Histoire*..., p. 186, 188, 191; T. Braun, *Barley Cakes and Emmer Bread*, [in:] *Food in Antiquity*, eds. J. Wilkins, D. Harvey, M. Dobson, Exeter 1999, p. 28–29; J.P. Alcock, *Milk and its Products in Ancient Rome*, [in:]

world[2]. There is a prevailing belief among scholars, however, that fresh milk was a relatively rare sight on tables in those days, since the people of the time opted for its derivative, i.e., cheese, as it kept significantly longer. This general pattern of consumption endured beyond antiquity and was equally typical in the early Middle Ages[3].

Since the times of Hippocrates ancient medicine was dominated by the opinion that proper nourishment played a major role in the process of maintaining and regaining good health. Therefore, it should come as

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Milk. Beyond the Dairy. Proceedings of the Oxford Symposium on Food and Cookery 1999, ed. H. W a l k e r, Totnes 2000, p. 31–33; C.A. D é r y, *Milk and Dairy Products in the Roman Period*, [in:] *Milk...*, p. 117–118, 121–124; J. A u b e r g e r, *Le lait des Grecs. Boisson divine ou barbare?*, DHA 27.1 2001, p. 131–157; A. D a l b y, *Food in the Ancient World from A to Z*, London–New York 2003, p. 217–218; G. M a l i n o w s k i, *Zwierzęta świata antycznego. Studia nad Geografią Strabona*, Wrocław 2003, p. 46; P. F a a s, *Around the Roman Table. Food and Feasting in Ancient Rome*, transl. S. W h i t e s i d e, Chicago 2005, p. 123–124; J.P. A l c o c k, *Food in the Ancient World*, Westport–London 2006, p. 82–83, 121, 154, 156, 160; J.M. W i l k i n s, S. H i l l, *Food in the Ancient World*, Malden, Mass.–Oxford 2006, p. 119, 161–162; W. C a v a n a g h, *Food Preservation in Greece during the Late and Final Neolithic Periods*, [in:] *Cooking Up the Past: Food and Culinary Practices in the Neolithic and Bronze Age Aegean*, eds. C. M e e, J. R e n a r d, Oxford 2007, p. 115; H. V e l t e n, *Milk. A Global History*, London 2010, p. 29–31, 41–42; A. D a l b y, *The Flavours of Classical Greece*, [in:] *Flavours and Delights. Tastes and Pleasures of Ancient and Byzantine Cuisine*, ed. I. A n a g n o s t a k i s, Athens 2013, p. 22; Ch. C h a n d e z o n, *Animals, Meat, and Alimentary By-Products: Patterns of Production and Consumption*, [in:] *A Companion to Food in the Ancient World*, eds. J. W i l k i n s, R. N a d e a u, Malden, Mass.–Oxford–Chichester 2015, p. 135–137; G. K r o n, *Agriculture*, [in:] *A Companion...*, p. 163; S. M i t c h e l l, *Food, Culture, and Environment in Ancient Asia Minor*, [in:] *A Companion...*, p. 286, 290; D.F. S m i t h, *Food and Dining in Early Christianity*, [in:] *A Companion...*, p. 364.

[2] M. S t o l, *Milk, Butter and Cheese*, BSA 7, 1993, p. 99–113; N. B a t m a n g l i j, *Milk and its By-Products in Ancient Persia and Modern Iran*, [in:] *Milk...*, p. 64–73, etc.

[3] C. P e r r y, *Medieval Arab Dairy Products*, [in:] *Milk...*, p. 275–277; I. A n a g n o s t a k i s, C. A n g e l i d i, *Ē byzantinē theōrēsē tou kyklou tou galaktos (100s–120s aiōnas)*, [in:] *Ē istoria tou ellēnikou galaktos kai tōn proiontōn tou I΄ triēmero ergasias Ksanthē, 7–9 Oktōbriou 2005*, Athena 2008, p. 199–209; I. A n a g n o s t a k i s, T. P a p a m a s t o r a k i s, *Agraulountes kai amelgontes*, [in:] *Ē istoria...*, p. 211–237; M. K o k o s z k o, Smaki Konstantynopola, [in:] *Konstantynopol – Nowy Rzym. Miasto i ludzie w okresie wczesnobizantyńskim*, eds. M.J. L e s z k a, T. W o l i ń s k a, Warszawa 2011, p. 487–489, 560–562; i d e m, *Rola nabiału w diecie późnego antyku i wczesnego Bizancjum (IV–VII w.)*, ZW 16, 2011, p. 8–28.

no surprise that ancient (and also Byzantine) physicians focused on milk and its derivatives in their deliberations[4], generating a set of beliefs that was shaped over centuries, which in Greek might be termed *galaktología iatriké*. This doctrine, in a form consolidated within two extant source texts from the 1st c. AD, will be the subject of my study.

2. Theory on milk and dairy products in the encyclopaedia *De medicina* by Aulus Cornelius Celsus

It seems fitting to commence our deliberations on milk not from a work written in Greek, but from a Latin treatise, since this is the earliest comprehensive depiction which I am familiar with of the medical science of milk prevailing before the 1st c. AD. Thus, the subject of the first part of the present text is the theory of milk included in the Latin work entitled *De medicina* and compiled by Celsus (Aulus Cornelius Celsus)[5], the Roman author of the *sui generis* encyclopaedia[6], who,

[4] Such interest can already be found in *Corpus Hippocraticum* – K. D e i c h g r ä b e r, *Zur Milchteratpie der Hippokratiker (Epid. VII)*, [in:] *Medizingeschichte in unserer Zeit. Festgabe E. Heischkel-Artel und W. Artel*, ed. H.H. E u l n e r, Stuttgart 1971, p. 36–53; M. C h r o n ē, *Ē panida stēn diatrofē kai stēn iatrikē sto Byzantio*, Athenai 2012, p. 201–226; M. K o k o s z k o, *Galaktologia terapeutyczna (γαλακτολογία ἰατρική) Galena zawarta w De simplicium medicamentorum temperamentis ac facultatibus*, PNH 14.2, 2015, p. 5–23. Modern applications of milk in folk medicine, cf. M. A b d a l l a, *Milk and its Uses in Assyrian Folklore*, [in:] *Milk*..., p. 9–18 (esp. 11–13).

[5] This extract includes the research included in the Polish article: M. K o k o s z k o, J. D y b a ł a, *Medyczna nauka o mleku (γαλακτολογία ἰατρική) zawarta w De medicina Celsusa*, PNH 15.2, 2016, p. 5–43, and its English versions: i i d e m, *Medical Science of Milk Included in Celsus' Treatise De medicina*, SCer 6, 2016, p. 323–353; i i d e m, *Milk in Medical Theory Extant in Celsus' De medicina*, JFSE 6.5, 2016, p. 267–279.

[6] Surely, Celsus must have been an amateur in the field of medicine – V. N u t t o n, *Ancient Medicine*, London–New York 2005, p. 5. And one of many in the Roman world, as we learn from Dioscorides (*filiatroúntes* – D i o s c o r i d e s, V, 19, 3, 2) and Galen (*filofármakos* – G a l e n, *De compositione medicamentorum per genera*, 636, 2, vol. XIII). The phenomenon of interest in medicine during the time of the Roman Empire has been fairly recently examined by Ido Israelowich (*Patients and Healers in the High Roman Empire*, Baltimore 2015, p. 73), also cf. C.F. S c h u l t z e, *Aulus Cornelius Celsus – Arzt oder Laie? Autor, Konzept und Adressaten der De medicina libri octo*, Trier 1999, *passim*.

under the reign of emperor Tiberius (14 AD – 37 AD), composed a work consisting of, in all probability, 26 books[7], only eight of which have survived until today[8].

From the perspective of studies on the role of milk, it is invaluable that the author of *De medicina* presents numerous thoughts on the contemporary diet of the day. This Roman scholar also indicated that this issue was of interest to the branch of medicine called dietetics, i.e., *diaitetiké*[9], which was divided into sub-branches, namely into speculative and empirical dietetics[10]. Following the methodology adopted by his Greek predecessors, Celsus felt obliged to present the most important types of food by compiling a relatively systematic description of their nutritive and curative functions, since he believed that both were tightly entwined, which, *nota bene,* was a centuries-old doctrine propagated by the Greeks, whose achievements this Roman author relied upon. Not surprisingly then, Celsus refers to a great number of Greek medical authorities[11], and his knowledge of Hellenic thought is also revealed in the Latinised terminology he uses[12].

The details of Celsus' teachings on milk and its derivatives are scattered throughout the treatise. Some can be found in Book II, which contains an interesting extract regarding detoxification procedures.

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[7] Their full content, apart from medicine, also focused on agriculture and animal husbandry, rhetoric, military art, philosophy and law.

[8] On Celsus and his work, cf. F. M a r x, *Prolegomena*, [in:] *Cornelii Celsi quae supersunt*, ed. F. M a r x, p. I–XXV; B.S. S p i v a c k, *A.C. Celsus: Roman Medicus*, JHM 46.2, 1991, p. 143–157; C. O s e r-G r o t e, *Celsus*, [in:] *Antike Medizin. Ein Lexikon*, ed. K.-H. L e v e n, München 2005, cols. 189–191; A. G a u t h e r i e, *Physical Pain in Celsus' On Medicine*, [in:] *'Greek' and 'Roman' in Latin Medical Texts Studies in Cultural Change and Exchange in Ancient Medicine*, ed. B. M a i r e, Leiden–Boston 2014, p. 137–154, etc.

[9] C e l s u s, I, *Proemium*, 9.

[10] C e l s u s, I, *Proemium*, 11.

[11] Cf. W. D e u s e, *Celsus im Prooemium von "De medicina": Römische Aneignung griechischer Wissenschaft*, [in:] *ANRW*, vol. II, 37, 1, Berlin–New York 1993, p. 819–841.

[12] D.R. L a n g s l o w, *Celsus and the Makings of a Latin Medical Terminology*, [in:] *La médecine de Celse. Aspects historiques, scientifiques, et littéraires. Mémoires du Centre Jean Palerne*, vol. XIII, eds. G. S a b b a h, P. M u d r y, Saint-Étienne 1994, p. 297–318; S. S c o n o c c h i a, *Aspetti della lingua di Celso*, [in:] *La médecine...*, p. 281–296.

The author informs the reader that were there to be a need to remove undesired substances from the body, either enemas or two types of oral medicaments could be used, i.e., laxative and emetic agents. Milk was classified among the first type in the second group, i.e., as a laxative. The desired effect could be triggered by animal milk (though not human), and more specifically by milk from donkeys, cows and goats, while its efficacy was intensified by adding salt to the milk. What we also learn from Celsus is that milk was considered a complex substance, in which the active agent is one of its constituent commonly known as whey (in Latin: *serum*, and in Greek: *or*[*r*]*ós*)[13]. The author also took the opportunity to explain the method used to separate curd from whey. This effect was obtained by the process of heating milk, which led to coagulation and thereby separation of the whey, which was later administered to patients. The writer also maintained that the procedure of purging the body by means of milk was considered safer than other approaches (since alternative methods entailed the application of substances characterised by a more radical effect). As a result, whey-based cleansing was prescribed for feverish patients. Finally, the author added that whey not only led to the softening of the intestines (the contents of which were excreted from the body), but it also possessed a nutritive function[14].

The passage presented above contains much important information. Celsus believed that milk was a mixture of, at least, two components, which made it a nourishing substance with an additional therapeutic effect. It must be emphasised that, even though the discussed excerpt contains no precise characteristics of either milk or its components, the author actually refers here to the medical theory in which these two components had been determined and accepted. Celsus indicates that milk curd possesses specific nutritional values which it shares with whey, and it is the combined virtues of both these products that contribute to the general esteem in which milk as a useful substance was held. From the fact that the author of *De medicina* particularly recommended whey for the purposes of purification of the gastrointestinal system,

[13] Cf. for instance – G a l e n, *De alimentorum facultatibus*, 684, 16 – 685, 6, vol. VI.
[14] C e l s u s, II, 12, 1 a–c.

it might be concluded that curd was commended as a substance which possessed different properties to *serum*. Since whey was described as an active laxative, it may also be surmised that curd was considered by physicians to have a constipatory effect. The text suggests that there is also some justification in supposing that the analogical characteristics could also be attributed to cheese made from curd, since it was a derivative. Thus, on the basis of this narrative, we could venture the conclusion that, as far as pharmacological properties were concerned, cheese could not be used as a laxative since it had the same properties as milk curd. It is also worth noting that one of the constituents of milk was never listed in the analysed extract; even though Celsus was undoubtedly well aware of its existence. This ingredient is fat, used to produce butter (Latin: *buturum/butyrum*). On the other hand, as butter had been, on numerous occasions, listed by Celsus among substances used in therapeutics, it must have been described in the theory on the basis of which his treatise was composed. The examined extract also makes it possible to conclude that milk itself could change its properties, depending on the percentage of the individual constituents. Their amount was conditioned by the type of milk (as suggested by the note that milk could be obtained from various animal species) and modified by the chosen processing technology. Last but not least, the therapeutic effect of milk could be intensified through the addition of other substances, e.g., salt – as mentioned by Celsus[15].

The formulated conclusions may seem exaggerated due to the generality of the analysed extract from *De medicina*. They are, however, fully confirmed in the fragment of the work in which Celsus discusses the role of foodstuffs as a significant element of diet, which, in fact, constitutes a catalogue of foods classified in accordance with the dominant characteristics of a given product (similar to the already mentioned catalogues composed by, for instance, Oribasius[16] and Aëtius of Amida[17]). It must also be added that the dietetic characteristics compiled by Celsus

[15] Salt intensified the purgative effect of milk.

[16] Cf. pages 6-9.

[17] As above.

refer, directly or indirectly, to all the aforementioned dairy products, with the exception of butter. Since butter was described exclusively in regard to its pharmacological properties, it can be concluded that the medical theory applied in *De medicina* treated it not as a foodstuff but as a medicament.

Let us now move on to present Celsus' doctrines as they appear in his treatise. Firstly, the author draws the reader's attention to the high nutritional value of milk[18], also including cheese in the same food group. Celsus confirms his absolute certainty on this point by qualifying baked cereal products which were prepared with dairy additives as an element of a diet with analogical properties[19]. He maintains that milk and soft (*mollis*, i.e., fresh) cheese belong to the group of foodstuffs with good juices (*boni suci* [*alimenta*])[20], whereas mature (*vetus*) cheese is categorised among those foodstuffs which were said to be characterised by bad juices (*mali suci* [*alimenta*])[21]. Milk is also classified as a food with delicate juices, devoid of any sharpness (*lenes*)[22] and considered a drink that thickens sputum (*crassiorem pituitam facit*)[23]. In addition, milk and all types of cheese are classified as foodstuffs that may upset the stomach (*aliena stomacho*)[24]. Moreover, any food which it is added to, including cheeses, is categorised as a class of food that sours easily (*facile/faciliter intus corrupta*) inside the stomach[25]. Next, Celsus returns to the subject he has already discussed in the introduction to *De medicina*, by reminding the reader that milk itself and any foodstuffs to which it is added accelerate bowel movements (*alvum movent*), i.e., they stimulate excretion[26]. Finally, we can also find information that cheese which is sharp in taste, no matter how this feature developed (as the author puts it, no matter whether it could be due to its age, a change in its properties

[18] C e l s u s, II, 18, 11.
[19] C e l s u s, II, 18, 2.
[20] C e l s u s, II, 20, 1.
[21] C e l s u s, II, 21.
[22] C e l s u s, II, 22, 2.
[23] C e l s u s, II, 23.
[24] C e l s u s, II, 25, 1.
[25] C e l s u s, II, 28, 1.
[26] C e l s u s, II, 29, 2.

during transportation[27], or boiling it in honey or water with honey[28]), has a constipatory effect, inhibiting the functioning of the digestive system (*astringit*)[29].

The selected milk products appear in yet another catalogue, this time within Book V of the analysed encyclopaedia, as elements of classes of therapeutically active ingredients. For the purposes of our discussion, it is worth commenting on the fact that although the group of medicaments listed therein contains milk and butter, cheese and whey are omitted. This absence is not, however, justified by the author in any way. Perhaps the sources he used did not specify them as part of the categorisation in which we are currently interested. Nevertheless, it must be stated that the lack of any mention of these products does not mean that Celsus disqualified their usage in medical procedures. As has already been explained, whey was an element of laxative treatments, in which it was referred to as *lac*. Cheese, in turn, was included in the treatment of aphthous ulcers, which means that it was applied in a therapeutic method known to Celsus. Since this was not a common usage, however, one can surmise that this product was mainly perceived by the author as a foodstuff. What also must be added here is the fact that, in subsequent Greek medical sources, cheese was invariably classified as *fármakon*, which is confirmed by evidence quoted later in this text[30]. Therefore, it seems possible that medical study into cheese was posterior with regard to the state of medical knowledge Celsus profited from. Referring back to the *materia medica* information from *De medicina*, it must be stated that milk was listed in the treatise as being among those substances which were capable of dissipating harmful agents that can accumulate in any given part of the body[31]. What is more, milk is also classified as a medicament which can allevi-

[27] Delivery time was probably another factor that enabled the product to ripen and mature.

[28] This statement is abstruse. Perhaps it refers to the cheesemaking technology later mentioned by Dioscorides. Cf. the section of this book devoted to the analysis of *De materia medica*.

[29] C e l s u s, II, 30, 2.

[30] Cf. further sections of this book.

[31] C e l s u s, V, 11.

ate irritations[32]. Butter is also mentioned with regard to two categories. Firstly, we can read that it is one of the therapeutic agents which lead to tissue growth and result in filling post-ulcer cavities (*carnem alens*; *ulcus implens*)[33]. Secondly, it is also included in the class of mollifying medicines (*molliens*)[34], i.e., substances reducing all kinds of hardenings.

When completing this synopsis, one must emphasise the fact that descriptions of milk and its derivatives, focusing on both their sitology and their properties as *fármakon*, are not an exclusive attribute of *De medicina*, since they are regularly found in medical literature, both earlier as well as posterior to Celsus' teachings. We can find it in *De diaeta*, *I–IV* (5th/4th c. BC)[35], in the output of Dioscorides[36], Rufus of Ephesus (1st/2nd c. AD)[37], Galen[38], Oribasius[39], Aëtius of Amida[40], and Paul of

[32] C e l s u s, V, 13.

[33] C e l s u s, V, 14.

[34] C e l s u s, V, 15.

[35] Since information is limited and terminology partly differs from what we find in later texts, galactology in the treatise seems to be in its *statu nascendi*. Cf. milk – *De diaeta*, II, 41; whey – *De diaeta*, II, 42; cheese; the fat constituent of milk (the base to produce butter) – *De diaeta*, II, 51. On the Hippocratic regimen, cf. J.M. W i l k i n s, *Hippokratic Corpus, Regimen (ca 430 – 370 BCE)*, [in:] *The Encyclopedia of Ancient Natural Scientists. The Greek Tradition and its Many Heirs*, eds. P.T. K e y s e r, G. I r b y-M a s s i e, London–New York 2008, p. 416–417.

[36] Cf. further sections of this book.

[37] The entirety of his works has not survived, but they are later quoted in the writings by medical authors. On the physician, cf. S. I h m, *Rufus v. Ephesos*, [in:] *Antike Medizin...*, cols. 759–760; J. S c a r b o r o u g h, *Rufus of Ephesos (ca 70 – 100 CE)*, [in:] *The Encyclopedia of Ancient Natural Scientists...*, p. 720–721; M. B u j a l k o v á, *Rufus of Ephesus and his Contribution to the Development of Anatomical Nomenclature. Rufuz iz Efeza i njegov doprinos razvoju anatomiskog nazivlja*, AMHA 9.1, 2011, p. 89–100; M. L e t t s, *Rufus of Ephesus and the Patient's Perspective in Medicine*, BJHP 22.5, 2014, p. 996–1020. For the purpose of the present discussion, I would call Rufus of Ephesus one of the key witnesses to the development of ancient galactology, and refer to some examples of his topical competence, cf. milk – R u f u s o f E p h e s u s, *De renum et vesicae morbis*, II, 19, 1 – 21, 7; R u f u s o f E p h e s u s, *De satyriasmo et gonorrhoea*, 28, 5; O r i b a s i u s, *Collectiones medicae*, II, 61, 1, 1 – 10, 2; O r i b a s i u s, *Synopsis*, I, 40, 1, 1 – 6, 3; A ë t i u s o f A m i d a, II, 86, 1 – 87, 15; cheese – R u f u s o f E p h e s u s, *De satyriasmo et gonorrhoea*, 28, 5. Cf. further sections of this book.

[38] Cf. further sections of this book.

[39] As above.

[40] As above.

Aegina[41] as well as in *Historia naturalis* by Pliny (1st c. AD)[42]. This reveals that the subject was considered important from a medical point of view and interesting for both medical doctors and a wider audience[43]. All sources display doctrinal uniformity, which seems to suggest that they were based on the same or analogous teachings in the field of *materia medica*. Their origin, however, has still to be discovered.

When moving on to discuss the details of the therapeutic application of milk, it must be indicated that *De medicina* contains a substantial amount of information on milk in the treatment of ancient patients. Lengthy as it may seem, I have decided to introduce a list of topical cures because I think it is the only way to demonstrate how common a medicament milk was in the 1st c. AD. Accordingly, it – and Celsus does not specify what kind here – was recommended for patients with permanent weight loss that was a symptom of the disease known by the Latin term *phthisis*, i.e., consumption. What can also be concluded from the text is the fact that milk was regularly added to soups served to consumptives (e.g., to the popular soup called *ptisáne*, which, in Cicero's language, was referred to as *tisana*[44]), to spelt flour pulp, and to a dish

[41] As above.

[42] P l i n y, XXVIII, 123, 1 – 135, 3 (milk – XXVIII, 123, 1 – 130, 11; whey – XXVIII, 126, 2 – 128, 1; cheese – XXVIII, 131, 1 – 132, 7; butter – XXVIII, 133, 1 – 134, 6 *oxygala*– XXVIII, 135, 1–3). Pliny, by virtue of his interest in *Historia naturalis*, very often refers to foods, the knowledge of which he borrows from ancient, mostly Greek medical writings. As a result, his work has become a piece of crucial evidence in reconstructing patterns of medical knowledge transmission, and especially in tracking down the history of *materia medica* development. On his connections with ancient medicine, for instance, cf. M. W e l l m a n n, *Sextius Niger, eine Quellenuntersuchung zu Dioscorides*, H 24, 1889, p. 530–569; J.H. P h i l l i p s, *Juxtaposed Medical Traditions: Pliny HN 27.131*, CP 76.2, 1981, p. 130–132; M. J o n e s-L e w i s, *Pharmacy*, [in:] *A Companion to Science, Technology, and Medicine in Ancient Greece and Rome*, ed. G.L. I r b y, vol. I–II, Malden, Mass.–Oxford 2016, p. 406, 408.

[43] Medical knowledge seems to have been of interest for a large number of educated people. On the reasons for the phenomenon cf. J. D r a y c o t t, *Roman Domestic Medical Practice in Central Italy*: *From the Middle Republic to the Early Empire*, London–New York 2019, p. 38–39.

[44] M. K o k o s z k o, K. J a g u s i a k, Z. R z e ź n i c k a, *Kilka słów o zupie zwanej ptisane (πτισάνη)*, ZW 18, 2013, p. 282–292.

made from starch (Latin: *amulum*/*amylum*, Greek: *ámylon*)[45]. On the other hand, the author adds that milk should be completely avoided when patients were suffering from acute fever and outbursts of thirsts triggered by high body temperature; when their chest was swollen, when their urine contained traces of bile, or when they were bothered by haemorrhages[46]. Instead, as late as on the fourth or fifth day of treatment, patients were administered – in addition to spicy foods – a mug of therapeutic juice made from broadleaf plantain (*Plantago maior* L.), or a spoonful of juice made from white horehound (*Marrubium vulgare* L.) boiled with honey. Moreover, another applicable medication was the natural resin of terebinth (*Pistacia terebinthus* L.), boiled with the addition of butter and honey[47].

Milk was also part of the treatment procedure in healing a malady which manifested itself in breathing difficulties. Greeks called its mildest form *dýspnoia*, its more acute variant *ásthma*, and its most dangerous manifestation *orthópnoia*[48]. The cure recommended by Celsus included bloodletting and using milk as a laxative to cleanse the colon, and, if these methods failed, the application of enemas[49].

Equally, milk was prescribed for patients suffering from throat ulceration[50]. They were advised to avoid spicy dishes and foods characterised by a rough texture, and to opt for milk as well as honey, lentils, a dinkel wheat soup called *tragum*, a barley soup called *tisane*, fatty meat, and a leek decoction[51].

Undoubtedly, one of the most common ailments of that time was a cough, several types of which were distinguished, including productive and non-productive ones[52]. Regardless of the variant, Celsus recommended a lifestyle full of travelling, with a particular focus on sea

[45] C e l s u s, III, 22, 11.
[46] C e l s u s, III, 22, 10.
[47] C e l s u s, III, 22, 13.
[48] C e l s u s, IV, 8, 1.
[49] C e l s u s, IV, 8, 2.
[50] *In interiore vero faucium parte exulceratio* – C e l s u s, *De medicina*, IV, 9, 1.
[51] C e l s u s, IV, 9, 3.
[52] C e l s u s, IV, 10, 1.

voyaging[53]. He also suggested dwelling by the sea and taking regular baths in seawater. As far as diet was concerned, Celsus advised the reader to opt for both mild and spicy foods. Among the former, he recommended mallows and young nettle tips; as for the latter, the Roman listed milk boiled with garlic; soups with the addition of asafoetida (*laser*) or sliced leek, and soft-boiled eggs with a sprinkling of sulphur. As far as drinking habits were concerned, Celsus encouraged patients to choose pure water first, and then alternate between water or wine daily[54].

When a patient had a disease of the spleen, manifesting itself through its enlargement, a swelling on the left side of the body, tension in the abdominal area, swollen legs, etc., milk and cheese[55], as well as sweets, were completely excluded from the nutrition plan[56], while still being advised to consume all types of sour drinks and foodstuffs, and particularly sharp wine vinegar, or vinegar with sea onion (*Squilla maritima* L.), which should be sipped regularly. Other administered foods included salted fish, olives in a strong pickle sauce, lettuce and endive spiced with vinegar, beetroots with mustard, and, when it came to meat, dishes made from legs (*ungulae*), dewlap (*rostra*), lean poultry (*aves macrae*) or game[57].

A different treatment was offered to those suffering from chronic colic – an ailment called *colitis* (Greek: *koiliaké diáthesis*), whose symptoms included stomach aches, the inability to expel the gases accumulated within the intestines, constipation, a lower temperature in the

[53] A form of medical procedure called *aióra*. Cf. M. K o k o s z k o, *Medycyna bizantyńska na temat aiora (αἰώρα), czyli kilka słów o jednej z procedur terapeutycznych zastosowanych w kuracji cesarza Aleksego I Komnena (na podstawie pism medycznych Galena, Oribasiusa, Aecjusza z Amidy i Pawła z Eginy)*, [in:] *Cesarstwo bizantyńskie. Dzieje, religia, kultura. Studia ofiarowane Profesorowi Waldemarowi Ceranowi przez uczniów na 70-lecie Jego urodzin*, eds. P. K r u p c z y ń s k i, M.J. L e s z k a, Łask–Łódź 2006, p. 87–111.

[54] C e l s u s, IV, 10, 4.

[55] This is Celsus' only dietetic recommendation referring explicitly to cheese.

[56] C e l s u s, IV, 16, 1.

[57] C e l s u s, IV, 16, 2. On dangers related to the consumption of milk – K. A l b a l a, *Milk: Nutritious and Dangerous*, [in:] *Milk...*, p. 19–30; F. B l a n k, *Milk-Borne Diseases: An Historic Overview and Status Report*, [in:] *Milk...*, p. 81–85; H. M o r r o w B r o w n, *The Health Hazards of Milk*, [in:] *Milk...*, p. 259–267.

limbs, and breathing difficulties[58] – and involved applying warm compresses, inducing vomiting in order to empty the stomach, and cupping therapy of the underbelly and the hip area[59]. In order to induce purgation, the sick were served pure milk or milk with water, mixed in a one-to-one ratio. Celsus' remark on the dosage is quite interesting, since it allows us to determine the amounts of milk administered to patients. Namely, we learn that they were served – most likely on a daily basis – between two and three ladles (*cyathi*) of milk, and if need be, the same measure of milk mixed with an equivalent amount of water. Since one ladle (*cyathus*) had a capacity of 42 cubic centimetres, i.e., approximately 0.042 litres, four *cyathi* meant a daily intake of milk amounting to approximately 0.170 litres, meaning it was less than a standard tumbler today. One must also remember that this amount was administered to induce purgation in patients with a particular ailment, which means that the average daily intake of milk must have been lower for healthy members of society. Additionally, since it was believed that an increase of pressure in the bowels greatly facilitated the expulsion of intestinal gases, grated garlic was added to the milk. Further recommendations included *aióra* (e.g., in the form of sea voyages), embrocating olive oil with soda, rinsing in warm water, applying poultices made from mustard to the limbs (which resulted in skin reddening, i.e., a procedure called *sinapismós*), and many other therapeutic measures[60].

Milk was also served in treatments aimed at curing ophthalmological disorders. Celsus wrote that a common symptom accompanying eye infections was the occurrence of ulcers on eyeballs and eyelids. In order to treat them, patients were given enemas and advised to follow diets that entailed a limited consumption of food, while drinking more milk. The Roman author claimed that this beverage neutralised the sharpness of the juices which caused the ailment[61]. Milk was also mentioned in the treatment administered to patients suffering from *phthirisis* (Greek: *ftheiríasis*). Celsus reported that this disorder afflicted patients who, as

[58] C e l s u s, IV, 19, 1.
[59] C e l s u s, IV, 19, 2.
[60] C e l s u s, IV, 19, 3.
[61] C e l s u s, VI, 10.

a result of their poor personal hygiene, had lice in their eyelashes and whose eyes oozed a purulent secretion of an irritant nature that could lead to the ulceration of the eyeball and, in extreme cases, even to vision loss. Patients were purified with enemas, and then had their hair cut and heads massaged. Other recommendations included fasting, vigorous walks, mouthwashes with *mulsum* (hot wine with honey), often with the addition of catmint and figs, warm baths, and washing the head with hot water. The diet should be based on soothing foodstuffs, and, among drinks, milk and sweet wine were recommended, as they were expected to neutralise the sharp (and thus irritating) juices generated during the disease[62].

De medicina also contains a substantial number of uses on milk as a simple therapeutic substance or as an ingredient of more complex medicines. Let us commence by saying that when reading Celsus' treatise we can learn that this *medicamentum* could be applied both internally and externally. In the analysed text, we find a remark that milk was considered to be an antidote to poisons, especially weaker ones. For instance, it was served without any additives to people poisoned with cantharidin, i.e., a substance obtained from the cantharis fly (*Cantharis vesicatoria*)[63]. Another treatment included the application of a concoction made from milk with a powdered plant called *panaces* (*Ferula galbanifera* Mill.), or galbanum, (i.e., a gum resin produced by the plants *Ferula galbanifera* Mill. and *Ferula rubricaulis* Boiss.), and dissolved in wine[64]. And in the case of poisoning with black henbane (*Hyoscyamus niger* L.), all types of milk were recommended – donkey milk, or hot wine with honey, *mulsum* in particular[65].

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[62] C e l s u s, VI, 6, 15–15 b.

[63] On the substance and insects producing it (the cantharis fly and the buprestis beetle [Greek: *boúprestis*]), cf. M. D a v i e s, J. K a t h i r i t h a m b y, *Greek Insects*, New York–Oxford 1986, p. 91–94; L. M o e d, T.A. S h w a y d e r, M.W. C h a n g, *Cantharidin Revisited: A Blistering Defense of an Ancient Medicine*, ADer 137.10, 2001, p. 1357–1360.

[64] C e l s u s, V, 27, 12.

[65] C e l s u s, V, 27, 12 b. Cf. A. T o u w a i d e, *La toxicologie dans le De medicina: un système asclépiado-méthodique?*, [in:] *La médecine...*, p. 211–256.

Celsus also classified milk as a substance that could be used for the therapeutic washing of the throat and oral cavity (as an alternative to *tisana* and a chaff brew)[66]. In this form, milk was applied in the final stage of tonsillitis[67]. It is worth mentioning here that the only time Celsus refers to the therapeutic application of cheese, he also speaks of the oral cavity and its disorders, as he indicates that canker sores (Latin: *aphthae*) recurring in children's mouths were healed by covering them with cheese – fresh, we can presume, and blended with honey[68].

Another common ailment reported in the Greek and Latin source texts was dysentery. Celsus wrote that, in general, affected patients needed rest. The treatment involved appropriately prepared poultices which could stop diarrhoea, applied to the stomach; washing the anus with lukewarm water previously boiled with common verbena (*Verbena officinalis* L.)[69], and enemas, among which Celsus recommended a *clyster* made from thin *tisana* or milk. Other procedures included applying melted animal fat, deer bone marrow, olive oil, and rose attar mixed with butter (another dairy product of interest here) or egg white, as well as many other substances[70]. Celsus also indicated that Themison of Laodicea (1st c. BC)[71] even recommended using a special brine for storing olives. And as far as diet was concerned, Celsus opted for styptic foodstuffs[72].

In the field of gynaecology described by the Roman scholar, milk was used to treat hysteria. First of all, the fruit of black nightshade (*Solanum nigrum* L.) was dipped in milk and later crumbled, together with white wax, deer bone marrow (blended with iris oil), or beef suet

[66] C e l s u s, V, 22, 9.
[67] C e l s u s, VI, 10, 4.
[68] C e l s u s, VI, 11, 3.
[69] C e l s u s, IV, 22, 2.
[70] C e l s u s, IV, 22, 3.
[71] On the physician, cf. S. I h m, *Themison v. Laodikeia*, [in:] *Antike Medizin...*, cols. 849–850; J. S c a r b o r o u g h, *Themisōn of Laodikeia (Syria) (ca 90 – 40 BCE)*, [in:] *The Encyclopedia of Ancient Natural Scientists...*, p. 782–783.
[72] C e l s u s, IV, 22, 4.

(or goat suet mixed with rose oil) and converted into an ointment that was applied as a softening agent (an emollient) to the patient's distended underbelly (*super imum ventrem*)[73]. Moreover, the therapeutic procedure involved voiding the patient's bowels, induced by enemas or drinking milk[74]. Celsus also wrote that breast milk was utilised to produce a vaginal suppository used to provoke menstruation. In order to make it, breast milk was mixed with the frittered inside of wild cucumber (*Cucumis silvestris*)[75]. Next, this substance was used to soak soft wool, which was later inserted into the genitals[76].

Milk was also one of the substances used in ancient nephrology. The author of *De medicina* claimed that patients suffering from kidney disorders should rest a lot, sleep on a soft bed, regularly cleanse their bowels, even by means of enemas, take hot baths, avoid cold food and drink, and refrain from tasting anything salty, sour or spicy[77]. The recommended treatment also involved the application of a medication made from wild cucumber seeds, pine nuts, anise and saffron, served in sweet *mulsum* wine. Any patients complaining of pain were administered a medicine consisting of thirty seeds of squirting cucumber (*Ecballium elaterium* [L.] A. Rich.), twenty pine nuts, five almonds (*nuces Graecae*), and a pinch of saffron (*crocus*). These ingredients were ground and mixed with milk[78].

As far as external applications are concerned, we learn from Celsus that the joint disorders of both the upper and lower limbs which accompanied such diseases as gout or chiragra (Latin: *cheragra*, Greek: *cheirágra*) were treated by drinking donkey milk, which, in this case, was considered a medicament *sensu stricto*. However, what we can conclude from this Roman's text is that this medicine was only effective in the early stages of the disease. It is also worth noticing that other similarly effectual procedures included abstinence from wine, *mulsum* and sex[79]. In more advanced stages, patients were advised to be more active, to pay

[73] C e l s u s, IV, 27, 1.
[74] C e l s u s, IV, 27, 2.
[75] C e l s u s, V, 21 b, 1.
[76] C e l s u s, V, 21 a.
[77] C e l s u s, IV, 17, 1.
[78] C e l s u s, IV, 17, 2.
[79] C e l s u s, IV, 31, 1.

visits to bath houses, and to soak their painful limbs in hot therapeutic solutions[80]. At times, wet cooling therapies were also administered, especially when an elevated temperature was recorded in the afflicted body parts[81]. When the pain was so intense that it was even unbearable for the patient to touch sore spots, relief was brought by sponging them with a hot infusion made from skin peeled off a poppy-head or the root of wild cucumber (*Cucumis silvestris*)[82]. Next, the patients were smeared with saffron, poppy juice and sheep milk[83]. Celsus also added that those aware of the fact that their joint aches were of a seasonal nature should ward them off by following a special diet which protected against the harmful substances in food. For this purpose, they were advised to use emetics and cleanse their bowels by drinking milk. The author of *De medicina* stated that although the latter method was rejected by Erasistratus (4th/3rd c. BC)[84] as it could increase the accumulation of harmful juices in the feet of patients with gout, Celsus himself considered such a fear to be groundless, since the said measures led to the voiding of juices from both the upper and lower parts of the body[85].

Milk was also an ingredient of those solutions aimed at facilitating the healing of wounds[86]. According to Celsus, when uncontrolled hyperplasia of tissue was observed on a wound's edges, measures were taken to stop this process by means of dry lint (*siccum linamentum*) or copper shavings (*squamae*) applied to the dressed area. If, however, the hyperplasia was more aggressive, solutions that decomposed the offending tissue were applied. The dressing was removed, and the wound was washed with a decoction made from buckthorns dissolved in *passum* wine or milk, since this procedure was expected to accelerate cicatrisation[87].

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[80] C e l s u s, IV, 31, 3–4.

[81] C e l s u s, IV, 31, 5.

[82] Probably another name for squirting cucumber.

[83] C e l s u s, IV, 31, 6.

[84] On the physician, cf. K.-H. L e v e n, *Erasistratos v. Keos*, [in:] *Antike Medizin*..., cols. 265–267; J. S c a r b o r o u g h, *Erasistratos of Ioulis on Keōs (ca 260 – 240 BCE)*, [in:] *The Encyclopedia of Ancient Natural Scientists*..., p. 294–296.

[85] C e l s u s, IV, 31, 9.

[86] On the issue within Celsus' output – I. I s r a e l o w i c h, *Patients*..., p. 96–97.

[87] C e l s u s, V, 26, 30 c.

Milk was also added to compound medicines used in ophthalmology. Celsus remarked that breast milk was an ingredient of the eye ointment which in Latin was called *collyrium*, added to soothe any irritating effect of the medicament. He indicated that it was also used to modify the balsam called *cycnon* (or *tephron*)[88], and added to another balm which was known as *trygodes*[89]. Both medicaments were applied to eyes in cases of relatively acute inflammations. Moreover, an unspecified milk was mentioned by Celsus as an ingredient of other medications within the same group. In the treatise, we read about a very severe eye inflammation called *proptosis*, which manifested itself with a swelling that made the eyeballs look as if they were about to pop out of their sockets. It could lead to vision loss accompanied by a purulent secretion oozing from the outer corner of the eye, i.e., on the side of the temple, if so, a surgical procedure was conducted. An incision in the eyeball was performed to create an outlet for the accumulated pus, to alleviate the pain, and to prevent disfigurement. After the surgery, Cleon's (2nd/1st c. BC)[90] or Nileus' (3rd c. BC)[91] *collyrium* was crumbled and mixed with milk or eggs[92] to soothe its effect, and then applied to the eye. What is more, in the case

[88] *Cycnon/tephron* consisted of starch, milkvetch and acacia juice, *cummis* rubber, poppy juice, washed white lead (Latin: *cerussa*) and lead oxide processed in the same manner. Once mixed, these ingredients were usually blended with rainwater. In the case specified by Celsus, the latter was substituted with breast milk – C e l s u s, VI, 6, 7. This medicament was also known to Galen (*De compositione medicamentorum secundum locos*, 795, 4–10, vol. XII) and to Aëtius of Amida (VII, 106, 75–80).

[89] *Trygodes* consisted of castoreum, a decoction made from buckthorns, nard, poppy juice, saffron, myrrh, aloe, burnt copper, *cadmia* clay, antimony sulfide, acacia juice and *cummis* rubber – C e l s u s, VI, 6, 8. It was also known to Galen (*De compositione medicamentorum secundum locos*, 713, 9–10, vol. XII).

[90] On the physician, cf. P.T. K e y s e r, *Kleōn (of Kuzikos?) (100? – 20 BCE)*, [in:] *The Encyclopedia of Ancient Natural Scientists*..., p. 481.

[91] On the physician, cf. G. I r b y-M a s s i e, *Neileus (255 – 215 BCE)*, [in:] *The Encyclopedia of Ancient Natural Scientists*..., p. 569.

[92] C e l s u s, VI, 6, 9 b–c.

of eye ulceration, Philalethes' (1st c. BC/1st c. AD)[93] *collyrium*[94] was used, ground with milk[95].

Breast milk was also added to medicaments aimed at treating ear infections, e.g., a drug made from Egyptian bean (*Nelumbium speciosum* Willd.) pestled with rose oil and myrrh, or juice made from bitter almonds with the addition of the same ingredients[96]. After these medicaments were inserted into the ear, the auricle was sealed with a swab to prevent the liquid from seeping out[97]. And when the ear was swollen with an oozing secretion, an unspecified type of milk mixed with a buckthorn infusion was poured inside[98].

Finally, it is worth mentioning that – alongside rose oil – milk was also utilised in cranial surgery. Drops of both liquids were supposed to facilitate bone penetration[99] for trephination (*modiolus*[100]) by reducing friction.

While medical applications of whey can only be conjectured on the basis of those extracts where Celsus refers to the laxative effect of milk, from his remarks, we may conclude that butter was an ingredient of numerous medicaments applied externally, especially in therapies aimed at healing wounds and ulcerations. For instance, it was one of the constitu-

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[93] On the physician, cf. H. von Staden, *Alexander Philalethes*, [in:] *Herophilus: The Art of Medicine in Early Alexandria*, ed., transl., essays H. von Staden, Cambridge–New York–New Rochelle–Melbourne–Sydney 1989, p. 532–539; G. Irby-Massie, *Alexander of Laodikeia on the Lukos, Philalēthēs (20 BCE – 25 CE)*, [in:] *The Encyclopedia of Ancient Natural Scientists*..., p. 56.

[94] Philalethes' *kollýrion* consisted of myrrh, poppy juice, washed lead, clay of Samos, milkvetch juice, antimony sulphide, starch, washed zinc oxide and washed white lead – Celsus, VI, 12.

[95] Celsus, VI, 12.

[96] Celsus, VI, 7 e.

[97] Celsus, VI, 7 c.

[98] Celsus, VI, 7, 3 b–4.

[99] Celsus, VIII, 3, 3. Cf. I. Mazzini, *La chirurgia celsiana nella storia della chirurgia greco-romana*, [in:] *La médecine*..., p. 135–166.

[100] Celsus, VIII, 3, 1.

ents of *enneapharmacum*[101], used for clearing wounds. The ingredient list included wax, milk, suet, resin, myrrh, rose oil, bone marrow (deer, calf, or ox), lanolin, and butter, mixed in equal proportions[102]. It is also noteworthy to mention that in order to clean and fill a wound to the tendon, after the pus had already been removed, a slightly less complex medication was applied, i.e., butter mixed with powdered rose petals and a dash of honey[103]. We also read about *buturum* as an ingredient of the so-called *enchrista*[104], or – as explained by Celsus – liquid medicaments used to treat ulcerations in *neúra*, e.g., tendons. One such medicine consisted of equal portions of butter, calf bone marrow and fat, goose lard, wax, honey, terebinth resin, and castor and rose oils. And when the latter was substituted with alkanet oil, the medicament also became an emollient, i.e., it efficiently mollified concretions[105]. It is also worth highlighting those extracts within Celsus' writings which prove that butter was used in medicaments applied to treat those delicate and sensitive body parts which are not normally visible. Therefore, it can be found in therapies aimed at healing damage to the cerebral meninges. The author of the discussed treatise claimed that, in cases where they swell so significantly that they became visible, emerging from the wound and rising above the surface of the skull, physicians would apply powdered lentil or grapevine leaves mixed with fresh butter or goose lard to the inflamed spots, which was supposed to reduce the swelling[106].

Celsus' work also provides information that butter was suitable for treating male and female genitals. A recommended treatment of metritides was to administer Numenius' (3rd c. BC)[107] medication, which

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[101] Greek doctors were well familiar with this medicament. Cf. for instance G a l e n, *De compositione medicamentorum secundum locos*, 310, 15 – 311, 5, vol. XIII; O r i b a s i u s, *Eclogae medicamentorum*, 146, 17, 1–3; A ë t i u s o f A m i d a, XVI, 82, 16–19; P a u l o f A e g i n a, VII, 24, 6, 1–3.

[102] C e l s u s, V, 19, 10.

[103] C e l s u s, V, 26, 30.

[104] This term was known, for instance, to Oribasius (*Libri ad Eunapium*, III, 34, 4, 4).

[105] C e l s u s, V, 23, 3.

[106] C e l s u s, VIII, 4, 19.

[107] On the physician, cf. J.-M. J a c q u e s, *Noumēnios of Hērakleia (270 – 230 BCE)*, [in:] *The Encyclopedia of Ancient Natural Scientists...*, p. 583.

included saffron, wax, butter, goose lard, boiled egg yolks, and rose oil[108]. As far as the treatment of ulcerations to the penis were concerned, if the ulceration was dry, the organ was bathed in warm water, and then butter with rose oil, or a decoction made from box-thorn or *amurca* mixed with wine was applied. When ulcers suppurated slightly, they were washed with wine, followed by the application of a mixture of butter, rose oil, honey and terebinth resin to the sores[109].

Conclusions

As for conclusions, the results of the presented analysis make it possible to recognise Celsus' work as a treatise competent in the field of galactology, i.e., well-grounded within the output of Greek medical thought. By the time Celsus composed his work, teachings on milk had already been shaped into a coherent theory which included both its dietetics as well as *materia medica*. What is more, Celsus' encyclopaedia shows that, by the same period, milk and its derivatives had been consistently used in a high number of cures, including complex surgical procedures. All the above-mentioned facts appear to prove that by the first part of the 1st c. AD theories on the uses of dairy products already had a long history, which must have been moulded by many medical doctors. Unfortunately, Celsus' work gives no reliable clues as to the origin of this corpus of knowledge, naming neither its author nor the time of its creation. Nevertheless, it is plausible that he extensively profited from the teachings of the school of Asclepiades of Bithynia (2nd/1st c. BC)[110],

[108] C e l s u s, V, 21, 4.

[109] C e l s u s, VI, 18, 2 c.

[110] About the physician, cf. M. W e l l m a n n, *Asklepiades (43)*, [in:] *RE*, vol. II, Stuttgart 1896, cols. 1633–1634; J. S c a r b o r o u g h, *The Drug Lore of ASCLEPIADES of Bithynia*, PhH 17.2, 1975, p. 43–57; J. V a l l a n c e, *The Medical System of Asclepiades of Bithynia*, [in:] *ANRW*, vol. II, 37, 1, Berlin–New York 1993, p. 693–727; R. P o l i t o, *On the Life of Asclepiades of Bithynia*, JHS 119, 1999, p. 48–66; V. N u t t o n, *Asclepiades (6)*, [in:] *BNP*, vol. II, Leiden–Boston 2003, cols. 96–98; S. I h m, *Asklepiades v. Bithynien*, [in:] *Antike Medizin...*, cols. 107–108; J. S c a r b o r o u g h, *Asklēpiadēs of Bithunia (in Rome, ca 120 – 90 BCE)*, [in:] *The Encyclopedia of Ancient Natural Scientists...*, p. 170–171; J. D r a y c o t t, *Roman Domestic...*, p. 48–49.

which, interestingly and importantly, at a broadly similar time, were included in the work on *materia medica* composed by Sextius Niger (1st c. AD)[111].

Celsus' work, however, is not only a medical encyclopaedia. It is also worth emphasising that, due to their substantive content of realia, his treatise has become important not only for the history of medicine *sensu stricto*, but it is also a significant source of materials providing information on gastronomy and the techniques applied in agriculture and animal husbandry. What is more, it also sheds some light on how often (and in which quantities) individual foodstuffs within the group under discussion were consumed. This aspect of Celsus' treatise *De medicina*, generally leads us to the conclusion that milk was only drunk in small amounts, which can be justified by the intake indicated therein – cited in the present study. One may also speculate that this limited role in diet applies to, first and foremost, educated residents of urban areas, who would have been the target reader of the analysed text. This group was most probably of at least moderate means, since we can assume that its members could afford to choose whatever foodstuffs they would like to include in their diet. In cities, milk of adequate freshness must have been difficult to obtain, as can be concluded from the remark that it would easily coagulate when boiled (as slightly soured milk does). Therefore, it comes as no surprise that we usually come across this drink in its slightly spoiled, i.e., fermented form, and thus, it is a foodstuff classified as a product that is easily acidified in the stomach and demonstrates a laxative effect. The latter effect may also lead us to the conclusion that the majority of society at that time had problems digesting milk, i.e., they showed signs of lactose intolerance. The quoted dietetic characteristics also prove that various methods were applied to extend the shelf life of milk, including the addition of salt, and heating. Let us note that fresh milk would have been significantly easier to obtain in the countryside than in urban areas, as the bulk of it was produced there.

[111] On Sextius Niger cf. my comments on Dioscorides and Galen's sources.

Animals listed as providers of milk were donkeys[112], sheep[113] and cows[114]. Since donkeys were also used for transportation, they, owing to their exertion due to the physical strain imposed by carrying large and heavy loads, could offer smaller amounts of milk, which is why it was mainly used for specialist therapies. What is more, donkey milk was not held in high regard by dieticians. For instance, Galen, over a century later, described it as watery and almost devoid of any fat, and that such characteristics indicated that its nutritional value was virtually non-existent from the dietetic point of view. This was by no means true when it came to sheep and cow milk, however, which were highly valued as foodstuffs[115]. One can conjecture that Galen's views were related to the preferences of milk consumers during his lifetime, and thus, to the availability of this product on the market. If true, in the 2nd c. AD, the milk obtained from sheep and cows was significantly more popular than that of donkeys. There is, however, no evidence demonstrating that the pattern of husbandry presented by this doctor from Pergamum differed considerably from that depicted by Celsus.

Butter played no crucial role in diets, as proved not only by the substantive content of *De medicina*, but also by the fact that Galen decided against providing a detailed description of it within *De alimentorum facultatibus*, i.e., his most significant dietetic work. Instead, he included its characterization in *De simplicium medicamentorum temperamentis ac facultatibus*, which was a treatise devoted to simple medications, in which butter was classified as *fármakon*. The conclusion corresponds with those one may draw from other medical works as well as from the encyclopaedia composed by Pliny.

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[112] On the animals and products derived from them – M. C h r o n ē, *Ē panida...*, p. 90–91, 362, 395–395.

[113] Information on sheep – Z. R z e ź n i c k a, *Rola mięsa w diecie w okresie pomiędzy II a VII w. w świetle źródeł medycznych*, [in:] *Dietetyka i sztuka kulinarna antyku i wczesnego Bizancjum (II–VII w.)*, Część II, *Pokarm dla ciała i ducha*, ed. M. K o k o s z k o, Łódź 2014, p. 249–257.

[114] *Ibidem*, p. 266–279.

[115] G a l e n, *De alimentorum facultatibus*, 681, 11 – 682, 2, vol. VI (thickness of milk and animal species which provided milk; donkey milk – 682, 1, vol. VI; sheep milk – 682, 2, vol. VI; cow milk – 681, 14, vol. VI); 684, 7–9, vol. VI (fat content in milk and; donkey milk – 684, 9, vol. VI; sheep milk – 684, 8, vol. VI; cow milk – 684, 7, vol. VI).

As for cheeses, Celsus conveys far more information on those varieties which were eaten in their fresh, and thus less durable, form, than on more mature products with a greater lifespan (which resulted from the process of aging). On the other hand, we can learn from his text that the latter were also present on the market and, being suited for transportation, were delivered over great distances. One may speculate that the export of such cheeses was only profitable if they could be sold for an appropriately high price. Thus, we might expect that by the time *De medicina* was written, the widely known types of cheese had already taken their final shape, were being made according to an established recipe and delivered to recipients residing far away from their place of production. Such conclusions seem to be justified also on the basis of analogies found in later works, and especially in *Historia naturalis*. As can be concluded from Celsus' remarks, cheese was particularly significant in culinary art, and the information on how it was prepared indicates that a variety of methods were applied to modify its flavour.

What is more, since the galactology described in *De medicina* had been developed before the 1st c. BC, the teachings of this branch of medicine provided an insight into what had been eaten until that time. The works by Galen, who was a shrewd observer of everyday life and often verified encountered theories against his own experience[116] (which, together with those of his followers, will be tackled in the next chapter of this book), can also be perceived as testimonies of their time. After Oribasius, however, we only come across repeated and already established dietetic and pharmacological doctrines regarding milk, which calls into question the credibility of later medical treatises as a source of accurate information on the reality contemporaneous to their authors.

[116] For instance, when discussing the raw material from which butter is made, he entered into a dispute with a recognised authority in the field of *materia medica*, i.e., Dioscorides (whose other opinions he generally valued and respected). Namely, he expressed his surprise at the fact that the doctor of Anazarbus had suggested that butter was made from goat and sheep milks, since Galen knew it could also be made from cow milk and the term itself came from the noun *boús* – G a l e n, *De simplicium medicamentorum temperamentis ac facultatibus*, 272, 12–15, vol. XII. Cf. D i o s c o r i d e s, II, 72, 1, 2–3.

Nevertheless, there is a possibility that Oribasius, as well as Aëtius of Amida and Paul of Aegina, wrote down doctrines which were already considered classical at that time, because changes to the portfolio of available foodstuffs and methods of their production were minimal or even non-existent. If so, early Byzantine physicians were most likely to select and convey to future generations those constituents of the theory that they considered to be applicable in their own medical practice.

Finally, and interestingly, the recommendations in *De medicina* regarding milk and dairy products lack any references to luxurious spices or exotic foodstuffs. Therefore, there is every likelihood that the dietetic data included within the text reflects a consumption pattern typical for the lower and middle urban social classes[117], which makes this work an excellent reference material for studies on the everyday life of a broad social stratum[118].

3. Theory on milk and dairy products in *De materia medica* by Dioscorides

Another comprehensive list of characteristics of milk and dairy products was compiled by Dioscorides and can be found in his treatise entitled *De materia medica*[119].

Little is known, however, about the life of Pedanius Dioscorides himself. A native of Anazarbus (Cilicia), he lived in the 1st c. BC, during the reign of Nero, and often travelled in search of medicinal substances across the whole Mediterranean region[120]. Dioscorides is the

[117] On a middle class in the city of Rome, the likely addressees of Celsus' medical advice, cf. J. D r a y c o t t, *Roman Domestic...*, p. 28–29. Their regimen, cf. *ibidem*, p. 50–55.

[118] A similar conclusion cf. *ibidem*, p. 54.

[119] D i o s c o r i d e s, II, 70, 1, 1 – 72, 3, 9.

[120] J.M. R i d d l e, *Dioscorides on Pharmacy and Medicine*, Austin 1985, p. 1–19. Other scholarship on Dioscorides' life and work, cf. J.M. R i d d l e, *Byzantine Commentaries on Dioscorides*, DOP 38, 1984, p. 95–102; M. S t a m a t u, *Dioskurides*, [in:] *Antike Medizin...*, cols. 227–229; J. S c a r b o r o u g h, *Dioskouridēs of Anazarbos (ca 40 – 80 CE)*, [in:] *The Encyclopedia of Ancient Natural Scientists...*, p. 271–273; K. D u r a k, *Dioscorides*

author of one major work which has achieved renown in the history of medicine, namely, the aforementioned *De materia medica*. It focused on substances used in ancient pharmacopoeia, i.e., *haplá fármaka*, also enumerating common ailments and illnesses which were treated by means of these substances. There is one more work that is sometimes also ascribed to Dioscorides. It is known by the title *Euporista sive de simplicibus medicinis* and it systematises virtually the same simple medicines which were tackled in *De materia medica* with regard to the specific ailments (arranged from the head to the foot) they were used to address. It is still unestablished whether the treatise is a genuine work by Dioscorides or a writing by an anonymous author composed, presumably, one or two centuries later. Originally, Max Wellmann, in his entry in *Real-Encyclopaedie,* termed it as pseudo-Dioscoridean and argued that it was written in the 3rd or early 4th c. AD[121]. However, his later research prompted him to change his position and defend Dioscorides' authorship of the work (though he also admitted that it was fraught with later interpolations)[122]. The issue is so difficult to resolve that even John Marion Riddle, the most prominent contemporary specialist on Dioscorides, and Ann Tess Osbaldeston, the author of a faithful translation of *De materia medica*[123], have remained cautious enough not to pronounce a final verdict[124]. Despite this, it is undeniable that *Euporista sive de simplicibus medicinis* was compiled by an author who was familiar with the corpus of *materia medica* theories Dioscorides adhered to and

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and Beyond Imported Medicinal Plants in the Byzantine Empire, [in:] *Hayat Kısa, Sanat Uzun Bizans'ta Şifa Sanatı. Life is Short, Art Long: The Art of Healing in Byzantium*, ed. B. P i t a r a k i s, Istanbul 2015, p. 153–160; M. K o k o s z k o, K. J a g u s i a k, Z. R z e ź n i c k a, J. D y b a ł a, *Pedanius Dioscorides' Remarks on Milk Properties, Quality and Processing Technology*, JAS.R 19, 2018, p. 982–986.

[121] M. W e l l m a n n, *Dioskurides aus Anazarbos in Kilikien*, [in:] *RE*, vol. V, Stuttgart 1905, col. 1140.

[122] M. W e l l m a n n, *Die Schrift des Dioskurides Peri haplōn farmakōn: Ein Beitrag zur Geschichte der Medizin*, Berlin 1914, p. 38–57.

[123] A.T. O s b a l d e s t o n, *Introduction*, [in:] D i o s c o r i d e s, *De materia medica*, ed., transl. A.T. O s b a l d e s t o n, Johannesburg 2000, p. XXI. Cf. Ch.J. S i n g e r, *The Herbal in Antiquity and its Transmission to Later Ages*, JHS 47, 1927, p. 19, note 45.

[124] J.M. R i d d l e, *Introduction*, [in:] *Dioscorides...*, p. XXVI–XXVII.

thus represented a similar (if not identical) way of medical reasoning. Therefore, the treatise may be considered to be a witness to the popular acceptance of Dioscorides' teachings.

As for Dioscorides' contribution to *materia medica*, the results of his research were a permanent component of the lectures on medical theory available for future generations (both in antiquity as well as later), due to the author's competence, the clarity of composition displayed in the treatise, and the approachable language of exposition. As shown by the history of medicine, they were excellently applied by theoreticians and practitioners of medicine, influencing medical studies for nearly two thousand years.

There is still, however, one remark to be made. It is highly probable that Dioscorides borrowed at least some of his information on milk from Sextius Niger, who, some thirty of forty years before the author from Anazarbos, and probably parallelly to Celsus, composed, in Greek, his treatise *Perí hýles*[125]. In order to justify the hypothesis, however, one has

[125] The most detailed research into Sextius Niger and his work comes from the end of the 19th and the first part of the 20th c., cf. M. W e l l m a n n, *Sextius Niger...*, p. 530–569; K. D e i c h g r ä b e r, *Sextius Niger*, [in:] *RE*, Supplementband V, Stuttgart 1931, cols. 971–972. One should notice that, having analysed similarities between *Materia medica* by Dioscorides and *Historia naturalis* by Pliny the Elder, Max Wellmann (*Sextius...*, p. 548) was keen to consider the former to be *nicht anders als alle die Compilatoren der nachchristlichen Jahrhunderte*, owing the bulk of his expertise to Niger. Although there has been no major development in the study of Niger's influence on ancient and Byzantine *materia medica* ever since, his work is occasionally acknowledged in modern scholarship. Although John Marion Riddle (*Dioscorides...*, p. 14–19), seems to appreciate his role as an eminent naturalist, he is not prone to accepting Max Wellmann's view. Nicholas Everett (*Sources Compared and Lost*, [in:] *The Alphabet of Galen: Pharmacy from Antiquity to the Middle Ages. A Critical Edition of the Latin Text with English Translation and Commentary*, ed., transl. N. E v e r e t t, Toronto 2012, p. 70–74) regards his work as a piece of ancient research which could have been made use of by the anonymous author of *Alphabetum Galeni* (composed between the 4th and the 6th c. AD). Recently Sextius' impact was discussed by Gavin Hardy and Laurence Totelin (*Ancient Botany*, Abingdon–New York 2016, p. 50–51) in the context of the history of botany in antiquity and was mentioned by M. Eleanor Irwin (*Greek and Roman Botany*, [in:] *A Companion to Science...*, p. 276). In modern research he also appears as a personage important for the development of pharmacy, as he was referred to, for instance, by Moly Jones-Lewis (*Pharmacy*, p. 406).

to turn to Pliny's output, who made use of Niger's work for the purpose of compiling his *Historia naturalis*. It is due to Pliny that we can be certain that Sextius Niger was an expert in the theory of milk, because his name is given by the naturalist in the list of domestic authors from whom he borrowed information to compile Book XXVIII (where he discussed the subject), and he is mentioned as the main source when Pliny elaborated on the term *hippace* – which was mare's milk or the cheese obtained from it[126]. Moreover, due to the fact that at least one passage from Galen's output, namely his discussion on curdling milk in *De alimenatorum facultatibus*[127], includes an analogy[128] to passages penned by Dioscorides[129] and Pliny[130], one can surmise that Niger's treatise was also known to Galen, who also admitted having read his work[131]. Accordingly, although the issue requires further research, on the basis of the presented premises it can be concluded that Sextius Niger's expertise had a profound influence upon the ancient theory of milk in the form we know from Dioscordies, Galen and his followers.

The characteristics of milk (*gála*) compiled by Dioscorides can be found in Book II of *De materia medica,* and it surpasses Celsus' writings in its detail. Dioscorides provides a description of milk as a foodstuff, praising it for its good juices, nutritional values and the ability to soften the digestive tract[132]. However, he also adds that milk contributes to the accumulation of gases in the stomach and intestines. Since the society in which he was living had a close relationship with the countryside and was familiar with the realities of rural life (and work), another remark comes as no surprise. Namely, Dioscorides states that milk obtained in spring contains more water than in summer. What is more, he also indicates that milk from animals feeding on fresh green grass

[126] P l i n y, XXVIII, 131, 2–4.

[127] G a l e n, *De alimentorum facultatibus*, 694, 10–14, vol. VI.

[128] All the authors mention a vessel used in the process of boiling milk.

[129] D i o s c o r i d e s, II, 70, 4, 1–10.

[130] P l i n y, XXVIII, 126, 4 – 127, 4.

[131] For instance – G a l e n, *De antidotis*, 7, 2, vol. XIV.

[132] The author simply meant that milk induces defaecation, which, in turb, leads to the reduction of the feeling of fullness in the intestines. Thus, equally to Celsus, he treated milk as a laxative.

has a stronger laxative effect. Recapping the introductory part of his text, the author states that the physical properties that distinguish good-quality milk are a white colour and uniform thickness, and that the latter can be determined by a simple test, in which one measures the time a milk drop takes to travel down one's fingernail[133].

Dioscorides provides a definitive list of the most popular types of milk, including an exhaustive description of the priorities of animal husbandry at the time. He commences his disquisition with goats, which were probably the most common milk animals in the Mediterranean region, claiming that their milk appears to be less upsetting for the digestive system, since they feed on food characterised by styptic properties[134], such as leaves and branches of the lentisk (*Pistacia lentiscus* L.), oak, olive and terebinth (*Pistacia terebinthus* L.), and thus, their milk has a beneficial influence upon the stomach[135]. These statements are intriguing in the face of the aforementioned testimony that milk was classified as a foodstuff frequently responsible for digestive discomfort. Dioscorides clearly explains that goat milk contributed to this ailment to a lesser extent, a statement which should be seen as indicating a general tendency towards lactose intolerance in ancient society, since goat milk is the least allergenic, and is therefore permissible in the diet of people lacking the digestive enzyme lactase[136].

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[133] D i o s c o r i d e s, II, 70, 1, 1–5.

[134] Such food reduces the purgative effect of milk.

[135] I.e., it does not have a strong purgative effect.

[136] Nowadays, goat milk is perceived as easily digested, and it is usually allowed to be drunk by people allergic to cow milk since it does not contain large amounts of lactose or casein, which are responsible for allergic reactions. The aforementioned establishments on difficulties in drinking milk are reinforced by modern genetic, anthropological and archaeological research, which certifies (despite their fragmented nature and only recent developments in the field) that Neolithic and then Hellenic societies of Greece and the eastern shoreland of the Mediterranean Sea did not develop lactose tolerance, in contrast to northern European peoples; this trend – despite fluctuations and numerous migrations, continues today – cf. e.g., G.G. H a r r i s o n, *Primary Adult Lactase Deficiency: A Problem in Anthropological Genetics*, AAnth 77, 1975, p. 812–835 (esp. 815, 817, 821); S. L a d a s, J. P a p a n i k o s, G. A r a p a k i s, *Lactose Malabsorption in Greek Adults: Correlation of Small Bowel Transit Time with the Severity of Lactose Intolerance*, Gut 23, 1982, p. 968–973; D.M. S w a l l o w, *Genetics of Lactase*

When describing sheep milk as thick, sweetish, and containing great amounts of fat, Dioscorides remarked that it was not as beneficial to the stomach[137] as goat milk[138]. He also stated that the milk of the donkey, cow and mare was good for the digestive system, with a reservation that they might still cause digestion problems[139]. While commenting on this extract, it can be legitimately concluded that – since there is no information on how common it was to breed horses[140] and donkeys[141] for their milk – the author of *De materia medica* must be listing the three species which were bred for milk, and that the order in which they appear in the text is by no means coincidental as it corresponds with data on the same subject recorded by other authors.

Persistence and Lactose Intolerance, ARG 37, 2003, p. 197–219; P. Anagnostou, C. Battaggia, V. Coia, C. Capelli, C. Fabbri, D. Pettener, G. Destro-Bisol, D. Luiselli, *Tracing the Distribution and Evolution of Lactase Persistence in Southern Europe through the Study of the T–13910 Variant*, AJHB 21, 2009, p. 217–219; A. Perino, S. Cabras, D. Obinu, L. Cavalli Sforza, *Lactose Intolerance: A Non-Allergic Disorder Often Managed by Allergologists*, EAACI 41.1, 2009, p. 3–16; Y. Itan, A. Powell, M.A. Beaumont, J. Burger, M.G. Thomas, *The Origins of Lactase Persistence in Europe*, PLoS.CB 5.8, 2005, p. 1–13; Y. Itan, B.L. Jones, C.J.E. Ingram, D.M. Swallow, M.G. Thomas, *A Worldwide Correlation of Lactase Persistence Phenotype and Genotypes*, BMC.EB 10, 2010, p. 1–11; P. Gerbault, A. Liebert, Y. Itan, A. Powell, M. Currat, J. Burger, D.M. Swallow, M.G. Thomas, *Evolution of Lactase Persistence: An Example of Human Niche Construction*, PTRS.BS 366, 2011, p. 863–877 (esp. 866 et seq.); M. Leonardi, P. Gerbault, M.G. Thomas, J. Berger, *The Evolution of Lactase Persistence in Europe. A Synthesis of Archaeological and Genetic Evidence*, IDJ 22, 2012, p. 88–97; J. Rocha, *The Evolution of Lactase Persistence*, APor 29, 2012, p. 121–137 (esp. 123 et seq.); S.P. Morris, *Dairy Queen: Churns and Milk Products in the Aegean Bronze Age*, Opus 7, 2014, p. 205–222 (esp. 215); N. Silanikove, G. Leitner, U. Merin, *The Interrelationships between Lactose Intolerance and the Modern Dairy Industry: Global Perspectives in Evolutional and Historical Backgrounds*, Nut 7, 2015, p. 7312–7331 (esp. 7315); Z. Hofmanová et al., *Early Farmers from across Europe Directly Descended from Neolithic Aegeans*, PNAS 113, 2016, p. 6886–6891 (esp. 6887).

[137] I.e., it has a relatively strong purgative effect.

[138] Dioscorides, II, 70, 1, 8–9.

[139] Dioscorides, II, 70, 1, 10–11. Thus, they are all strongly purgative.

[140] Although *De materia medica* does not contain a dietetic evaluation of mare's milk, it was explicitly stipulated in Galen's *De alimentorum facultatibus*, where mare's milk is described as watery and virtually devoid of fat – Galen, *De alimentorum facultatibus*, 681, 15 – 682, 1, vol. VI.

[141] The low value of donkey milk was discussed in the section devoted to Celsus' text.

Dioscorides also added that when animals were fed the bindweed called scammony, false hellebores, annual mercury (*Mercurialis annua* L.) or clematis, the resulting milks led to disorders of the stomach and digestive tract, which we learn that he heard of happening in the mountainous regions within the country of the Vestines. There, goats grazed on leaves of white hellebore (*Veratrum album* L.). Despite vomiting them up instantly, the ensuing milk had an exceptionally strong laxative effect and induced nausea.

As far as processing milk is concerned, Dioscorides has very little to say about it. He does, however, testify that it was exposed to high temperatures and, once boiled, it led to constipation, which was particularly true for milk that was thickened by the addition of hot stones[142]. Naturally, what Dioscorides has in mind here is procedures applied not only by medics, and we can conclude that the main purpose of such techniques was not only to produce a medicament, but also to prolong the shelf life of a foodstuff prone to spoilage.

The therapeutic properties of milk were listed as follows. Milk is helpful in treating internal ulceration and tissue damage, especially in the larynx, lungs, intestines, kidneys and bladder, as well as pruritic skin irritations, efflorescence, and disturbances of humoral balance. Fresh milk is served with boiled honey and small amounts of water and salt. When boiled, milk becomes less carminative. If a patient suffers from ulcerations within the digestive system caused by an inflow of undesired juices, they should drink milk boiled down to half of its initial capacity by means of hot stones[143].

Milk was also served to alleviate the effects (the author lists painful erosions and burns) of such poisons as cantharidin, a substance obtained from the buprestis beetle (*boúprestis*)[144], the venom of the fire salamander, a poison acquired from black henbane – a certain type of bindweed (*Convolvulus oleifolius* L.) – aconite and autumn crocus (*Colchicum autumnale* L.)[145]. According to Dioscorides, cow milk – which proved very

[142] Dioscorides, II, 70, 2, 7–8.
[143] Dioscorides, II, 70, 2, 8 – 3, 5.
[144] It could be equally obtained from the Spanish fly.
[145] Dioscorides, II, 70, 5, 1–4.

effective at counteracting toxic agents – was also particularly effective when used as a wash applied to ulcerations of the oral cavity and tonsils[146], whereas donkey milk was considered most powerful as a mouthwash administered for gum issues and loose teeth[147]. Ulcerations within the digestive system caused by an influx of unwanted juices and painful constipation, were treated with sheep, cow and goat milk, with hot stones put in the vessel containing the milk. The liquid was administered in the form of an enema, made from the milk itself or a mixture of milk combined with either watery *ptisáne* or an infusion made from *chóndros* groats. This medicament was very effective in alleviating pain, and – in a similar formula – it could also be injected into an ulcerated uterus[148].

Breast milk was believed to be the sweetest and most nutritious. It alleviated stomachaches, cured *fthísis*, and counteracted the toxic effect triggered by drinking a poisonous substance obtained from lumpfish. Dioscorides claimed that when mixed with powdered incense, breast milk could be used as eye drops to treat haemorrhages occurring after a blow. It was also applied to sores resulting from gout, having been previously mixed with hemlock (*Conium maculatum* L.) and a *keroté*-type[149] ointment.

There were also contraindications to the application of milk, which Dioscorides claimed to be inappropriate for people with spleen and liver disorders, and for those suffering from headaches, dizziness and ailments related to hard tissue, as well as for epileptics. In such cases, it was, however, permissible to administer milk with the curd (*tyródes*) removed (i.e., *schistón*) in order to induce purgation[150].

Next, Dioscorides focused on discussing a number of overheard opinions with which he may not have agreed. Thus, he mentioned the belief that dog's milk from an animal that had given birth for the very first time

[146] Dioscorides, II, 70, 5, 4–6.
[147] Dioscorides, II, 70, 5, 6–7.
[148] Dioscorides, II, 70, 5, 7–12.
[149] Dioscorides, II, 70, 6, 1–5.
[150] Dioscorides, II, 70, 6, 6–9.

was supposed to soften (or remove) hair when applied to pilose spots, and to act as a counter poison when taken orally. Some also claimed that it triggered the abortion of dead foetuses[151].

Although Dioscorides did not include a comprehensive explanation of the classification system of milk constituents, he clearly indicated it was not a homogenous substance, and all its components were listed and described. The physician began with whey, which – once extracted – was useful whenever there was a need for a mild laxative effect, i.e., when excretion of content lingering within the digestive system was to be induced without the application of more radical agents[152]. He also added that non-invasive procedures were required in the treatment of melancholia, epilepsy, leprosy, elephantiasis, and efflorescences appearing all over the body[153]. In order to obtain whey, one had to bring about the coagulation of milk, which was often done by boiling it in a ceramic bowl and stirring with a freshly cut fig branch. While boiling the milk, one had to add a dash of *oksýmeli*, observing the proportion of one *kýathos* of *oksýmeli* for one *kotýle* of milk. This approach made the whey easy to separate from the curd. One also had to be very careful not to overboil milk, which could be prevented by repeatedly wiping the edge of the vessel with a sponge moistened in cold water. During the process, it was also common to immerse a silver vessel filled with cold water in the boiling milk. A single *kotýle* of whey was to be drunk regularly. Between each dose, the patient was supposed to take a stroll, and advised not to exceed the amount of five *kotýlai*[154]. What makes this extract interesting is the fact that not only does it demonstrate the procedures applied by doctors in obtaining *fármaka* and treating their patients, but also, in all probability, it refers to the methods used in the regular production of cheese,

[151] Dioscorides, II, 70, 6, 9–12. An analogical and yet more elaborate passage can be found in Galen's *De simplicium medicamentorum temperamentis ac facultatibus* (269, 4–15, vol. XII), though Galen unambiguously evaluates such statements as untrue. The similarity of statements uttered by both may lead to the conclusion that Dioscorides and Galen used a source text of analogical contents, possibly the work by Sextius Niger.

[152] Some of them (e.g., hellebore) have already been mentioned in this part of the text.

[153] Dioscorides, II, 70, 3, 6–10.

[154] Dioscorides, II, 70, 4, 1–10.

and specifically it describes the technology of obtaining curd without the use of animal rennet (but with the application of plant rennet, i.e., fig juice). These methods must have been standardised and commonly profited from, since similar mentions can be found in other medical source texts. Naturally, a fundamental technology used in cheesemaking during Dioscorides' time was an approach based on obtaining milk curd through the addition of animal rennet, as proved by his remarks on the production of cheese made from mare's milk.

Milk curd was the raw material used to produce cheese. Dioscorides writes that fresh, unsalted cheese was considered nutritious, beneficial to the stomach, easily digestible and contributed to tissue growth, while having a mildly purgative effect. The occurrence of particular features of various types of cheese depended on the kind of milk used to produce it[155]. Boiled cheese (i.e., cheese made from milk curd exposed to high temperatures – most likely by adding hot water or by heating up milk [or whey]), which was first squeezed and then baked, had a constipatory effect[156]. When used as a cataplasm, it healed eye inflammations and dark circles under the eyes[157]. Fresh, salted cheese was less nutritious, but suitable for purifying soft tissues, while having a negative impact on the stomach, the digestive system and intestines. A more mature cheese of this type showed a constipatory effect while its whey made ideal dog food[158]. Dioscorides concludes his teachings on cheese referring to so-called *hippáke* (i.e., *hippace* in Latin). We learn that it was a cheese produced from mare's milk. It had a strong odour and was very nutritious, just like products made from cow milk. Some also used this term to describe the rennet obtained from horse stomachs[159].

Last but not least, the medical author turns to butter. Not even mentioning cow milk as its source, Dioscorides argued that it was not only made from full-fat sheep milk, but also from that obtained from goats. He also describes (though quite superficially) the technology of

[155] Dioscorides, II, 71, 1, 1–4.
[156] Dioscorides, II, 71, 1, 4–5.
[157] Dioscorides, II, 71, 1, 5–6.
[158] Dioscorides, II, 71, 1, 6–9.
[159] Dioscorides, II, 71, 1, 10–12.

its production, writing that it was made by shaking milk until the fat was separated[160]. The vast majority of his paragraph on butter has been devoted to its application in medical procedures. Dioscorides maintained that, because butter had a softening effect, it worked similarly to olive oil, leading to the purgation of the digestive system when drunk in large amounts, which means that butter was seen as a mere substitute of the latter, used only if olive oil was temporarily unavailable. When mixed with honey and rubbed into a sore spot, it alleviated the pain related to tooth eruptions experienced by young children, as well as other gum irritations, including aphthae. When applied to the skin, it nourished and protected the body against *psydrákia*, i.e., pustules. It also eliminated inflammations and hardenings of the uterus, though not those accompanied by a bad smell and chronic. Butter could also be injected into the body of patients suffering from dysentery and ulcerations within the large intestine. It was also mixed with agents facilitating the accumulation and excretion of pus from the body, especially if the purulence was the effect of damage to hard tissue, the meninges or bladder. What is more, butter could also induce the repair and cleansing of wounds, and help victims of a viper bite. Finally, the author strays from medicine, and adds a remark which reflects culinary realia, mentioning the fact that butter was added to some dishes instead of olive oil, and could substitute for lard in baking[161].

The fragment calls for a commentary. First, one can surmise that cow milk butter is absent from Dioscorides' characterization because the author's description does not refer to the specifics of the butter production in the whole Mediterranean but rather concerns its sun-scorched and mountainous eastern parts (including the region of Anazarbus, where Dioscorides grew up), which tend to be hardly accessible to cows but welcoming to sheep and goats. Second, this passage from *De materia medica* appears to confirm the conclusion drawn from Celsus' teachings that butter was primarily treated as a medicament. Dioscorides,

[160] Dioscorides, II, 72, 1, 1–4. A more detailed description of the technology is provided by Pliny. Cf. the passage of the present book devoted to butter in cuisine.

[161] Dioscorides, II, 72, 1, 5 – 2, 8.

however, recognises its limited alimentary role. Third, the author suggest that, although not as popular as olive or lard, butter was, in fact, more versatile than either of them, as it could be made use of (instead of the former) to prepare dishes that were commonly eaten with bread, i.e., so-called *ópsa*, or to be used for baking.

Butter was also used to make a curative soot. It was poured into a brand-new lamp which was then lit and covered with a ceramic vessel that tapered towards the top, with some holes at the bottom. The lamp would burn until it ran out of the first portion of fat, which was followed by adding another one for as long as necessary. The accumulated soot on the walls of the vessel, later removed with a feather, was believed to have the power to desiccate the juices responsible for eye diseases, and to have a mild styptic effect and the ability to repair and cicatrise wounds[162].

Conclusions

Recapping on the preceding deliberations on *materia medica*, it should be concluded that Dioscorides' teachings on milk do not differ from those presented by Celsus, since both authors referred to a similar or the same doctrine which they knew in its already established form. Neither is there a difference between Celsus' and Dioscorides' therapeutics. We may surmise then that the similarity stems from the fact that both owed their knowledge to the same corpus of medical knowledge canonised by Asclepiades of Bithynia and his followers (for instance, Sextius Niger).

De medicina and *De materia medica* also draw the same picture of milk-animal husbandry and food processing. One can notice that the manner of presentation and content differ little from those we can discover in *De re rustica* by Varro. In *De materia medica*, goats, sheep and cows are the major providers of milk, and the product itself is presented as the main raw material used in cheesemaking. There is no indication that in the second half of the 1st c. AD fresh milk was con-

[162] Dioscorides, II, 72, 3, 1–9.

sumed more frequently or in greater amounts than at the beginning of the period. Moreover, doctors used the same technologies to increase its shelf life (boiling, adding salt or honey), and to extract its components for later use in their medical practice.

Cheese seems to have been a commonly used product, available in a wide range. Dioscorides enriched our knowledge on the subject by expressing an important remark regarding cheesemaking procedures that involved heat processing. This technology appears to be analogical to methods applied today in the production of mozzarella and/or halloumi. Interestingly, this product was also baked, which indicates that the tradition of grilling cheese is certainly cole to (or even over) two thousand years old. What is more, the information provided in *De materia medica* confirms the variety of cheesemaking technologies and the abundance of cheese types. Thus, cheese was made with or without heating the curd, with or without the addition of salt, and was consumed immediately after its production or following a period of ripening.

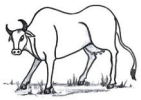
Dioscorides also clearly points to the role of butter in the diet eaten within the region of the Mediterranean Sea he was familiar with, although indicating its secondary importance. It was produced from various types of milk, by extracting fat through churning. Even though butter was used in cuisine, it was pictured as a substitute for olive oil and lard. On the other hand, the information included in the work also implies that it was widely applied by doctors as a medicament.

4. Conclusions

In the matter of milk and its derivatives, Celsus and Dioscorides represent the same medical tradition. Neither source provides information that would make it possible to determine the time when this tradition had been developed, but it is bound to have been (in its written form) the work of the Greeks. Although the authors of *De medicina* and *De materia medica* seem to utilise the output of different authorities[163],

[163] They both derive from sources characterised by different layouts of content. Celsus had at his disposal a separate list of dietetic and pharmacological descriptions of products,

in terms of approved assumptions, their teachings are the same, which leads us to a supposition that numerous physicians took a keen interest in galactology[164], and that it had been shaped as a doctrinally unified science some time before the 1st c. AD. As for galactology in *De materia medica* itself, it seems probable that the information provided by the author was heavily influenced by Dioscorides' reading of the work by Sextius Niger. Accordingly, it could be surmised that if we knew the latter's sources on milk, we would be also able to say more on the origin of galactology as we know it. Since the pool of knowledge presented by Celsus, Niger and Dioscorides was doctrinally similar (if not identical), it comes as no surprise that their assumptions were not questioned but constituted an excellent basis for the studies conducted by Galen.



and an independent (from the first list) register of therapies arranged according to body part, i.e., *secundum*. On the other hand, Dioscorides had access to the characteristics of products which included a list of therapies.

[164] An additional argument is the extract from Dioscorides' text, in which he writes about the variety of detailed views and opinions (most likely developed by different doctors) on the effect of dog's milk. A dispute on the issue, with a visibly negative attitude, can also be traced in Galen's output.