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THERAPEUTIC STRATEGIES FOR CANCER IN LATE ANTIQUITY: EVIDENCE FROM AETIUS OF AMIDA'S MEDICAL COMPENDIUM*

Abstract: This article examines the therapeutic management of malignant disease in the medical compendium of Aetius of Amida, treating the *Tetrabiblon* as evidence for late antique medical practice rather than merely as a repository of inherited theory. Focusing on passages concerning breast and uterine carcinomas, it analyses diagnostic description, surgical criteria, post-operative care, and pharmacological treatment. The article argues that Aetius preserves a coherent therapeutic framework structured around diagnostic classification, anatomical accessibility, prognostic evaluation, and humoral regulation which determine the choice between excision, cauterization, and palliative care. The study further shows that Aetius' pharmacological material, combining botanical, mineral, and animal-derived substances, reflects a practical and symptom-oriented approach to malignant disease. It suggests that late antique physicians possessed a more nuanced practical understanding of tumour progression and therapeutic limits than is often assumed.

Key words: pharmacology; gynaecology; surgery; malignant neoplasms

Non MeSH: history of cancer; late antique medicine; Byzantine medicine; Aetius of Amida; ancient surgery; humoral pathology

Introduction

The earliest Greek medical discussions of cancer appear in the Hippocratic corpus (4th century BCE), where malignant disease is described primarily through clinical observation of abnormal swellings and ulcerative lesions.[1] While these early texts focus on the visible characteristics and progression of such conditions, later authors developed a more systematic understanding of tumorous disease. Galen (2nd century CE) incorporated

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1 For scholarly discussions of tumours and cancers in Graeco-Roman antiquity, see [1-4]

cancer into his broader theory of pathological swellings *(onkoi)*, distinguishing between different forms of abnormal growth according to their consistency, humoral causes, and clinical behaviour. [5]

Despite these theoretical developments, both Hippocratic and Galenic medicine emphasized the practical limits of treatment. [6] Tumours that were accessible and not yet deeply ulcerated might be treated by cautery or surgical excision, whereas deeply seated or advanced lesions were generally regarded as incurable. Physicians therefore distinguished between cases suitable for intervention and those in which treatment would only increase suffering.

Much of the therapeutic knowledge associated with these traditions is preserved in the medical compilations of Late Antiquity. Unlike earlier theoretical treatises, these works were primarily oriented toward clinical practice, assembling surgical techniques, pharmacological recipes, and diagnostic observations intended for practical medical use. Among the most important of these compilations is the *Tetrabiblon* of Aetius of Amida (6th century CE), a sixteen-book collection that preserves a wide range of earlier Greek medical traditions.[2] [7-14]

Drawing extensively on authorities such as Hippocrates, Galen, Dioscorides, Rufus of Ephesus, Archigenes, and Leonides, Aetius reorganizes this inherited material into a systematic therapeutic manual. His compilation is particularly valuable for the history of ancient surgery, since it frequently transmits fragments of earlier surgical writings that would otherwise have been lost. In the case of breast diseases and cancer, Aetius records operative techniques attributed to Leonides, and therapeutic recommendations associated with Archigenes and other earlier authorities. These passages offer rare insight into ancient surgical practice, including the excision of breast tumours and the treatment of postoperative wounds.

The analysis that follows therefore combines close philological reading of Aetius' terminology with a historical interpretation of the therapeutic procedures described in the text. The sections examined in this study, devoted to breast and uterine cancer and

2 Despite its considerable importance for the transmission of late antique medical knowledge, Aëtius' *Libri medicinales* has been translated only in sections. The work circulated widely in the early modern period through the Greek edition printed by Aldus Manutius in Venice (1534) and the Latin translation published by Janus Cornarius in Basel (1546), which ensured its continued use among Renaissance physicians. Modern engagement with the text has largely taken the form of partial translations of individual books. From the late nineteenth century onward, several German scholars produced translations of selected sections, including Leopold Danelius' rendering of parts of Book VII (1889), Julius Hirschberg's translation of the first ninety chapters of the same book (1899), Max Wegscheider's translation of chapters 1–113 of Book XVI (1901), and Heinrich Steinhagen's translation of the entire Book IV (1938). Later contributions include James Ricci's English translation and commentary on Book XVI (1950) (based on the Latin edition of Janus Cornarius), Richey Waugh's English translation of Hirschberg's German version of Book VII (2000), Roberto Romano's Italian translation of parts of Book XVI (2006), and Jean-Marie Jacques' French translation of sections of Book XIII (2007). The most recent substantial contribution is Eric Gowling's annotated English translation of Book I (2014) and Books VI-10, by Ricarda Gäbel. [7,8]

their treatment, illustrate how late antique physicians integrated humoral theory, pharmacology, and surgical intervention in the management of malignant disease, revealing a structured therapeutic logic rather than the mechanical transmission of earlier authorities.

Conceptualizing tumours in Aetius' *Tetrabiblon*

As already noted, the theoretical framework for understanding cancer was articulated by Galen in *De tumoribus praeter naturam*. In this treatise he incorporated malignant disease into his broader theory of pathological enlargements (*onkoi)*, understood as bodily masses or swellings that exceed the natural state and impair normal function (ὅρος δὲ τῆς ὑπερβολῆς ἐστιν αὐτῶνή βλάβη τῆς ἐνεργείας). [5 s7.705] Such formations, Galen explains, are "contrary to nature" (*para physin*) and arise either from the accumulation of humours or from the presence of abnormal matter within the tissues. For Galen, deviation from the natural state was not merely quantitative but qualitative, affecting the very condition of the tissues, often through processes of inflammation, induration, and humoral alteration. [5 s7.706] Within this framework, tumorous conditions were classified according to their physical properties, humoral causes, and clinical progression.

While he retained the idea that malignant tumours were associated with an excess of black bile, Galen provided a more detailed account of the mechanisms by which this humour accumulated and became altered within a specific region of the body, particularly in organs rich in blood vessels such as the breasts or uterus. [15-18]

Galen's account is particularly important because it gave later physicians a stable conceptual language for distinguishing among different kinds of swellings according to their consistency, humoral origin, and clinical behaviour. Among these, *skirrhos* designated a hard, indurated lesion, usually associated with thickened or desiccated humours, especially black bile or dried phlegm. [17-19] Such lesions were typically slow-growing and could remain painless for some time, although in advanced stages they might become extremely hard and insensible. Galen notes that when these masses become very large and extremely hardened, they may even lose sensation entirely. [19 s7.735-6] Although not always malignant, scirrhous swellings were sometimes regarded as precursors to more destructive pathological growths.

By contrast, *karkinos* and *karkinōma* referred to malignant tumours in the stricter sense. In the Galenic tradition, these were linked above all to black bile and were recognized by their hardness, irregularity, dark coloration, and the presence of distended veins radiating around the lesion — features that reinforced the traditional comparison between malignant tumours and the legs of a crab. [20 s10.83.14] Precisely because these growths were thought to be deeply rooted in altered humoral matter, Galen regarded them as exceedingly difficult to cure. [16 s5.116, 5.122] Surgical intervention was therefore recommended only in selected cases, when the lesion remained localized and had not yet extensively invaded the surrounding tissues.

Aetius adopts this broad Galenic framework, but his terminology is more differentiated than the modern umbrella term "tumour" might suggest. He distinguishes between several kinds of lesions, including *phymata*, *choirades*, and *karkinoi*. In Gowling's translation of Aetius First Book and his nuanced medical vocabulary, *phymata* are best understood as "swellings," a general term covering various tumorous or raised lesions, often inflammatory or suppurative rather than malignant. *Choirades*, by contrast, refer to diseased lymph nodes, especially glandular swellings that may occur in the neck and other regions of the body. Only *karkinoi* correspond to malignant tumours in the strict sense.[3] [7]

The same precision appears in Aetius' use of terms for ulcerative pathology. The word *helkos* (ἕλκος) is most appropriately translated as "ulcer," denoting a lesion involving destruction of tissue rather than merely superficial irritation. More severe are the *helkē kakoēthē* (ἕλκη κακοήθη), which Gowling translates as "malignant ulcers." [7] Although this expression does not always correspond exactly to malignant neoplasia in the modern sense, it clearly denotes progressive, painful, foul-smelling, and destructive ulcerations with a grave prognosis. In this respect, Aetius preserves an important diagnostic distinction between ordinary ulcers, refractory or invasive ulcerations, and cancer proper.

What emerges from this terminology is a distinctly layered pathology of abnormal growths and lesions. Aetius' *Tetrabiblon* does not collapse swellings, glandular enlargements, indurations, ulcers, and cancers into a single undifferentiated category. Rather, it reflects a medical taxonomy in which hardness, ulceration, suppuration, anatomical location, and responsiveness to treatment all mattered for diagnosis and prognosis.

The most detailed discussion of malignant disease in Aetius' *Tetrabiblon* appears in Book 16, devoted to gynaecology, where the author presents extensive descriptions of breast and uterine cancers together with the therapeutic strategies employed in their treatment.

Breast cancer and its surgical treatment

Drawing on earlier authorities, particularly the surgeon Leonides, Aetius of Amida transmits accounts of both the clinical features and the surgical treatment of malignant breast disease. The tumours are described as hard, irregular masses that may become painful, ulcerated, and may be accompanied by dark or livid veins spreading across the surrounding tissue. Such features correspond closely to the diagnostic signs of cancer described in earlier Greek medical texts. Aetius preserves the following description, attributed to Archigenes and Leonides:

3 These lexical distinctions are significant, since they demonstrate that Aetius' diagnostic vocabulary was considerably more precise than the generalized modern term "tumour" might suggest. In this regard, Eric Gowling's translation of *Aetius of Amida, Libri medicinales, Book 1* — accompanied by extensive commentary on Aetius' medical terminology — is particularly valuable. Gowling's medical training allows him to interpret the technical vocabulary of the text with close attention to its possible correspondence with modern pathological concepts.

On carcinomas in the breasts, according to Archigenes and Leonides, and on the signs of ulcerated carcinomas[4]

The formation of cancerous tumours occurs most frequently in the breasts, and women are more often affected by the disease than men, particularly those who are fleshy and possess large breasts. The ancients called the cancerous ulcer both malignant and beast-like. It was termed "cancerous" metaphorically after the animal crab; for these creatures are rough and harsh in their hardness, and whatever they seize with their claws they hold fast and are difficult to detach. In a similar manner, the cancerous tumour is hard and resistant to pressure, and nodular and for this reason difficult to cure or even incurable. It is also called beast-like and malignant, by comparison with wild and harmful animals; for the disease is difficult to treat and becomes more aggressive under therapy and aggravated by surgical intervention.

There are two principal forms of carcinomas: some are non-ulcerated, while others are ulcerated. The non-ulcerated carcinomas were called hidden by most of the ancient physicians; Philoxenus, however, used the term hidden carcinoma particularly for those occurring in the uterus or the intestines. When the cancer is non-ulcerated, a tumour is found in the breast, varying in size, resistant to pressure, irregular, possessing the harshness of a wild beast. It is firmly rooted in depth, sending its roots far inward and appearing as if bound to the neighbouring veins; the surrounding veins become varicose. In colour it is ash-grey, purplish, and somewhat livid. To the eye it may seem soft, but to the touch it proves extremely hard; therefore, one should not trust the impression given by sight alone. It produces stabbing pains that extend far away, so that by sympathy malignant swellings arise in the armpits, and the pains extend even to the clavicle and the shoulder blade. The signs of an ulcerated carcinoma are as follows: it continually eats away and undermines the tissues in depth and cannot be made to stop. It discharges ichorous fluids more noxious than any poisonous corruption, foul-smelling and abundant. Stabbing pains likewise accompany it, and it is even more aggravated by touch and by medicinal treatments.

Περὶ τῶν ἐν μαστοῖς καρκινωμάτων ἐκ τῶν Ἀρχιγένους καὶ Λεωνίδου, καὶ περὶ σημείων τῶν ἑλκομένων καρκινωμάτων

Ἡ τῶν καρκινωδῶν ὄγκων γένεσις συνεχέστατα γίνεται περὶ τοὺς μαστούς, μᾶλλον δὲ ἀνδρῶν ἁλίσκονται τῷ πάθει αἱ γυναῖκες, εὐσάρκους τε καὶ μεγάλους ἔχουσαι τοὺς τιτθούς. Οἱ δὲ ἀρχαῖοι τὸ καρκινῶδες ἕλκος καὶ κακόηθες προσηγόρευσαν καὶ θηριῶδες·καρκινῶδες μὲν κατὰ μεταφορὰν τῶν καρκίνων ζῴων, καὶ γὰρ εἰσὶ τραχέα καὶ ἀπηνῆ τῇ σκληρότητι τὰ ζῷα ταῦτα, καὶ εἴ τινος λάβοιντο τοῖς χείλεσιν εἰσὶ δυσαπόσπαστα, παραπλήσιος δὲ καὶ ὁ καρκινώδης ὄγκος, ἀντίτυπος ὑπάρχων καὶ ὀχθώδης καὶ διὰ τοῦτο δυσίατος ἢ καὶ ἀνίατος. θηριώδης δὲ καὶ κακοήθης προσαγορεύεται ἀπὸ τῶν ἀγρίων

4 Unless otherwise indicated, all translations of passages from Aetius of Amida are the author's own translations from the Greek text of the *Libri medicinales*. Published translations have been consulted for comparison, but the wording adopted here reflects the author's interpretation of the original Greek.

> θηρῶν καὶ κακοήθων ζῴων, καὶ γὰρ δυσπαθὲς τὸ πάθος καὶ τῇ θεραπείᾳ ἀγριαινόμενον καὶ τῇ χειρουργίᾳ παροξυνόμενον. Δύο δὲ καρκινωμάτων εἰσὶν αἱ ἀνώτεραι διαφοραί, τὰ μὲν γὰρ αὐτῶν ἀνέλκωτα γίνεται, τὰ δὲ ἡλκωμένα. τὰ μὲν οὖν ἀνέλκωτα καρκινώματα κρυπτὰ ὠνό- μασαν οἱ πλεῖστοι τῶν ἀρχαίων, ὁ δὲ Φιλόξενος ἰδίως κρυπτὸν ὠνόμασε καρκίνωμα τὸ ἐν μήτρᾳ ἢ ἐντέροις γινόμενον. Ἀνελκώτου μὲν ὄντος καρκίνου, ὄγκος καταλαμβάνεται ἐν τῷ μαστῷ διαφέρων μεγέθει, ἀντίτυπος, ἀνώμαλος, ἀγρίου θηρὸς τὴν ἀπήνειαν ἔχων, στερεῶς δὲ διὰ βάθους ἐμπεφυκὼς καὶ τὰς ῥίζας πόρρω ἐμβεβλημένας καὶ φλεψὶ ταῖς παρακειμέναις οἷον συνδεδεμένος, καὶ κεκιρσωμένας ἔχων τὰς πέριξ φλέβας, τεφρώδης τέ ἐστι καὶ πορφυρίζων καὶ ὑποπέλιος τῇ χρόᾳ, καὶ τοῖς μὲν ὁρῶσι μαλακὸς νομίζεται, τοῖς ἁπτομένοις δὲ σκληρότατος· ὅθεν οὐ πιστευτέον τῇ τῆς ὄψεως δόξῃ· ὀδύνας τε νυγματώδεις καὶ πόρρω που διατεινούσας ἐμποιεῖ, ὥστε κατὰ συμπάθειαν ἐν ταῖς μασχάλαις βουνούσας ἐμποιεῖ, ὥστε κατὰ συμπάθειαν ἐν ταῖς μασχάλαις βουβῶνας ἐπανίστασθαι κακοήθεις, διήκουσι δὲ καὶ μέχρι κλειδὸς καὶ ὠμοπλάτης. Ἡλκωμένου δὲ σημεῖα ταῦτα· διαβιβρώσκων ἀεὶ καὶ διὰ βάθους ὑποκάμπτων, στῆναι ἀμηχανεῖ· ἰχῶράς τε ἐκβάλλει παντὸς ἰοῦ θηριώδους πονηροτέρους, δυσώδεις τε καὶ πολλούς· ὁμοίως δὲ πόνοι νυγματώδεις καὶ τούτῳ συνεδρεύουσι, καὶ μᾶλλον οὗτος παροξύνεται ἐν ταῖς χειραψίαις καὶ ταῖς φαρμακείαις. [10 s6.47]

The text also contains an observation that may correspond to what modern clinical observation would interpret as lymphatic spread. In describing non-ulcerated breast carcinomas, the author notes that "malignant swellings arise in the armpits by sympathy." Although explained through the ancient physiological notion of *sympatheia*—the interconnectedness of body parts—this description may reflect observation of axillary lymph node involvement in breast cancer.[5] The passage demonstrates that ancient physicians were capable of recognizing regional spread of malignant disease even without knowledge of the lymphatic system.[6]

5 In Galenic pathology a distinction is drawn between diseases that arise "sympathetically" (*kata sympatheian)* and those that originate in the affected part itself (*idiopatheia*). Sympathetic affections were understood as disorders produced by the functional or physiological interconnection of bodily parts, whereby a lesion in one organ could provoke secondary symptoms in another. By contrast, idiopathic diseases arise from causes located within the affected organ itself. Galen further distinguishes between primary affections (*protopatheiai*) and secondary or subsequent affections (*deuteropatheiā* or *hysteropatheiā*), emphasizing that conditions initially produced by sympathy may eventually become established as stable disorders of the affected part. This conceptual framework allowed ancient physicians to explain the apparent spread or persistence of disease within the body without positing a distinct anatomical pathway such as the lymphatic system. [21 s8.30-1]

6 The connection between cancer and the lymphatic system was not fully understood until the early modern period, following the discovery of the lymphatic vessels in the seventeenth century. Lymph as a carrier of cancer material. [22]

Which carcinomas are curable, and which are incurable

In general, carcinomas that are attached to the thorax must be abandoned as hopeless, just as those occurring in the head, neck, back, armpits, or groin; for these too are incurable and, if handled surgically, bring the danger of severe haemorrhage while still not being completely removed. But those that arise at the extremity of the breast (the nipple) are curable, provided they are treated by removal of the affected part.

Τίνα τῶν καρκινωμάτων εὔιατα καὶ τίνα ἀνίατα:

Καθόλου δὲ τὰ συμφυῆ τῷ θώρακι καρκινώματα ἀπαγορεύειν προσήκει, ὥσπερ καὶ τὰ ἐν τῇ κεφαλῇ ἢ τραχήλῳ ἢ νώτοις ἢ μασχάλαις ἢ βουβῶσι, καὶ ταῦτα γὰρ ἀνίατα τὸν ἐν χερσὶ κίνδυνον καθ' αἱμορραγίαν ἐπάγονται μετὰ τοῦ μὴ τελέως ἀναιρεῖσθαι. τὰ δὲ κατὰ τὸ ἄκρον τοῦ τιτθοῦ γινόμενα, εὐΐατα συναπτόμενα· στερήσει δηλονότι τοῦ πάσχοντος μορίου. [10 s16.48]

Ancient medical authors were already aware that surgical intervention in cancer could be dangerous and at times counterproductive. While later surgeons such as Leonides described radical excision of breast tumours, earlier medical authorities associated with the Hippocratic tradition warned that intervention could accelerate death. This tension between conservative and surgical approaches reveals an early awareness of the limits of operative treatment in malignant disease.

The passage attributed to Leonides preserves one of the earliest detailed descriptions of surgical intervention for breast cancer in the Greek medical tradition. The procedure combines excision (*ektomē*) with repeated cauterization (*kausis*) in order to control haemorrhage and destroy the remaining diseased tissue. The surgeon first incises the healthy tissue surrounding the tumour and then progressively cuts deeper, repeatedly applying cauterization. This sequence of cutting followed by cauterization reflects a well-established principle in ancient surgery: cautery served both as a haemostatic tool and as a means of preventing the spread of malignant tissue.

Surgical treatment of carcinomas according to Leonides

In cases of carcinomas that are not adherent to the thorax, I customarily employ surgical treatment. The procedure is as follows. The patient is positioned lying on her back. I make an incision in the healthy part of the breast above the carcinoma, and the divided tissue is then cauterized with cauteries until the bleeding is checked by the formation of eschar. Then I cut again, marking out the area while cutting deeply into the breast, and once more I cauterize the cut surfaces. I repeat this process many times, cutting and afterwards cauterizing in order to stop the bleeding, and this bleeding is without danger. After the complete removal of the tumour, I again cauterize the entire area until it becomes thoroughly dried out. The first and second cauterizations are performed in order to stop the haemorrhage, while the final application of the cautery, after the complete excision, is

intended to eradicate the whole disease. At times, however, I am accustomed to operate even without cauterization, when a hard, swine-like swelling forms around the breast, suggesting the early development of a carcinoma. When the disease is of this kind, it is sufficient to perform an excision of the breast beginning from the healthy parts, for in such cases the haemorrhage is not severe.

Χειρουργία καρκινωμάτων ἐκ τῶν Λεωνίδου.

Ἐγὼ μὲν οὖν ἐπὶ τῶν μὴ συμπεφυκότων τῷ θώρακι καρκινωμάτων, εἴωθα χρῆσθαι τῇ χειρουργίᾳ· ἔστι δὲ ὁ τρόπος τοιοῦτος· τῆς πασχούσης ὑπτίας ἐσχηματισμένης, ὑπὲρ τὸ καρκίνωμα διαιρῶ τὸ μέρος τοῦ μαστοῦ τὸ ὑγιές, καὶ τὸ διῃρημένον ὑποκαίω καυστηρίοις, ἕως ὅτου ἐσχαρωθέντων τῶν σωμάτων ἐπισχεθῇ ἡ αἱμορραγία· εἶτα πάλιν τέμνω, περιχαράσσων ἅμα καὶ βαθυτομῶν τὸν μαστόν, καὶ πάλιν τὰ τετμημένα καίω· καὶ πλειστάκις τοῦτο ποιῶ τέμνων καὶ μετὰ ταῦτα καίων πρὸς ἐποχὴν τῆς αἱμορραγίας, καὶ ἔστιν ἀκίνδυνος ἡ αἱμορραγία αὕτη. Μετὰ δὲ τὴν τελείαν ἀποκοπὴν πάλιν ἐπικαίω τὰ μέρη τὰ ὅλα ἕως ἀναξηρασμοῦ, τὸ μὲν γὰρ πρῶτον καὶ δεύτερον πρὸς τὴν τῆς αἱμορραγίας ἐποχήν, ἔσχατον δὲ μετὰ τὴν τελείαν ἀποκοπὴν τὰ καυτήρια προσάγειν πρὸς τὴν τοῦ πάθους ὅλου ἀνασκευήν·εἴωθα δέ ποτε καὶ χωρὶς καύσεως ἐνεργεῖν, ταν ὄγκος γένηται περὶ τὸν μαστὸν χοιρώδης, μελετῶν τὴν τοῦ καρκινώματος γένεσιν. Τοιούτου τοίνυν ὄντος τοῦ πάθους, ἔξεστιν ἀρκεσθῆναι τῇ ἀπὸ τῶν ὑγιῶν μερῶν ἐκτομῇ τοῦ μαστοῦ, οὐδὲ γὰρ σφοδρὰ γίνεται ἐπὶ τῶν τοιούτων αἱμορραγία [10 s16.49]

Particularly important is the emphasis on removing the tumour from the healthy tissue, which resembles the later surgical principle of removing diseased tissue together with surrounding healthy margins. Leonides also distinguishes cases in which the tumour is not firmly attached to the thoracic wall, considering these more suitable for surgical treatment. Tumours adherent to deeper structures were generally regarded as inoperable, largely because of the danger of severe bleeding and the difficulty of complete removal.[7]

A related surgical approach appears in the discussion of breast abscesses, [10 s16.43] which provides valuable insight into operative techniques applied to pathological lesions of the breast. When conservative treatments fail and the inflammation progresses to suppuration, the text recommends surgical intervention.

Putrefied tissue may be excised, but particular care is advised in the region near the nipple: the affected area should be removed through a crescent-shaped incision in order to expose the depth of the abscess while preserving the nipple itself. The preservation of the nipple is explicitly justified—among men for aesthetic reasons and among women both for appearance and for the continued secretion of milk. After the procedure the wound must be carefully packed, avoiding excessive pressure in order to prevent fistula formation, and the subsequent treatment includes dressings that promote suppuration

7 A similar distinction between operable superficial lesions and deeply rooted or adherent tumours can also be observed in earlier surgical discussions preserved in Galen and later summarized by Paul of Aegina, suggesting that this anatomical criterion formed a broader principle within the Greek surgical tradition.

and cleansing of the wound. Although the passage concerns abscesses rather than carcinomas, it illustrates the broader surgical principles governing breast operations in ancient medicine, including selective excision of diseased tissue, anatomical caution around the nipple, and systematic post-operative care.

Leonides [10 s16.44] also discusses one of the most frequent complications following surgical treatment of breast lesions: the formation of fistulas. According to the text, fistulas may arise after the rupture of an abscess or after surgical intervention when the wound is poorly treated. In most cases these fistulous tracts remain confined to the soft tissues of the breast rather than extending to bone. Treatment initially relies on topical medication, but in chronic cases surgical intervention is again required: the tract of the fistula must be opened with a probe, incised along its entire course, and all hardened or callous tissue removed. Only after this excision should cleansing and healing plasters be applied. This passage illustrates that ancient surgeons were well aware of postoperative complications and developed systematic strategies combining pharmacological treatment with secondary surgical correction.

Care after excision or cauterization

After excision, when cauterization has not been employed, we apply agents that promote bleeding (to drain the wound), followed by treatment that produces suppuration and the subsequent care intended to dry the lesion. When cauterization has been used in the surgery, however, we apply on the other occasions a poultice of plantain, or knotgrass, or finely ground sesame. Sometimes we mix one of the aforementioned substances with bread, and over the poultice we place a cloth soaked in water. A mixture of milk and honey applied with lint removes very well and painlessly the eschars produced by the cautery.[8] After the treatment described above, the patient should be kept resting in a warm room, for all cooling is harmful to the condition, especially during the time when the ulcers are being cleansed, since it provokes spasms. On the second or third day, after loosening the dressing, we pour lukewarm water over the wound and apply a poultice of boiled lentils with a very small amount of honey, because honey is irritating. Over this we place leaves of vine or lettuce, and apply a suitable bandage, continuing this treatment until the eschars fall away. After the eschars have fallen, we use lint dressings, but we avoid stronger medicines and fatty substances, since these may cause the disease to recur. For this reason, I usually mix rose oil with woman's milk or donkey's milk, soak the lint in this mixture, and apply it to the wound, covering it with an outer protective dressing soaked in the same preparation. The bandage should be simple and light, since the weight of many cloths is harmful in such cases. During the stage of suppuration, the rose oil should predominate; during the cleansing of the wound, the milk should be used in greater quantity. If the condition requires it, a poultice of melilot mixed with rose oil and water, or with woman's

8 Eschar is a thick, dry, black or brown layer of dead tissue (necrosis) that forms over severe wounds, burns, infections, or pressure ulcers, acting as a protective barrier.

milk, may be applied over the lint dressings. Cerates and elaborate poultices, however, are harmful in such cases. If a drying agent is required, finely washed and thoroughly dried pompholyx ash should be sprinkled on the wound, or cadmia that has been calcined three times, quenched in rose oil, then washed and carefully dried. During the course of treatment, the patient must abstain from wine, from hard-to-digest foods, and from cold drinks. When the ulcer is progressing toward healing, nothing should be neglected; rather, the whole condition of the body must be strengthened and directed toward good nourishment through wholesome foods, exercise, swinging therapy, and the rest of the restorative regimen.

Μετὰ τὴν ἐκτομὴν ἢ καῦσιν ἐπιμέλεια

Μετὰ δὲ τὴν ἐκτομὴν καύσεως μὴ δοκιμαζομένης, διαμότωσιν προσλαμβάνομεν καὶ τὴν ἀκόλουθον πυοποιὸν θεραπείαν καὶ τὴν λοιπὴν ἐπιμέλειαν ἀναξηραίνειν ἐπαγγελλομένην· καύσεως δὲ ἐν τῇ χειρουργία δοκιμαζομένης, ἐπὶ μὲν τῶν ἄλλων χρώμεθα καταπλάσματι ἀρνογλώσσου ἢ πολυγόνου ἢ σησάμῳ λείῳ, ἐνίοτε δὲ καὶ ἐντὸς τοῦ ἄρτου μίγνυμέν τινι τῶν εἰρημένων, ἔξωθεν δὲ τοῦ καταπλάσματος ὀθόνιον ὕδατι βεβρεγμένον ἐπιτίθεμεν. καλῶς δὲ καὶ πλάσματος ὀθόνιον ὕδατι βεβρεγμένον ἐπιτίθεμεν. καλῶς δὲ καὶ ἀνωδύνως ἀφίστησι τὰς ἐκ τῶν καυστήρων ἐσχάρας, γάλα μέλι προσλαβὸν καὶ διὰ τῶν μοτῶν προσαγόμενον, μετὰ δὲ τὴν εἰρημένην ἐπιμέλειαν κατάκλεισις δοκιμαζέσθω ἐν οἴκῳ θερμῷ· πᾶσα γὰρ ψύξις βλαβερὰ τῷ πάθει καὶ μάλιστα ἐν τῷ τῆς ἀνακαθάρσεως τῶν ἑλκῶν καιρῷ, σπασμὸν γὰρ ἐρεθίζει. Τῇ δὲ δευτέρᾳ ἢ τρίτῃ λύσαντες, καταντλήσωμεν ὕδωρ χλιαρόν, καταπλάττοντες φακῷ ἑφθῷ μετὰ μέλιτος πάνυ ἐλαχίστου διὰ τὸ ἐρεθιστικὸν τοῦ μέλιτος, ἔξωθεν δὲ φύλλα ἀμπέλου ἢ θριδακίνης ἐπιτιθέντες ἐπιδέσμῳ οἰκείῳ χρώμεθα καὶ τούτῳ ἐπιμένομεν ἕως ἐκπέσωσιν αἱ ἐσχάραι. Μετὰ δὲ τὴν τῶν ἐσχαρῶν ἔκπτωσιν τῇ διαμοτώσει χρώμεθα, παραιτούμεθα δὲ ἐπὶ τούτων τὰ δριμύτερα τῶν φαρμάκων καὶ τὰ λιπαίνοντα, εἰς ἀνάμνησιν γὰρ ταῦτα ἄγει τὸ πάθος. διόπερ εἴωθα γάλακτι γυναικείῳ ἢ ὀνείῳ ῥόδινον ἔλαιον προσπλέκειν, καὶ τούτῳ τοὺς μοτοὺς βρέχειν καὶ προστιθέναι κατ' αὐτῶν ἔξωθεν μοτοφύλακα τῷ αὐτῷ βεβρεγμένον, καὶ ἐπίδεσιν καὶ ἁπλῆν καὶ κούφην παραλαμβάνειν, ὁ γὰρ τῶν πολλῶν ὀθονίων φόρτος ἐπὶ τούτων βλαβερός. Καὶ ἐν μὲν τῷ τῆς πυοποιήσεως καιρῷ πλεῖον ἔστω τὸ ῥόδινον, πρὸς δὲ τὴν ἀνακάθαρσιν τὸ γάλα πλεοναζέτω· ἐὰν δὲ κατεπείγῃ, ἔξωθεν τῶν μοτῶν καταπλάσματι χρήσθω μελιλώτων μετὰ ῥοδίνου καὶ ὕδατος ἢ γάλακτος γυναικείου καὶ ἐπιτιθέσθω, τὰ γὰρ κηρώματα καὶ περίεργα καταπλάσματα ἐπὶ τούτων βλαβερά. εἰ δὲ ξηρῶν χρεία γένοιτο, σποδὸς πομφόλυγος ἀκριβέστατα πεπλυμένη καὶ ἐξηραμένη ἐπιπαττέσθω, ἡ καδμία τρὶς κεκαυμένη καὶ ἐσβεσμένη ῥοδίνῳ, ἔπειτα πεπλυμένη καὶ ἀκριβέστατα ἐξηραμένη· ἀπεχέσθω δὲ κατὰ τὸν καιρὸν τῆς θεραπείας οἴνου καὶ τῶν δυσπεπτικῶν τροφῶν καὶ ψυχροποσίας. Τῆς δὲ ἑλκώσεως εἰς ἀπούλωσιν ἀγομένης, οὐδὲν κατὰ ἀμελεῖν ἀλλὰ ῥωννύειν τὴν ἅπασαν ἕξιν τοῦ σώματος καὶ εἰς εὐχυμίαν τρέπειν, δι' εὐχύμων τροφῶν καὶ γυμνασίων καὶ αἰώρας καὶ τῆς λοιπῆς ἀναληπτικῆς ἀγωγῆς. [10 s16.50]

Post-operative care in Aetius' treatise also demonstrates a structured regimen designed to manage the wound environment. After excision, the wound was treated sequentially with dressings that promoted bleeding, then suppuration, and finally drying of the lesion. Various poultices made from plantain, knotgrass, sesame, lentils, and honey were applied, while milk-based dressings and rose oil were used to soften eschars and encourage healing. These preparations combined plant-based pharmacology with mineral agents commonly used in ancient wound management. Particular attention was given to bandaging, temperature control, and dietary regulation during recovery.

Furthermore, pompholyx and cadmia were metallurgical by-products rich in zinc compounds, most likely zinc oxide. These substances were widely employed in ancient pharmacology for their drying and astringent properties.[9]

Although ancient physicians lacked any concept of microbial infection, the combination of cauterization, drying agents, and honey-based dressings may inadvertently have produced mild antiseptic effects.

Uterine cancer

The clinical picture described by Aetius is strongly suggestive of a condition consistent with cervical carcinoma in modern medical terminology. The combination of a hard cervical mass, ulceration visible through the speculum, foul-smelling discharge, persistent bleeding, and severe pelvic pain strongly suggests that ancient physicians were observing malignant cervical tumours. Although the anatomical and pathological mechanisms of cancer were unknown, the careful clinical descriptions demonstrate a high degree of empirical diagnostic observation.

On carcinomas of the uterus, according to Archigenes

> Among cancerous tumours, some are non-ulcerated, while others are ulcerated, as has already been stated in the section concerning the breasts. The signs of non-ulcerated carcinomas are as follows: a tumour is found around the mouth (cervix) of the uterus, hard, resistant to pressure, uneven and nodular; in colour it appears wine-lees-like, without redness, somewhat livid. It produces severe pains extending to the groins, the lower abdomen, the hypochondrium, and the loins. It reacts irritably to touch and to more aggressive medicinal treatment. When the carcinoma is ulcerated, the tumour and hardness remain accompanied by similar pain; but the ulcerated tissues appear eroded, excavated, and irregular when examined through the speculum. Most of them are foul, rugged; and even those that seem cleansed appear whitish, hideous, livid, wine-lees-coloured, and without redness, discharging blood. From the ulceration there flows continuously a thin, watery ichor, dark, fiery, and foul-smelling; for the female organs are especially prone to abundant

9 Modern research confirms that zinc oxide possesses antimicrobial activity and promotes the wound-healing process, suggesting that some of these treatments may have had genuine therapeutic effects despite the absence of microbiological theory.

discharge. The accompanying symptoms of the diseased uterus have already been described in the section on inflammation. The condition of carcinoma is incurable, as Hippocrates says. Therefore, the care appropriate for such cases should be mild—capable of soothing, comforting, and alleviating pain. Sitz-baths should be made with decoctions of fenugreek and mallow, and with the substances mentioned previously, and similar poultices should be applied. During acute attacks, mallow or marshmallow boiled in honeyed water until softened is very soothing; it should then be mashed together with bread and mixed with a little rose oil. A poultice made of figs, melilot, and rue is also useful; or boil the flesh of dates in sweet wine, mash it, and apply it; and use egg yolks. Alternatively, crush and sift poppy heads and apply them with the juice of knotgrass, or of lettuce, or coriander. Or grind the tender leaves of nightshade with woman's milk and apply them. Or mix the nightshade with rose cerate, grind it thoroughly, pour in a little cold water gradually, and use it. Likewise, grind mallow leaves with woman's milk and mix them with rose cerate. These remedies should be used during periods of exacerbation; afterwards a cerate should be applied, prepared with rose oil, or quince oil, or oil of vine flowers, or myrtle oil, together with dates boiled in sweet wine; or with preparations made from eggs or from barley, such as we also use for burns. Particularly suited for malignant conditions appears to be the deposit found in bronze-workers' hot-water vessels. This deposit is heated among glowing coals until thoroughly red-hot, then ground finely and mixed with rose cerate. These applications are placed externally in the vagina near the mouth of the uterus. Into the uterus itself one should inject warm woman's milk or donkey's milk, or the gently warmed juice of plantain, especially when the ulcer is bleeding, or the juice of knotgrass with a little frankincense. Pessaries made of saffron, woman's milk, a little opium, and hyssop also provide relief. Of all remedies, however, the most effective—also used for diseases of the rectum—is the following: washed litharge, male frankincense, wool grease (*oesypum*), fresh pork fat, and fresh butter in equal amounts (about two ounces each), with four ounces of rose oil. The preparation should be stored in a lead container; if it dries, it should be moistened with rose oil. Archigenes himself says: "I ground the litharge with one cotyle of lettuce juice, and after adding the consistency of honey I combined it with the melted ingredients." I also use similar remedies prepared for rectal conditions. The preparation written above, made with wine, is also excellent for corrosive lesions of the breasts, together with tanning sumac, cypress cones, galls, and cassia; dissolve them in woman's milk or donkey's milk and use.

The philosopher's remedy for carcinomas in the uterus

Burn three or five river crabs (an odd number) on hot coals; then grind them with henna (kyprinos) and apply the preparation with a feather.

Περὶ καρκινωμάτων ἐν μήτρᾳ, Ἀρχιγένους

Τῶν καρκινωδῶν ὄγκων τὰ μὲν ἀνέλκωτα ἐστὶ, τὰ δὲ ἡλκωμένα, καθὼς ἐν τῷ περὶ μαστῶν τόπῳ προείρηται. τῶν μὲν οὖν ἀνελκώτων καρκινωμάτων ἡ σημείωσις ἥδε· ὄγκος

εὑρίσκεται περὶ τὸ στόμα τῆς μήτρας σκληρὸς, ἀντίτυπος, ἀνώμαλός τε καὶ ὀχθώδης, χροιᾷ δὲ τρυγώδης, ἀνερευθὴς, ὑποπέλιος, πόνους ἰσχυροὺς ἐμποιῶν, εἰς βουβῶνας διήκων καὶ ὑπογάστριον καὶ ἦτρον καὶ ὀσφύν· ἀγανακτεῖ δὲ πρὸς τὰς χειραψίας καὶ τὴν ποικιλω-τέραν φαρμακείαν. Ἡλκωμένου δὲ ὄντος τοῦ καρκινώματος, ὁ μὲν ὄγκος καὶ ἡ σκληρία περιωδυνίᾳ παραπλησίως συνεδρεύει, διαβεβρωμένα δὲ καὶ ἀνεσκαμμένα καὶ ἀνώμαλα τὰ ἡλκωμένα σώματα διὰ τῆς διόπτρας θεωρεῖται. καὶ τὰ μὲν πλεῖστα αὐτῶν ἐστὶ ῥυπαρὰ, ὀχθώδη δὲ, λευκανθίζοντα καὶ εἰδεχθῆ τὰ δοκοῦντα κεκαθάρται, πελία τε, τρυγώδη, ἀνερευθῆ, δίαιμα φέρεται. ἐκκρίνεται δὲ ἀπὸ τῆς ἑλκώσεως διηνεκῶς μὲν ἰχὼρ λεπτὸς ὑδα- τώδης, μέλας, καὶ πυρώδης, καὶ δυσώδης· εὐρευμάτιστοι γὰρ ἰδίως οἱ γυναικεῖοι τόποι τυγχάνουσι. τὰ δὲ παρεπόμενα τῇ πασχούσῃ μήτρᾳ σημεῖα προείρηται ἐπὶ τῆς φλεγμονῆς. ἀνίατος δὲ ἐστὶν ἡ τοῦ καρκινώματος διάθεσις, ὡς Ἱπποκράτης φησίν. Ἐπιμέλεια τοίνυν ταύταις ἁρμόζει κούφη καὶ παρηγορεῖν καὶ πραῦνειν δυναμένη· ἐγκαθίσματα μὲν διὰ τήλεως καὶ μαλάχης ἀφεψήματος καὶ τῶν πλειστάκις προρρηθέντων, καὶ καταπλάσματα παραπλήσια· λίαν δὲ παρηγορεῖ ἐν τοῖς παροξυσμοῖς μαλάχη ἢ ἀλθαία ἐν μελικράτῳ ἑψηθεῖσα μέχρι τακερώσεως, καὶ συλλειουμένη ἄρτῳ καὶ ὀλίγῳ ῥοδίνῳ μολυνομένη, καὶ τὸ δι᾽ ἰσχάδων καὶ μελιλώτων καὶ πηγάνου κατάπλασμα, ἢ φοινίκων σάρκας ἑψήσας ἐν γλυκεῖ καὶ συλλεάνας ἄλειφε, καὶ ὠῶν λεκίθοις χρῶ· ἢ κωδύας κόψας καὶ σήσας μετὰ χυλοῦ πολυγόνου, ἢ σέρεως ἢ κορίου χρῶ ἢ στρύχνου τὰ ἁπαλὰ φύλλα λεάνας μετὰ γάλακτος γυναικείου προστίθει· ἢ κηρωτῇ ῥοδίνῃ ἀναλαβὼν τὸν στρύχνον, λέαινε καὶ ἐπίχεε κατὰ βραχὺ ψυχρὸν ὕδωρ, καὶ χρῶ· ἢ μαλάχης φύλλα λεάνας μετὰ γάλακτος γυναικείου, καὶ ἀναλαβὼν τῇ ῥοδίνῃ κηρωτῇ χρῶ. ταῦτα μὲν οὖν ἐν ταῖς περιόδοις, μετὰ δὲ ταῦτα κηρωτῇ ἐπιρριπτέσθω διὰ ῥοδίνου ἢ μηλίνου ἢ οἰνανθίνου ἢ μυρσινίνου μετὰ φοινίκων ἐν γλυκεῖ ἑφθῶν, ἢ τῷ δι᾽ ὠῶν ἢ τῷ διὰ τῶν κριθῶν, οἷς καὶ ἐπὶ τῶν πυρικαύστων χρώμεθα· ἰδίως δὲ συμπεφωνηκέναι δοκεῖ ταῖς κακοήθαις τὸ διὰ τῆς εὑρισκομένης ἐν τοῖς χαλκείοις τοῦ θερμοῦ ὕδατος ὑποστάθμης. Ἐγκρυπτομένη δὲ αὕτη ἡ ὑποστάθμη ἄνθραξι διαπύροις, μέχρις ἂν διάπυρος γένηται, λειοτριβεῖται καὶ ἀναλαμβάνεται κηρωτῇ ῥοδίνῃ. Ταῦτα μὲν οὖν ἔξωθεν προστίθεται τῷ κόλπῳ παρὰ τὸ στόμα τῆς ὑστέρας, εἰς αὐτὴν δὲ τὴν μήτραν ἐγχέειν προσήκει γάλα γυναικεῖον ἢ ὄνειον θερμὸν, ἢ ἀρνογλώσσου χυλὸν προσηνῶς κεχλιασμένον, καὶ μάλιστα ὁπόταν αἱμορραγῇ τὸ ἕλκος, ἢ χυλὸν πολυγόνου μετὰ βραχέος λιβάνου. παρηγοροῦσι δὲ καὶ πεσσοὶ οἱ διὰ κρόκου καὶ γυναικείου γάλακτος καὶ ὀπίου ὀλίγου καὶ ὑσσώπου σκευαζόμενοι. Πάντων δὲ ἄμεινον ἐνεργεῖ, ᾧ καὶ πρὸς τὰς ἑδρικὰς διαθέσεις χρώμεθα, ἔστι δὲ τοῦτο· λιθαργύρου πεπλυμένου γοστ ἤτοι οὐγ. στ. λιβάνου ἄρρενος, οἰσύπου, στέατος χοιρείου προσφάτου, βουτύρου νεαροῦ ἀνὰ γοβ ἤτοι οὐγ. β. ῥοδίνου γοδ ἤτοι οὐγ. δ. ἀποτίθεται δὲ τὸ φάρμακον ἐν μολυβδίνῃ πυξίδι, ξηραινόμενον μέντοι ὑγραίνεται ῥοδίνῳ ἐγὼ δὲ φησὶν Ἀρχιγένης τὴν λιθάργυρον ἐλείωσα σέρεως χυλῷ κοτύλην α, καὶ μέλιτος πάχος προσλαβοῦσαν ἀνέλαβον τοῖς τηκτοῖς. χρῶ δὲ καὶ τοῖς ὁμοίοις ἑδρικοῖς φαρμάκοις· κάλλιστον δὲ καὶ πρὸς τὰς τῶν μαστῶν ἀναβρώσεις τὸ προγεγραμμένον δι᾽ οἴνου σκευαζόμενον, καὶ ῥοῦς βυρσοδεψικὸς, καὶ κυπαρίσσου σφαιρία, καὶ κηκῖδες καὶ κασία, ἀνέσας δὲ αὐτὰ γάλακτι γυναικείῳ ἢ ὀνείῳ χρῶ.

Τοῦ φιλοσόφου πρὸς τὰ ἐν μήτρᾳ καρκινώματα

Καρκίνους ποταμίους τρεῖς ἢ πέντε μόνον ἄζυγας ἐπ᾽ ἀνθράκων καύσας, λείου μετὰ κυπρίνου καὶ διάχριε πτερῷ. [10 s16.109]

The passage is particularly noteworthy for its reference to direct visual examination through a speculum (διόπτρα), which allowed the physician to inspect the ulcerated surface of the cervix. This suggests that late antique physicians relied not only on symptoms but also on direct visual observation in diagnosing uterine carcinoma. The text distinguishes clearly between non-ulcerated carcinomas, characterized by a hard nodular mass around the cervical opening, and ulcerated carcinomas, where the tissues appear eroded, irregular, and excavated. Such descriptions demonstrate that late antique physicians relied not only on symptoms but also on direct visual inspection of the cervix, suggesting a relatively sophisticated level of gynaecological examination.

Equally important is the therapeutic approach, which combines external applications, vaginal pessaries, and intrauterine injections. Substances such as woman's milk, donkey's milk, plantain juice, and knotgrass are introduced directly into the uterus, while soothing poultices and cerates are applied to the vaginal canal. This layered treatment strategy reflects an attempt to manage both the local ulceration and the associated pain and discharge.

Plantain *(Plantago major)*, one of the key ingredients in these preparations, was widely valued in ancient medicine for its astringent and drying properties. The leaves were believed to be effective when applied as poultices for malignant wounds, elephantiasis, rheumatic conditions, and foul ulcers. They were also thought to stop bleeding and were recommended for a variety of inflammatory and ulcerative conditions, including carbuncles, skin eruptions, and chronic wounds. In addition, plantain was used for bites, burns, glandular swellings, and fistulas, especially when applied as a poultice with salt. When taken internally after boiling with salt and vinegar, it was considered beneficial for dysentery and abdominal pain, while moderate quantities were also administered against excess phlegm following a period of dietary abstinence. [23 s2.126]

A comparison with earlier gynaecological authors shows that Aetius preserves and expands a diagnostic tradition already present in Greek medicine. Soranus of Ephesus, writing in the second century, also describes ulcerative diseases of the uterus accompanied by pain, discharge, and progressive tissue destruction. [24] Aetius, however, provides a more explicit description of the tumour itself and of its visual appearance when examined with a speculum, indicating a growing attention to the morphological features of gynaecological disease in late antique medicine.

Despite this detailed clinical awareness, the prognosis remained extremely pessimistic. Following the Hippocratic tradition, Aetius states unequivocally that carcinoma of the uterus is incurable. Surgical intervention was not attempted, largely because the tumour was believed to penetrate deeply into the surrounding tissues and because

operative procedures in the pelvic region carried a high risk of fatal haemorrhage. As a result, treatment was primarily palliative, aimed at reducing pain, soothing inflamed tissues, and controlling the corrosive discharges associated with ulcerated tumours.

In this respect, the therapeutic strategies recommended by Aetius differ fundamentally from those used for breast cancer. Whereas tumours of the breast could occasionally be treated surgically through excision and cauterization, uterine carcinomas were managed conservatively through topical medications, pessaries, and soothing applications. This contrast further illustrates the structured therapeutic reasoning visible throughout Aetius' text, where anatomical accessibility, prognosis, and the expected progression of disease together determine whether intervention, conservative treatment, or palliative care is appropriate.

Non-surgical treatment of cancer: pharmacology and humoral therapy

Aetius' pharmacological recipes reveal a complex therapeutic strategy for managing malignant disease. In addition to surgical intervention in selected cases, physicians relied on a wide range of medicinal preparations intended to alleviate symptoms, limit ulceration, and restore humoral balance within the body. These treatments combine botanical substances, mineral compounds, and animal-derived materials, reflecting the broader pharmacological tradition inherited from earlier Greek medicine.

Care of carcinomas not subject to surgical treatment

First of all, before any treatment of a malignant ulcer, it has been stated many times that one must take care of the condition of the whole body and only then employ local remedies. Accordingly, the bowels should be kept relaxed through diet, through the use of aloe, and the bitter preparation made from it. The patient should also be given to drink continually certain substances that are generally considered poisons but serve here as medicines, such as theriac, mithridate, and the antidote prepared from blood.

Among the simpler remedies, one should especially administer the warm blood of a freshly slaughtered goose or duck, or the finely ground bituminous trefoil in the amount of one or two spoonfuls with three cotyles of water. Alternatively, one may give one ounce of the seed of wild rue, or one drachma of aged pennyroyal, and also a decoction of mallow.

The broth of large river crabs taken together with donkey's milk and drunk for five days is also beneficial, as is the consumption of the crabs themselves. When this course is repeated seven times, it renders even the most cancerous breast very mild, and afterwards, with simpler topical applications, it can be brought completely back to a natural state.

Ἐπιμέλεια καρκινωμάτων τῶν χειρουργίᾳ μὴ ὑποβαλλομένων

Πρῶτον μὲν πρὸ πάσης ἐπιμελείας παντὸς ἕλκους κακοήθους, προείρηται πλειστάκις, ὡς προνοεῖσθαι χρὴ τοῦ παντὸς σώματος καὶ οὕτως τοῖς τοπικοῖς βοηθήμασι χρῆσθαι· εὔλυτον μὲν οὖν προσήκει τὴν κοιλίαν κατασκευάζειν διά τε τροφῶν καὶ δι᾽ ἀλόης καὶ τῆς δι᾽ αὐτῆς σκευαζομένης πικρᾶς, διδόναι δὲ πίνειν συνεχῶς καὶ τὰ πλεῖστα δηλητήρια ὡς φάρμακα ἁρμόζοντα, οἷά ἐστιν ἡ θηριακὴ καὶ ἡ μιθριδάτειος καὶ ἡ δι᾽ αἱμάτων ἀντίδοτος·τῶν δὲ ἁπλῶν μάλιστα αἷμα χηνὸς ἢ νήσσης νεοσφαγοῦς θερμὸν τῶν δὲ ἁπλῶν μάλιστα αἷμα χηνὸς ἢ νήσσης νεοσφαγοῦς θερμὸν διδόναι ἢ τριφύλλου τῆς ἀσφαλτώδους λειοτάτης ὅσον κοχλιάρια α ἢ β μεθ᾽ ὕδατος κοτυλῶν γ′. ἢ πηγάνου ἀγρίου σπέρματος γοα ἤτοι οὐγ. α. ἢ γλήχωνος παλαιοτέρου δραχ. α. διδόναι χρὴ καὶ μαλάχης ἀφέψημα. Ὠφελήσει δὲ τὰ μεγάλα καὶ καρκίνων ποταμίων ζωμὸς σὺν γάλακτι ὀνείῳ ῥοφώμενος ἐπὶ ἡμέρας πέντε, καὶ πάλιν ἡ τῶν καρκίνων πόσις· ἑπτάκις γὰρ ἡ τοιαύτη περίοδος παραληφθεῖσα, πραότατον τὸν καρκινωδέστατον μαστὸν ἀποτελεῖ, καὶ δι᾽ ἁπλουστέρων λοιπῶν ἐπιθεμάτων εἰς τὸ κατὰ φύσιν τελείως φθάνει. [10 s16.51]

This passage demonstrates that Aetius did not approach malignant disease solely through local intervention. Following the established therapeutic principles of Hippocratic and Galenic medicine, he first seeks to regulate the body as a whole and to evacuate or counteract the morbid humours believed to underlie cancerous formations. Particularly striking is the recommendation of internal antidotes such as theriac and mithridate, substances originally developed to counteract poisons and venomous bites but here redeployed against pathological internal corruption.[10] Cancer is therefore treated not merely as a local mass but as the manifestation of a broader systemic disorder requiring humoral correction before topical treatment can begin.

Aetius distinguishes carefully between non-ulcerated and ulcerated malignant lesions. In the former case the therapeutic aim is cautious and conservative: one seeks to calm pain, reduce inflammatory exacerbation, soften hardness, and above all prevent the lesion from breaking open.

10 Antidotes (*antidota*) in Greco-Roman medicine were compound remedies administered internally in order to counteract poisons, venomous bites, or diseases believed to arise from corrupted humours. Among the most famous were mithridate (*mithridateion*) and theriac (*thēriakē*). Mithridate was traditionally attributed to King Mithridates VI of Pontus, who was said to have experimented with numerous substances in search of a universal antidote against poisons. The later and more elaborate preparation known as theriac was formulated in the first century CE by Andromachus, physician to the emperor Nero, who modified the earlier Mithridatic compound and added ingredients such as viper flesh. [25 s14.2-8] Both preparations became highly complex polypharmaceutical mixtures containing dozens of botanical, mineral, and animal ingredients and were widely used throughout antiquity and the Middle Ages as general antidotes against poisons, venomous animals, and various chronic diseases.

Treatment of non-ulcerated cancerous tumours

In particular, for non-ulcerated tumours, one should apply a poultice made by grinding bread with a small amount of comfrey, applying it lightly. During acute attacks, grind together roses, melilot, and poppy seed with sweet wine; when the mixture has softened, boil it slightly and apply it after grinding it together with egg yolks. Alternatively, apply boiled marsh-mallow leaves ground either alone or together with bread. The following remedy is also effective during exacerbations: take equal amounts of plantain seed, poppy heads together with their seeds, and psyllium. Grind the other ingredients but soak the psyllium in Cretan sweet wine and grind it separately, adding a sufficient amount of the fleshy pulp of rich dates. Then mix this with the dry ingredients, add the psyllium, combine them thoroughly, and add a small amount of goose fat. Warm the entire mixture gently and apply it warm. Afterwards apply a dressing consisting of dates together with a suitable amount of bread soaked in liquid, applied cold. The finely ground seed of hedge-mustard is also useful for cancerous conditions when applied warm with a little hyssop and hydromel. Likewise, the tender leaves of the ash tree, boiled in water and then ground and applied warm by themselves, soothe the pains of even the most malignant tumours; and if any hardness persists in them, they disperse it remarkably. I also continually use fomentations with the decoction of these leaves and obtain good results. The tree in question is a cultivated one that bears no fruit. After this, the poultice made from plantain should again be applied, or the plaster of Hicesius, or black panacea carefully prepared, or another similar remedy. These treatments apply provided that the condition has not yet ulcerated.

Ἐπιμέλεια τῶν ἀνελκώτων καρκινωδῶν ὄγκων

Ἰδίως δὲ ἐπὶ τῶν ἀνελκώτων ὄγκων ἄρτον μετ᾽ ὀλίγου συμφύτου λειώσας, κουφότερον ἐπιτίθει· ἐν δὲ τοῖς παροξυσμοῖς ῥόδα, μελίλωτα, μήκωνος σπέρμα λεάνας σὺν γλυκεῖ, καὶ ὅταν βραχῇ ἑψήσας καὶ σὺν λεκίθοις ὠῶν λεάνας ἐπιτίθει· ἢ ἀλθαίας φύλλα λεάνας ἑφθὰ ἐπιτίθει καθ᾽ αὑτὰ ἢ σὺν ἄρτῳ. Δραστικὸν δέ ἐστιν ἐν τοῖς παροξυσμοῖς παραλαμβανόμενον καὶ τοῦτο· ἀρνογλώσσου σπέρμα καὶ κωδύα μήκωνος σὺν τῷ σπέρματι καὶ ψυλλίοις ἴσα κόψας, σήσας τὰ ἄλλα, τὸ δὲ ψύλλιον γλυκεῖ κρητικῷ βρέξας καὶ λεάνας, καὶ φοινίκων λιπαρῶν σαρκῶν τὸ ἀρκοῦν. κἄπειτα μίξας τοῖς ξηροῖς ἐπίβαλλε καὶ τὸ ψύλλιον, καὶ ἑνώσας καὶ στέαρ χήνειον ἐπιβαλὼν ὀλίγον καὶ χλιάνας ἅμα τὰ πάντα, ἐπιτίθει θερμῶς, καὶ ἀναλαβὼν τοῖς φοίνιξι καὶ ἄρτον διάβροχον σύμμετρον ἐπιτίθει ψυχρόν. χρήσιμον ἐπὶ τῶν καρκινωδῶν καὶ τοῦ ἐρυσίμου τὸ σπέρμα λεῖον μετὰ ὑσσώπου ὀλίγου καὶ ὑδρομέλιτος θερμὸν ἐπιτιθέμενον· μελίας δὲ τοῦ δένδρου τὰ ἁπαλὰ φύλλα ἑψούμενα ὕδατι, εἶτα λεῖα καθ᾽ αὑτὰ θερμὰ ἐπιπλαττόμενα, παραμυθεῖται τῶν κακοηθεστάτων τὰς ὀδύνας, καὶ εἴ τι ἐπιμένει αὐτοῖς, διαφορεῖ θαυμαστῶς· καὶ τῷ ἀφεψήματι δὲ τῶν φύλλων πυρίᾳ χρῶμαι συνεχῶς καὶ ἐπιτυγχάνω, ἔστι δὲ τὸ δένδρον ἐργάσιμον ἄκαρπον. μετὰ δὲ ταῦτα πάλιν τὸ δι᾽ ἀρνογλώσσου κατάπλασμα δοκιμαζέσθω ἢ ἡ Ἱκεσίου ἔμπλαστρος, ἢ πανάκεια μέλαινα εὐαφεστάτως σκευαζομένη, ἢ ἑτέρα τῶν παραπλησίων ἐπιτιθέσθω· καὶ ταῦτα μὲν εἰ μὴ ἕλκος εἴη. [10 s16.52]

The therapeutic logic behind these preparations is consistent. Their ingredients largely belong to a pharmacological profile characterized by softening, moistening, cooling, and pain-relieving effects. Aetius is not attempting to destroy the tumour itself. Rather, he aims to quiet inflammatory activity and maintain the lesion in a relatively stable condition. This approach accords closely with the broader ancient medical preference for cautious treatment of hidden or non-ulcerated cancers, which were often regarded as dangerous to irritate aggressively.

One particularly elaborate example is the compound plaster attributed to Poletos, prepared from marshmallow, colophony, wax, oil, and copper derivatives. The detailed instructions preserved by Aetius illustrate the sophisticated pharmaceutical techniques involved in preparing such *emplastra*. The preparation was applied to ulcers, glandular swellings, and non-ulcerated cancers, where its purpose was to soothe the lesion, promote drainage, and prevent further ulceration. [13 s15.120-58] Significantly, the text explicitly states that the remedy "soothes non-ulcerated cancers and prevents them from further corrosive growth," [13 s15.15] indicating that the therapeutic goal was primarily the control of disease progression rather than radical cure. [13]

Another compound preparation preserved by Aetius further illustrates the therapeutic logic applied to non-ulcerated cancers. [10 s16.54] The remedy combines wax, resins, animal fats, honey, and mineral substances such as *diphryges*.[11] Aetius explicitly remarks that when frankincense is added the compound becomes more dispersive and digestive, making it particularly suitable for non-ulcerated tumours, whereas the milder version without frankincense is more appropriate for ulcerated lesions. This observation is revealing, since it demonstrates that Aetius calibrated his pharmacological compounds according to the stage of the disease. Non-ulcerated tumours could tolerate somewhat more active, dispersive preparations intended to soften hardness and restrain further development, while once ulceration occurred the therapeutic strategy shifted toward gentler, soothing dressings.

This distinction marks an important transition in Aetius' therapeutic reasoning. As long as the tumour remained closed, treatment aimed to control inflammation and prevent rupture. Once ulceration developed, however, the physician's goal changed: rather than attempting to disperse the lesion, therapy focused on calming the ulcerated tissue and limiting further damage:

11 *Diphryges* was a mineral medicinal substance known in ancient pharmacology, produced as a by-product of copper smelting. According to Galen, it originated particularly from the copper mines of Soloi in Cyprus and was initially discarded as waste after the extraction of cadmia. Pharmacologically it was considered a compound of moderately astringent and mildly caustic qualities, which made it especially useful in the treatment of malignant or putrid ulcers. Galen reports employing it both alone and mixed with honey for ulcerative lesions of the mouth and throat, and also for wounds of the genital and anal regions, where its drying and cicatrizing properties promoted the formation of firm scar tissue. [19 s12.214-7]

Treatment of ulcerated cancer

For a malignant ulcerated carcinoma, the mildest dressing is considered the most appropriate remedy. Archigenes recommends the following preparation: Take litharge, fresh pork fat, and white wax in equal amounts; add sixteen ounces of good oil and twelve yolks of roasted eggs.[12] Grind the litharge with a suitable amount of water; then pour in some of the oil and add the egg yolks, mixing them thoroughly. Melt the fat after cutting it into pieces in a vessel, gently heating it together with the wax, and strain it. When the mixture has cooled, gradually add the remaining oil while stirring, and combine it with the previously ground ingredients. Use the preparation after thinning it with rose oil, applying it with soft wool in place of lint dressings. If the ulcer is painless, one may also add orris root, myrrh, and aristolochia, one or three drachmas of each. This preparation is also effective when applied to non-ulcerated carcinomas.

Ἑλκωμένου καρκίνου ἐπιμέλεια

Ἠλκωμένῳ δὲ κακοήθει πραότατον ἐπίθεμα ὅμοιον κειμήλιον ἐστί· παράλαβε τοῦτο φησὶν Ἀρχιγένης, ὃ καὶ ἔχει οὕτως· λιθαργύρου, στέατος ὑείου προσφάτου, κηροῦ λευκοῦ ἀνὰ λια. ἐλαίου καλοῦ γοιστ ἤτοι οὐγ. ις′. ὠῶν ὀπτῶν λεκίθους ιβ′. τὴν λιθάργυρον τρίβε μεθ᾽ ὕδατος συμμέτρου, εἶτα παραχέων τι τοῦ ἐλαίου, ἐπίβαλλε καὶ τὰς λεκίθους καὶ συλλέαινε. τὸ δὲ στέαρ ἐξυμενίσας καὶ κόψας ἐν θυίᾳ, τῆκε ἀκνίσσως σὺν τῷ κηρῷ καὶ διήθει·ψυχρανθὲν δὲ, κινῶν ἐπίβαλλε τὸ λοιπὸν τοῦ ἐλαίου κατὰ βραχὺ, καὶ ἀναμίξας ἐν θυίᾳ τοῖς λειωθεῖσιν ἀναλάμβανε. χρῶ δὲ αὐτῷ ἀνιεὶς ῥοδίνῳ, καὶ ἐρίῳ ἁπαλῷ ἀναλαβὼν ἀντὶ μοτῶν ἐπιτίθει· ἀνωδύνου δὲ ὄντος τοῦ ἕλκους, προσπλεκέσθω καὶ ἴριδος, σμύρνης, ἀριστολοχίας ἀνὰ δραχ. α ἢ καὶ γ′, ὃ καὶ τοῖς ἀνελκώτοις ἐπιτιθέμενον ἰσχύει χρήσιμον εἶναι. [10 s16.53]

The composition of this dressing reflects the therapeutic principles governing the treatment of ulcerated cancers. Aetius explicitly recommends the mildest possible applications for such lesions, emphasizing substances that protect and soothe the exposed tissue rather than aggressively attacking the tumour itself. The addition of small amounts of iris, myrrh, and particularly *aristolochia* is noteworthy. In ancient pharmacology, aristolochia was known for its cleansing and mildly corrosive properties,

12 Litharge (*lithargyros*), a lead oxide obtained as a by-product of silver–lead smelting, was widely used in ancient pharmacology, particularly in the preparation of medicinal plasters (*emplastra)*. As Galen explains, litharge itself possessed only a minimal intrinsic pharmacological activity, functioning primarily as a material base that allowed oils, water, vinegar, or wine to combine into stable adhesive preparations. These plasters exerted a mild cooling and drying effect and were thought to restrain pathological "fluxes" of humours into diseased tissue, a mechanism considered crucial in the management of ulcers and other chronic lesions. Stronger formulations were applied to fistulas and difficult-to-heal wounds, conditions that ancient physicians often associated with malignant ulcerations. Galen also emphasizes that such preparations dried tissues "without biting" (*xērantikon adēktōs*), distinguishing them from more aggressive caustic treatments frequently employed in the management of cancerous growths. [26 s13.397-408]

frequently used to draw out pathological matter from wounds and ulcers.[13] In this context, however, it appears in a carefully moderated form, suggesting that the aim was not to destroy malignant tissue but to assist the controlled cleansing of the ulcer while avoiding further irritation.

Book 1 also records the use of more aggressive botanical substances intended to cleanse or cauterize malignant tissue, among them *drakontion* (*Dracunculus vulgaris*), considered as more potent than arum, possessing heating, bitter, and slightly astringent properties capable of thinning thick and viscous humours. [7 p13, 9 s1.94.7] According to Dioscorides, the root was believed to cleanse malignant and gangrenous ulcers when ground with white bryony and honey, reflecting the broader ancient use of caustic or cleansing botanical substances in the treatment of destructive lesions. [23 s2.166] The leaves were applied to ulcers and fresh wounds, provided they were not excessively dried, since overly dry leaves were considered too sharp for damaged tissue. The fruit, regarded as even more powerful than the root, was believed to "dissolve cancers and polyps," and the juice extracted from it was used to cleanse impurities from the eyes. [7 p12, 9 s1.94]

Furthermore, the seed of *erysimon* (often identified with hedge mustard, *Sisymbrium polyceratium*), whose taste was considered very similar to that of cress, was used in poultices. It was considered beneficial for expectoration of thick and viscous humours in the chest and lungs. Dioscorides considered them beneficial for hidden cancers. [7 s1.146]

Aetius [9 s16.55] also preserves compound preparations based on strongly astringent substances such as sumac, oak galls, and cypress cones. These ingredients, rich in tannins, were intended to dry ulcerating lesions and promote the natural wound-healing process.[14]

Animal-derived substances also appear prominently in Aetius' therapeutic repertoire. These include goose or duck blood, donkey's milk, and preparations made from river crabs, administered either internally or externally depending on the condition. The river crab's ashes or decoctions were administered in various treatments, especially in cancerous conditions.[15]

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13 Ancient pharmacological texts distinguish several varieties of *aristolochia*, whose root was regarded as a powerful medicinal substance characterized by bitter and pungent properties. The "round" variety was considered the most potent and therapeutically active, particularly valued for thinning thick humours, clearing obstructions, and cleansing wounds. The "long" variety was regarded as somewhat less penetrating but strongly warming and was therefore preferred when a milder cleansing effect was required, for example in wound healing or uterine fumigations. A more fragrant type, sometimes compared to clematis, was valued primarily for perfumery rather than medical treatment. [19 s11.835]

14 In book 2.209, Aetius gives a list of the substances possessing drying properties, including various plants (e.g., agnus castus, aristolochia, bryony, pomegranate blossom), animal products (viper flesh, crab ash, castoreum), and mineral materials such as salt, nitre, gypsum, and metallic substances. [9]

15 The medicinal use of burned crustaceans may also have had a practical pharmacological basis, as their mineral-rich ashes possess drying and astringent properties suitable for treating ulcerative lesions. River crabs were also used for the treatment of gout, [14 s12.67] as well as in the treatment of those bitten by rabid animals. [9 s2.175, 7 s6.24, 11 s13.23]

Mineral substances also played a significant role in these preparations. One particularly striking passage recommends a substance that effectively functions as a chemical cauterizing agent. The author advises the use of a deposit collected from the hot-water vessels of bronze-workers, likely a sediment or residue produced in the working of copper (*hypostathmē*).[16] This material is heated among glowing coals until it becomes fully incandescent, then finely ground and incorporated into rose cerate before being applied locally. The therapeutic logic behind this preparation reflects the broader ancient pharmacological use of copper-based substances as caustic and desiccating agents. In the context of uterine carcinomas—explicitly described in the text as incurable following Hippocratic doctrine—the goal of such treatment was not curative but palliative: to cauterize, dry, and control ulcerating malignant tissue while reducing discharge and foul odour.

In addition to local pharmacological treatments, Greco-Roman medicine also recommended systemic therapies aimed at removing harmful humours from the body, believed to cause hard and destructive tumours. For this reason physicians frequently prescribed purgative treatments intended to evacuate these harmful humoral residues. Vomiting and other forms of purgation (*katharsis*) were considered beneficial in many diseases, including malignant tumours, because they expelled substances thought to contribute to the formation and persistence of pathological growths. [9 s2.255] Among the substances used for purgation were saline mineral preparations such as *empetron* (sea-heath, *Franklinia pulverulenta*), *epipetron* (a rock plant), and the seeds of *knēkos (*safflower, *Carthamus tinctorius*) which ancient physicians believed could evacuate phlegm and bile from the body. [7 s1.206, 9 s1.143]

Dietary regulation also formed part of this therapeutic logic. Aetius warns, for example, that certain foods — especially beef — produce blood that is excessively thick and therefore predispose individuals of melancholic constitution to diseases associated with black bile. Among the conditions linked to such humoral imbalance he lists cancer, elephantiasis, scabies, quartan fever, and melancholia itself. [9 s2.121]

16 After the pouring of cold water - just as in the case of "flower of copper" (*chalkou de anthos*) - and after the copper has been removed, this substance is found remaining in the furnace, lying on the bottom of the crucible. It possesses both the astringent quality and the taste of copper. [23 s5.103.2] The flower of copper, yet another important mineral, was described as a reddish metallurgical deposit formed during the cooling of molten copper when water is poured over the metal to remove impurities. The sudden contraction of the heated material produces a granular residue that rises to the surface of the vessels used in smelting. In ancient medicine this substance was valued for its strongly astringent and caustic properties and was used in the treatment of abnormal tissue growths, ulcerations, and inflammatory conditions, as well as in certain ophthalmic and otological preparations. [23 s5.77]

Conclusion

The evidence preserved in Aetius of Amida's *Tetrabiblon* shows that late antique physicians approached malignant disease through a therapeutically differentiated framework rather than through abstract theory alone. Breast and uterine carcinomas were not treated in the same way: the former could in selected cases be excised and cauterized, whereas the latter were regarded as incurable and managed conservatively. This distinction reveals the importance of prognosis, anatomical accessibility, and haemorrhagic risk in shaping therapeutic choice.

At the same time, Aetius' pharmacological material demonstrates that the management of cancer extended well beyond isolated recipes. Botanical, mineral, and animal-derived substances were deployed within a coherent strategy aimed at soothing pain, drying ulcerations, controlling discharge, and regulating the humoral condition of the whole body. Even where cure was impossible, treatment remained active and purposeful.

Taken together, these therapeutic approaches illustrate the integrated medical framework of late antiquity, in which surgery, topical pharmacology, diet, and humoral regulation functioned as complementary strategies in the management of malignant disease. Although ancient physicians lacked the anatomical and pathological understanding of cancer developed in modern medicine, their treatments reveal a coherent therapeutic system that combined surgery, pharmacology, and regimen in a sustained effort to manage malignant disease.

More broadly, this evidence challenges the long-standing historiographical assumption that late antique medicine was largely derivative or intellectually stagnant. Instead, Aetius' compilation demonstrates that late antique physicians preserved and systematized a practical body of surgical and pharmacological knowledge, adapting inherited traditions into coherent therapeutic strategies suited to clinical practice.

Rezime

Ovaj rad razmatra terapijske pristupe malignim oboljenjima u medicinskom kompendijumu Aetija iz Amide, polazeći od *Tetrabiblona* kao izvora za praktičnu medicinu kasne antike, a ne samo kao kompilacije ranijih teorijskih znanja. U središtu analize nalaze se odlomci posvećeni karcinomima dojke i materice, kroz koje se ispituju dijagnostički opisi, kriterijumi za hirurški zahvat, postoperativna nega i farmakološko lečenje. Pokazuje se da Aetije čuva koherentan terapijski okvir u kojem prognoza, anatomska pristupačnost i humoralna regulacija određuju izbor između ekscizije, kauterizacije i palijativne terapije. Dok su tumori dojke u pojedinim slučajevima mogli biti podvrgnuti operaciji, karcinomi materice smatrani su neizlečivim i lečeni su konzervativno, umirujućim, adstringentnim i isušujućim sredstvima. Posebna pažnja posvećena je Aetijevoj farmakologiji, koja objedinjuje biljne, mineralne i životinjske supstance u terapiji usmerenoj na ublažavanje bola, kontrolu ulceracije, smanjenje sekrecije i regulaciju celokupnog stanja organizma. Rad pokazuje da su lekari kasne antike raspolagali razvijenijim praktičnim razumevanjem progresije tumora i granica lečenja nego što se to obično pretpostavlja, te da Aetijev tekst

predstavlja dragoceno svedočanstvo o integraciji hirurgije, farmakologije i humoralne patologije u lečenju raka.

Ključne reči: farmakologija; ginekologija; hirurgija; maligni neoplazmi

Non MeSH: istorija raka; kasnoantička medicina; vizantijska medicina; Aetije iz Amide; antička hirurgija; humoralna patologija

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HEALTH PRESERVATION DURING TRAVEL: EVIDENCE FROM THE MEDIEVAL MEDICAL MANUSCRIPT *CANTICA CANTICORUM AVICENNE CUM COMMENTO AVERROIS*

Abstract: This paper examines medieval recommendations for maintaining health during travel, as recorded in the manuscript *Cantica canticorum Avicenne cum commento Averrois*, preserved in the Metropolitan Library of Zagreb. It is a Latin translation of Avicenna's poetic medical treatise *Urjuza fi'l tibb* (Poem of Medicine) accompanied by Averroes' commentary. Focusing on chapters that provide practical guidance for travellers, the study examines advice concerning diet, hygiene, environmental conditions, and preventive medical practices for journeys by land and sea during both winter and summer times. These instructions are analysed within the broader framework of medieval medical theory, particularly the humoral concept of bodily balance. The paper also situates Avicenna's recommendations in relation to earlier medical observations found in the *Corpus Hippocraticum*, highlighting continuities and divergences in the perception of travel as a potential health risk. The analysis illustrates how medieval medical authors synthesized ancient and Arabic medical knowledge with practical guidance, emphasizing the significance of preventive measures and the preservation of health in premodern travel contexts.

Keywords: medieval medicine; manuscripts, medical; travelling

Non MeSH: Avicenna; Averroes; Cantica canticorum Avicenne cum commento Averrois; Corpus Hippocraticum; humoral theory

Introduction

This paper analyses the recommendations concerning the preservation of health during travelling written in the medical manuscript *Cantica canticorum Avicenne cum commento Averrois*. The manuscript originates from the Arabic philosopher and physician Avicenna (Ibn Sīnā, 980–1037), whose text was during the twelfth century accompanied by commentaries written by the Arab scholar Averroes (Ibn Rushd, 1126–1198). In ancient and medieval times, travel represented a significant health risk, so great attention was therefore paid to proper conduct during journeys, including guidance on diet, drink, and protective measures. Even the medical "Bible," the *Corpus Hippocraticum*, already provides information connected to the various health dangers linked to travel and describes conditions associated with journeys and their potential harmful consequences for human health.

The medical codex *Cantica canticorum Avicenne cum commento Averrois*, which is in the central focus of this discussion, is preserved in the Metropolitan Library in Zagreb, the largest and most important ecclesiastical library in Croatia. Today, the library holds eleven medieval medical manuscripts, although surviving inventories — one from the mid-fourteenth century, another from 1394, and a third from the fifteenth century (more precisely from 1425)—indicate that its collection once contained as many as thirty-two medical manuscripts. [1] The surviving manuscripts reveal a strong French influence, particularly that of the medical school of Montpellier, although the precise circumstances under which most of these manuscripts arrived in Zagreb remain uncertain. One hypothesis suggests that the majority of the medical manuscripts in the Metropolitan Library were brought there by the bishop James of Piacenza (Jacobus de Placentia, ? - 1348). [2] Before becoming a bishop, and after finishing his studies, he shortly worked as a professor of medicine in Bologna (1322). Later he became the provost in Pozsony (Bratislava) and personal physician of the King Charles I of Hungary (Charles Robert of Anjou). From 1333 to 1343 he served as the bishop of Csanád, and from 1343 to 1348 as the bishop of Zagreb. [3]

As he was himself a physician, it is believed that he brought to Zagreb a considerable number of medical manuscripts which he commissioned during his stay in Avignon, since he intended to establish a medical course at the cathedral school in Zagreb. [2]

Among the eleven surviving medical manuscripts in the Metropolitan Library is the manuscript *Cantica canticorum Avicenne cum commento Averrois* kept under the shelfmark MR 154. This manuscript contains Averroes' commentaries on Avicenna's work *Urjūza fi'l ṭibb* composed in the *rajaz* metre and considered a poetic summary of Avicenna's most important work, the *Canon of Medicine*. Rhyme and poetry were often used for scientific writing in Avicenna's era and were considered a method for memorizing scientific information and raising students' interest in difficult scientific concepts. Verse was used to simplify the didactic content, ease memorization and make difficult scientific issues more attractive. [4]

From the 12th century onwards, several commentaries on this work were made, including those of Andalusian scholar Ibn Tufayl (1105–1185) and the Arab philosopher and physician Averroes. Averroes's commentary on Avicenna's *Urjūza fi'l ṭibb* was written in Córdoba at the end of the 12th century. It was also known to the Dominican priest and theologian Raymond Martini (c. 1230 – c. 1285), who cites it in his work *Pugio fidei* (c. 1270) under the title *Oriusa Avicennae*. [5]

The Latin translation of the work together with Averroes's commentary was made in the 13th century by the physician Armengaud Blasius of Montpellier (Armengaldus Blasii Monspeliensis, c. 1264 – 1312) under the title *Avicennae Cantica*. The translator Armengaud was the nephew of the prominent Catalan physician, scholar, and religious figure Arnaldus de Villanova (c. 1240–1311), who translated various medical texts from Arabic and Hebrew into Latin. [1]

In the scholarly literature there are various opinions regarding the exact year of its origin, which resulted from the surviving copies preserved in different European countries, in which different dates are explicitly stated. Thus, the manuscripts which are kept in various institutions in England give the years 1283 and 1284 as the year of the translation, as do the copy from the National Library in Paris. But, in the analysed manuscript on folio 72, the following note appears: *Explicit translatio Canticorum Auicenne cum commento Auerrois facta ab arabico in latinum a magistro Ermengando Blasi de Monte Pessulanis magistro in medicina. Anno incarnationis verbi MoIIo LXXXXIIIIo Deo gratias.* This indicates the year 1294 as the year of the translation. The copies which are kept in the Vatican Library, Hunterian Library Museum (University of Glasgow) and University Library of Paris as well as in analysed copy, list 1294 as the year of origin. To the latter we could also add the copy from the Bayerische Staatsbibliothek, which lists 1290 as the year of the translation.

Since the original is not preserved and filiations from the surviving copies have not yet been fully established it is difficult to determine the precise year of the translation. Nevertheless, it is certain that the translation was made within a relatively short period between 1283 and 1294. [1]

It should also be mentioned that the first print version of Armengaud's translation of the *Cantica* with Averroes's commentary was made by Petrus Maufer and Nicolaus de Contugo in Venice on 24 March 1483. The work was evidently so popular that just one year later, on 25 September 1484, it was printed again in Venice by Andreas de Soziis Parmensis. During the sixteenth century and the centuries that followed, the work was printed numerous times, while the first translation into a modern vernacular language was not published until the 20th century. The first translation was made on French by H. Jahier and A. Noureddine in 1956. Using the French translation as basis, Haven C. Krueger translated the work into English in 1963. [1]

Short description of the content of the codex *Cantica canticorum Avicenne cum commento Averrois*

The manuscript begins with an introductory part in which Averroes explains that, for better understanding of the art of medicine, he devoted himself to comment Avicenna's metrical text (*liber rithimatum*) which was, as Averroes said, much better than many other introductions and summaries of medicine. Furthermore, he justifies the purpose of commenting on the text itself, pointing out the fact that the authors of metrical texts dealing with scientific topics were sometimes, in order to achieve a better rhythm, allowed to shorten or change the order of words, which could sometimes cause the text itself to be unclear, and therefore Averroes tried with his comments to clarify the text where he thought it was unclear. In doing so, he warns that he was very careful and tried to present Avicenna's theses the way Avicenna did, while avoiding ambiguities.

After the introductory part, the text begins with a discussion of the very concept of medicine, in which Averroes presents Avicenna's definition of medicine, in Hippocratic tradition which says: *Medicina est conservatio sanitatis et curatio egritudinis* (Medicine is preservation of health and healing of disease). Then he presents its initial division into two main parts, theory and practice. The theoretical discussion consists of three parts. The first part addresses the doctrine of the seven natural components (*res naturales*), the second contains a discussion of the seven non-natural components (*res non naturales*), while the final part deals with three theoretical questions: diseases, their causes, and accidental conditions.

The second main part of the manuscript addresses medical practice and contains a discussion on preserving a healthy body in accordance with the air, that is, atmospheric conditions. This is followed by discussions on habits, on the order of eating and its correction, on the proper consumption of food in both quantity and quality during the summer season, on the correct manner of drinking water, on the proper consumption of wine and similar beverages, on appropriate sleep and rest, on proper movement and exercise, on suitable warming during winter, and on maintaining health in accordance with the changing seasons. The manuscript also contains paragraphs addressing the infant while still in the mother's womb, instructions for those who have recovered from illness and for the elderly, guidance for individuals whose health has weakened in a particular limb, as well as advice concerning the health of those who experience pain in a single limb rather than throughout the body.

The manuscript further includes a treatise on restoring of the health through diet and medicines, which begins with a reminder of the types of medicinal substances used in the treatment of diseases. This is followed by a reminder on purgatives, first those that evacuate bilious humour (yellow bile) then those that evacuate phlegm and atrabilious humour (black bile). The text then proceeds to a chapter discussing on the constitution and composition of medicines. This is followed by a reminder concerning the secondary properties of simple medicines that promote maturation, as well as

those used for softening, opening, and cleansing. Additional paragraphs discuss on medications that are astringent, that burn, that decompose, on those that absorb and on medications that are antidotes. The text further examines the signs of illnesses and treatments of changes by different constitutions, i.e. illnesses that arise from changes in a hot and cold constitution, the types and methods of evacuating bodily fluids, beginning with illnesses caused by the sanguinous humour (blood), by the bilious humour (yellow bile), by the serous humour (phlegm) and atrabilious humour (black bile) followed by instructions for their treatment.

At the end of the manuscript there are treatises on surgical operations, that is, surgical practice, divided into three parts. The text begins with a discussion on vessels and the usefulness of bloodletting as well as on the technique for an incision of the veins. The second part of this section concerns surgical techniques for the flesh, including a chapter on excision, cauterization and incision. The final part of the manuscript deals with the bones and the repair of fractures, ending with the chapter on the treatment of dislocations.

Within the manuscript, there are also paragraphs, which are the central focus of this study. They are devoted to advice on preserving health during travel by sea and by land, particularly in the cold conditions of winter and in the dry and hot climate of summer. [6]

Health and Travel in the *Corpus Hippocraticum*

In antiquity, particular attention was paid to health during travel, since journeys were generally long and exhausting, exposing the traveller to numerous factors that could seriously affect health. These factors ranged from exposure to cold or heat to long walking, sitting on uncomfortable surfaces, or extended periods of horseback riding, all of which could lead to severe fatigue. Consequently, already in the texts of ancient authors we find discussions concerning the relationship between travel and health. Thus, in the *Corpus Hippocraticum*, attention is also drawn to the problems associated with extensive riding on horseback, which in that period was the most common means for covering long distances. Thus, in Book 38 it is stated:

"Those who rode horses extensively, or travelled a great deal, or otherwise fatigued their legs, experienced severe stiffness of the hips and pain and fatigue in the calves. The most persistent and painful symptoms were those that led to complete stiffness (paralysis)." (7 p445)

One of the problems travellers frequently encountered on long journeys was related to reduced intake of food and liquids, or to their improper consumption. Travellers often consumed food and drink in quantities or forms that could be harmful to their health. This issue is therefore discussed in several places within the *Corpus Hippocraticum*. Thus, it is noted that a particular form of dropsy arises during the summer when a person, exhausted from a long journey, hastily drinks rainwater or stagnant water (7 p469)

The *Corpus Hippocraticum* also addresses health problems affecting particular parts of the body associated with travel, especially the extremities. It is stated that it is a bad sign if patients experience pain in their legs after travelling. In addition, it is remarked:

"Travellers, both during and after illness, have thin legs, for their joints are worn out and exhausted." (7 p437)

The same medical book provides an example describing the health complaints of a man who had returned from a journey. It is written:

"A certain man, exhausted from travelling, experienced great weakness, began to cough and to expectorate. A severe fever seized him. On the second day he felt heaviness in the head, and his tongue was dry and parched. When scratched with a fingernail, his nose did not bleed. His spleen on the left side was enlarged, hard, and painful." (7 p444)

Corpus Hippocraticum also discusses the health risks associated with travel in relation to the case of a patient named Dinon, whose digestion was disturbed after a journey:

"Before the rising of Arcturus, Dinon, who had already been weakened by the summer heat and diarrhoea, after becoming fatigued from travelling, began to feel pain in the left side of his chest." (7 p459)

Another noteworthy case concerns the son of Epicharmus, who was unable to digest food after a journey and a bout of drinking. The following morning, he developed a fever. After drinking water mixed with vinegar and salt, he vomited phlegm, after which he became chilled. While still feverish, he bathed, and pain appeared in his chest. On the third day in the morning, he fell into a light coma and began to rave. A severe fever followed, and he endured the illness with great difficulty. On the fourth day he was unable to sleep, and he subsequently died (7 p471)

How to preserve health while travelling according to Avicenna's advice?

Travel in the Middle Ages was slow, dangerous and filled with challenges. It was characterized by limited transportation options, dangerous conditions, and significant social mobility. Whether it was undertaken for Crusades, trading or diplomatic missions, pilgrimages, intellectual exchange or anything similar, without secure roads or reliable maps every step carried the danger, ranging from bandits and wild animals to disease and natural disasters. Travel times, of course, depended on the means of travel. Travellers in the Middle Ages primarily relied on walking, horses, and carts. While nobles and the upper class might also use carriages or carts, especially for longer trips or when transporting goods, the majority of people travelled on foot or used pack animals. When travelling by foot, people often walked in groups to protect each other from potential threats. Those wealthier could hire armed guards for protection, making the journey much safer.

In the medieval period, most roads were poorly maintained. Roman roads still existed in some areas, but many were in bad condition. The roads, in general, were often rough, muddy, and filled with obstacles, further slowing the journey. Weather conditions played a big role in how quickly someone could travel, and winter months were

particularly difficult. People often followed well-known paths, rivers, and landmarks. Along popular routes, there were sometimes inns or monasteries that offered a place to rest. Diseases were common, and many travellers got sick during long journeys and even died. Therefore, before departing on long journeys, they often compose a will, distributing their property among their heirs or for the salvation of their souls.

Maritime travel was particularly desirable one when transporting large amounts of goods. But it had its own risks and expenses. Travelling by sea was often unpredictable and unpleasant. Storms and bad weather could easily send a ship off course or sink it altogether and pirates also posed a significant threat to travellers on the seas. Despite these risks, maritime travel was faster than land travel and naval travellers could use compasses, lunar tables, and astrolabes while those travelling over land would have to rely on knowledge of the terrain and basic sun-and-star navigation. If travelling in an unfamiliar land, one might hire a guide or else have to rely on the spoken directions of locals. [8-10]

Large number of travel diaries, chronicles and diplomatic records from the medieval period testify to the experience of travelling to distant lands and encountering previously unknown peoples and customs. [11-14]

Bearing in mind the fact whether travelling on foot, by horse, or by ship journeys were always long, uncomfortable and dangerous, and in order to help travellers to return safely from their journeys, Avicenna in his work *Cantica canticorum,* gives much practical advice on preserving health during long and exhausting travel.

In the chapter entitled *De regimine iter agentibus et primo de nauigantibus* (Management of the health of the travellers et first those travelling on the sea) Avicenna in general recommends avoiding travel on land and sea during wintertime and land voyages during the rainy season. If one nevertheless decides to travel by sea, it is advisable to bring a sufficient supply of water and numerous clean vessels in which moist foods may be prepared. It is also important that stomach would be prepared with medicines. Therefore, traveller must be purged if he fears seasickness and should take acidic syrups mixed with some astringent liquids. Averroes comments on Avicenna's recommendation, emphasizing that the advice against sailing during the wintertime is by no means a matter of medicine (*ars medicinalis*), but rather piece of a good advice. He further explains that the recommendation to carry a large supply of water is connected with the possibility that travellers might remain at sea longer than originally planned. Additionally, Averroes expresses uncertainty regarding Avicenna's recommendation for offering moist food to those who embarking on a sea voyage. He states that he does not fully understand this advice, since sailors are already in a state of excessive moisture due to their maritime environment—unless, he suggests, Avicenna intended this recommendation as a means of reducing the intake of drinking water. So, Averroes believes that this recommendation also is not *ex operatione medicine*. In contrast, Avicenna's instruction for travellers to consume acidic syrups mixed with some astringent liquids, in order to prevent vomiting and strengthen blood flow is, however, regarded as medically justified by Averroes. [6 f49v-50r]

Maintaining personal hygiene during travel was also considered important. In order to avoid uncleanliness, Avicenna recommends bringing sufficient clothing for changing. Averroes notes that this rule is indeed beneficial for anyone travelling, whether by sea or by land, particularly when bathing facilities are unavailable. One of the problems travellers often faced — due both to insufficient hygiene and to close contact with others in cramped and unhygienic conditions — was the infestation of lice. The manuscript curiously advises that if lice multiply during a journey and cannot otherwise be eliminated, the traveller should take some wool threads, pour quicksilver (*argentum vivum*) on them and rub himself with it. He should also place the threads among the clothes to be worn, to eradicate the lice effectively. Averroes agrees that this method is indeed recommendable for travellers afflicted by lice, since quicksilver effectively kills them. [6 f50r]

The manuscript also provides much advice for those travelling over land in cold (winter) and hot weather (summer). For those travelling by land, Avicenna says that is essential to be aware of what lies ahead. Therefore, during cold weather travellers must be particularly cautious of snowfall and the danger of freezing, which could even lead to death. When travelling across dry and open terrain, he advises that travellers should eat meals until they are full in order to avoid starvation. Averroes explains that this recommendation stems from the fact that cold has a strong effect on the bodies of those who fast or starve. [6 f50r]

If a traveller becomes severely chilled or hypothermic, Avicenna advises entering a warm bath and lying beside those with more corpulent and soft bodies to get extra warmth. Averroes agrees that it is indeed appropriate for a person suffering from hypothermia to be placed in a bath and to lie with others whose bodies provide warmth and comfort. [6 f50r]

Avicenna also offers advice for dealing with snow blindness. If a traveller's eyes become clouded and vision impaired, a black veil should be placed over his eyes, and he should look for a long time at a dark object held in the hands. The extremities should be protected from cold by applying oil derived from costus (*Saussurea costus*, also known as *Saussurea lappa*). In ancient and medieval medicine, costus — an aromatic root was used for digestive disorders and inflammations and more generally for regulating bodily fluids and protecting the body from cold. After the extremities had been protected with oil, the traveller's feet were to be wrapped several times before placing them in shoes. If the pain in the extremities stopped, but the feeling did not return, it was a sign that the extremities was dead and frozen, i.e. that the cold had seriously damaged the tissue. In such cases the bindings had to be removed, and the extremities should be warmed and rubbed with mustard oil and other warming oils, if available. If the feet turn black, it is necessary to carry out scarification below the affected area with an iron instrument until blood began to flow. If decay appears in them, it should be cleaned, and any necrotic tissue should be excised. [6 f50r-50v]

The manuscript further notes that if a traveller becomes exhausted, the body should be treated with oil, and the extremities should be rubbed and stretched in a bath, followed by consummation of light food and he should remain in rest for several days. [6 f50v] Avicenna forbids further exertion, since activity itself is the cause of fatigue, and there can be no proper treatment or restoration except by removing its cause.

Avicenna also provides much advice concerning travel during the hot summer season. Thus, travellers should prepare themselves by avoiding departure during the hottest hours of the day, particularly at midday, and should first rest so as not to become overheated through exertion. He recommends performing phlebotomy in order to draw some sanguinous humour (blood) and thereby protect the body from the formation of abscess. [6 f50v]

Averroes explains that phlebotomy is indeed beneficial and even necessary for someone preparing to travel, because physical exertion generates heat, which can overheat the blood. The external heat to which a traveller is exposed during summer intensifies this effect: if the blood is already warm, further heating causes constriction of veins. Therefore, when the veins become too constricted to bear this pressure, the blood may flow into one of the extremities and predispose to an abscess. After phlebotomy, however, the remaining blood in the veins warms somewhat but does not cause constriction. For this reason, he notes, people customarily preformed bloodletting of animals in late spring and early summer. They learned this from experience. [6 f50v]

It was also necessary to purge the traveller who had too much bilious humour (yellow bile) to prevent the risk of dehydration. Travellers should drink cooling juices — such as sour grape juice, pomegranate juice – in order to reduce bodily heat before departure. It was also recommended to drink water frequently and to rest whenever possible. Travellers were advised to sustain from shouting, excessive conversation, and quarrelling, since these activities increase thirst. They should remain in shaded places, avoid very hot locations, and drink syrup made from sour grape juice, purslane, diluted with water. Therefore, Averroes states that this rule is indeed perfectly clear in itself, i.e., one should avoid that which generates heat and use that which has a cooling effect. [6 f50v-51r]

If a traveller felt thirsty in the middle of the day, he should hold in his mouth a pill of the size of a small pea made from saffron and camphor. And if he feared that his face would be damaged by the sun and his skin would darken, he should apply a mixture of oil and wax, - an instruction directed particularly toward women. Averroes comments that what Avicenna has said about holding camphor pills in the mouth is because they quench thirst and cool the body. Also, applying on face a mixture of oil and wax to protect the skin from the sun was a well-known practice. However, Averroes points out that wax tends to melt under intense sunlight and thus recommends using oil alone. He further notes that this advice is particularly directed toward women, whose faces, due to their greater sensitivity, are believed to be more vulnerable to the effects of the sun. [6 f51r]

Later medieval medical literature, strongly influenced by ancient texts, also discusses protective measures related to travel. Thus, another important medieval medical work, the *Regimen sanitatis Salernitanum*, one of the most widely cited and reinterpreted medical and health manuals of the Middle Ages, also refers to problems encountered during sea voyages. It focuses particularly on sea sickness and offers the following verse:

Sea sickness will trouble no one greatly,
if he mixes these substances with wine:
Sage, salt and pepper, wine, garlic and parsley —
if the mixture is right, the broth will be salty.[1] [15 v60]

Conclusion

The analysed manuscript preserved in the Metropolitan Library in Zagreb represents a valuable source in which diverse intellectual experiences and medical traditions — from ancient Greece, through the Arab and Moorish worlds, to medieval European scholarship — are brought together. Medieval medical codices may therefore be regarded as important sources for tracing the transmission and transformation of ancient medical knowledge and Arabic medical learning within the framework of medieval European medicine, particularly through practical instructions concerning the preservation of health.

A comparison between the texts of the *Corpus Hippocraticum* and the analysed Avicenna's manuscript accompanied by the commentary of Averroes, reveals several notable parallels. In both traditions, travel is understood as a dangerous activity capable of endangering human health and even leading to death. Whereas Hippocrates mainly emphasises the health consequences and pathological outcomes associated with travel, Avicenna and Averroes devote greater attention to preventive measures, providing practical advice aimed at preserving health during the journey itself.

The medieval medical tradition, reflected for example in the *Regimen sanitatis Salernitanum*, likewise addresses health problems related to travel and integrates them into broader guidance on maintaining bodily balance and well-being. Within this framework, travel is not only recognised as a potential medical risk but also treated as a circumstance that requires specific preventive strategies and behavioural adjustments.

The medical advice contained in these sources demonstrates that journeys in earlier periods were widely perceived as significant health hazards. Consequently, considerable attention was devoted to the development of practical guidelines aimed at preserving health and maintaining the balance of bodily humours in accordance with the dominant

1 *Nausea non poterit quemquam vexare marina,*
antea cum vino mixtam si sumpserit illam.
Salvia, sal, vinum, piper, allia, petroselinum,
ex his fit salsa, nisi sit commixtio falsa.
(Translation and poetic adaptation from Latin by professor Zrinka Blažević).

medical theories of the time. Therapeutic measures included the use of plant and mineral-based remedies, alcoholic macerations, hygienic practices, and carefully regulated dietary regimens.

Despite the considerable historical distance, some of these recommendations are still extremely relevant today, especially those related to hygiene, moderation, and the importance of maintaining physical fitness and calmness and composure when travelling. The manuscript *Cantica canticorum Avicenne cum commento Averrois* thus not only illustrates the continuity of medical thought from antiquity to the medieval period but also highlights the enduring concern of medical writers with the protection of human health in situations of physical strain and environmental change.

Sažetak

U radu se na osnovu rukopisa *Cantica canticorum Avicenne cum commento Averrois* koji se pripisuje arapskom liječniku i misliocu Aviceni (980 – 1037) a koji također sadrži i komentare arapskog filozofa Averroesa (1126 –1198) analiziraju upute kako očuvati zdravlje tijekom putovanja. Prijepis rukopisa nastao je u 14. stoljeću i čuva se u Metropolitanskoj knjižnici u Zagrebu. Naputci o čuvanju zdravlja prilikom putovanja, sačuvani u navedenom djelu otkrivaju kako su putovanja donosila značajne zdravstvene rizike pa se velika pozornost posvećivala smjernicama vezanima uz očuvanje zdravlja, o čemu svjedoče i komparativno analizirani tekstvi iz djela *Corpus Hippocraticum*, a koji se odnose vezano uz putovanja, te napuci o zaštiti od mučnine pri vožnji brodom iz popularnog srednjovjekovnog djela *Regimen sanitatis Salernitanum*. Upute o očuvanju zdravlja su se prije svega odnosile na balansiranje tjelesnih tekućina moderiranim režimom prehrane i dijetetskim mjerama, zatim na higijenske mjere vezane uz tjelesnu čistoću i čistoću odjeće, te zaštitu tijela od snažnih atmosferskih prilika. Jednako su se tako koristila preventivna i terapijska ljekovita sredstva od biljaka i minerala, kao ulje kosta, kamfor ili alkoholni macerat kadulje.

Ključne reči: srednjevekovna medicina; rukopisi, medicinski; putovanja

Non MeSH: Avicena; Averoes; Cantica canticorum Avicenne cum commento Averrois; Corpus Hippocraticum; humoralna teorija

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DEALING WITH DEMOGRAPHY. IMMIGRATION RESTRICTIONS IN THE UNITED STATES C. 1880-1930 AND THE LITERATURE OF EXCLUSION

Abstract: The article investigates immigration restrictions in the United States circa 1880 to 1930. The emphasis is on the rhetoric and arguments utilized by supporters of limiting the intake. After 1890, immigrants from southern and eastern Europe grew as a proportion of the total. The anticipated resulting demographic change was worrying to traditionalist Americans and to the labour movement. Yet their country had always progressed through arrivals from overseas. How could they formulate mechanisms of exclusion which distinguished between people who were similar to themselves and those who brought something new? The racist conservationist Madison Grant drew upon anthropology and history for his contention that Americans were a great fusion of pioneers from northern Europe. The historian and journalist Lothrop Stoddard continued this line of reasoning. Both were organized supporters of eugenics, a doctrine used to 'fine-tune' racist discourses. Eugenics only became a factor in the last two decades of the period. The labour movement and others had been clamouring for immigration restrictions long before that, roused to action especially by the arrival of Chinese workers. The pamphlet *Meat vs. Rice* by American Federation of Labor leader Samuel Gompers and Herman Gutstadt, originally published in 1902, applied crude racism to limit competition from such entrants in the job market. Society drew a dividing line between those who could become American and those who could not, buttressed by the Naturalization Law of 1870 and the Chinese Exclusion Acts of 1882 and 1902. The negative contentions against immigrants from less familiar places had significant influence on the Immigration Act of 1924. The article argues that Yankee intellectuals often had a conception of America as a British republic, in which related peoples were assimilable and valuable too.

Keywords: immigration; demographics; racial bias; anthropology; negative eugenics; mental test

The Transportation Act of 1718, passed by Parliament in Great Britain, led to an estimated 50,000 convicts from the old country being shipped out to the thirteen colonies before 1776. [1 p416] Eight out of ten were male and the majority were transported for resorting to petty theft during times of scarcity. In 1770 there were about 470,000 slaves in the colonies, of which nine out of ten in the South. [2 p369-70] For virtually everyone else America was the land of opportunity. The first census of what had become the United States in 1790 revealed a free population of more than 3 million. Exactly a century later, slavery having been abolished in 1865, almost 63 million people called it home. Hard-working immigrants could save money, buy or obtain land, start careers and raise their children with fewer impediments than they were accustomed to in Europe.

This article is about immigration restrictions and theories which are likely to have influenced the legislation. It asks how arguments opposing immigration were formulated in the late nineteenth and early twentieth centuries. A number of interest groups were geared towards exclusion. The Immigration Restriction League was founded in Boston in 1894 by lawyers, senators and scholars. It continued to function until 1921, overlapping with eugenics organizations in its final years. Organized labour saw its economic interests as being at risk from further immigration. Language and cultural barriers made recent arrivals harder to unionize. As a society, the United States needed to resolve the question of who could be an American and how much conformity was expected of citizens. The volume and nature of immigration created the impression of permanent flux in the population. New York state on the East Coast, accessible to immigrants arriving by sea from Europe, and California on the West Coast, accessible to those who came from Asia, were disproportionately affected by demographic shifts. The theorists who disdained immigration wanted to maintain a seemingly homogeneous population. They needed a schema to sift further additions according to who was acceptable and who was undesirable.

In 1870 the foreign-born population amounted to 5.57 million people. [3 p463] An exact third of it was from Ireland and 47 per cent in total came from the British Isles. British North America (Canada) accounted for another 8.9 per cent. Most of the others were known to be assimilable: the slightly more than 30 per cent from Germany, 2 per cent from France and over 4 per cent from Scandinavia. The remainder amounted to a little more than 7 per cent and included the newcomers to whom many theorists objected. The 1890 census was still taken before the waves of southern and eastern European immigration had begun in earnest. At this point, the foreign-born population comprised 9.25 million people, significantly higher than it had been in 1870. The Irish share of it had by now declined to just over 20 per cent. The two British Isles provided just over a third of the immigrants. [4 p606-8] Canada made up another 10.6 per cent. The most populous 'foreign' grouping was by now the Germans at 30 per cent of the total, almost as many as the British Isles. Scandinavia had grown to 9.6 per cent of immigrants. France had fallen to 1 per cent or so. That left roughly 35 per cent from all other countries, a fivefold

increase in percentage terms. The establishment of the Immigration Registration League, consisting of influential people often privy to inside information anyway, occurred close in time to the census becoming available in 1895.

The article will follow the literature of exclusion into the 1920s when the well-known Immigration Act of 1924 came into force. The 1920 census uncovered 13.92 million foreign-born. Ireland was third in the stakes, having slipped back to 7.5 per cent. [5 p318] All immigrants from the British Isles collectively made up 15.6 per cent, half of what the proportion had been in 1890. Another 8 per cent from Canada increased the traditional origins of the population somewhat. As in 1890, Germans were the largest group of immigrants at just over 12 per cent. Scandinavia stood higher than before at 8.5 per cent. France again accounted for 1 per cent. Consequently, the remainder, including the second largest group the Russians, constituted 55 per cent of all immigrants. The nationalities seen as less assimilable were thus in a majority among new arrivals. Anti-immigration feeling rose noticeably in the early 1920s. [6 p89] Considering that the entire population was more than 106 million people in 1920, 7.5 million inhabitants originating in unfamiliar parts of the world nevertheless did not impinge on the fundamentals of national identity. Allowing 'foreigners' the opportunity to make the United States their home too, could even entail advantages. In 1869 the polymath Francis Galton noted that America possessed little of the higher culture and was dependent on Britain for first-rate works in art and the humanities. [7 p40] In 1893 the Czech composer Antonin Dvorak suggested that an American tradition of music might be founded on black melodies. [8 p121] Stretching the boundaries of what was conceived as American might permit the country to escape from the shadow of its colonial past. Of course, that was exactly what numerous long-standing Yankees wished to avoid at all costs. They wanted self-government but saw themselves as a derivative of an older civilization.

I

To whom citizenship may be conferred and how easily say much about how welcoming a country is and what the boundaries are for joining its civil life permanently. The first American Naturalization Law of 1790 allowed free white men with two years' residence to become citizens. It reflected that the country was young and in need of a larger population. Citizenship was limited to the free because a bondsman would not necessarily be able to fulfil the requirements incumbent upon a national, such as defending the state against outside aggression. The Naturalization Act of 1870 followed from the defeat of the Confederacy in 1865, allowing foreign-born people of African nativity or descent to become citizens. It was a logical step in view of the slaves becoming free. The length of residence required was 14 years, which had been established in 1798 by an amendment to the original naturalization law. There was no provision for bestowing citizenship on Asian people.

Chinese immigrants had begun arriving in California in the 1850s, finding their place in the job market as labourers. An estimated 300,000 of them were admitted in the next thirty years until the flow was severely restricted by the Chinese Exclusion Act of 1882. It banned entrants from China unless they were merchants, government officials, students, teachers, visitors or US citizens. Designed to last for ten years, the Act was renewed once and then superseded by another Chinese Exclusion Act of 1902, which remained in force until 1943. The courts were specifically instructed not to naturalize Chinese people already in the country on the state level and that any laws in contravention of this were hereby repealed. The Act of 1882 was the first major federal law restricting immigration. The justification given was that the presence of Chinese workers endangered the wellbeing of certain communities in America.

The Chinese were well-disciplined, hard-working and frugal. Leland Stanford, the Californian railway magnate, declared in 1865 that without Chinese labourers the transcontinental railway could not have been built. It had been a decision by Congress that the network should be constructed, implying that the legislators needed to keep the facts in mind. [9 p27] The Chinese were nevertheless competing for jobs on price and American workers did not relish being displaced in this manner. In an act of ethnic solidarity with those who had lost out as well as defending future opportunities for themselves, they began bad mouthing the Chinese workers. Racism often emerges in such situations and trivial differences may be blown out of all proportion. Friedrich Engels, as a radical journalist and writer, painted a highly prejudiced picture of the competition English workers had to endure from Irish immigrants in his *Condition of the Working Class in England in 1844*. [10 p90-4] A possible equivalent in the United States was the pamphlet *Meat vs. Rice* by American Federation of Labor leader Samuel Gompers and Herman Gutstadt. They are not household names like Engels and their booklet had no loftier aim than excluding the Chinese from the labour market and, if possible, America. Even so, the rhetoric of the two works aligned in this respect. Gompers and Gutstadt vilified the Chinese for the same reason that Engels had criticized the Irish: to protect the well-being of American or British workers respectively.

An 1885 law prohibiting entry to 'contract labourers', immigrants who already had a job lined up in the United States, was passed at the behest of the labour movement. It was meant to reduce the supply of labour, thus helping to keep American wages high. Few Asians belonged to the American public in the early twentieth century. It was therefore possible to launch broadsides at them without much fear of retaliation. The metonymy *Meat vs. Rice* sought to portray American working-class manhood as natural and desirable, in contrast to what was actually Chinese precarious employment. Meat was a valued foodstuff, whereas rice may have come across as alien and cheap. The pamphlet, published in 1902, was used as a Senate document. It was republished by the Asiatic Exclusion League, a California-based pressure group, in 1908. Arguments against immigration could be vicarious, tailored to the audience and the level of politeness required.

With restrictions on immigration from Asian countries, however, little subterfuge was needed. In 1907 and 1908 came the so-called Gentlemen's Agreement with Japan. The Japanese government had become aware in 1906 that their nationals were segregated in the schools of California. Outraged by this, it sought redress from Theodore Roosevelt's government. Correspondence between the two established a concord whereby the federal government would use its influence towards ending the segregation. In return, Japanese workers would not be issued passports to travel to America. The Chinese Exclusion Act of 1882 defined skilled, unskilled and mining occupations as 'labouring'. Restrictions on the Japanese and Chinese were therefore partly motivated by the interests of American workers. The Asians were often seen as temporary additions to the labour market, rather than as future compatriots. After all, legislation at the time meant that they could not become American citizens except by birth.

Meat vs. Rice was a lengthy diatribe again Chinese immigration. [11 p3-6, 12, 16, 18-9, 27, 14] Many of its arguments are summarized in the table below, alongside those in a similar but much shorter pamphlet *The Mongolian Problem in America* by W. K. Roberts, until recently an American customs officer in China. [12 p3-4]

Table 1. Anti-Oriental features in two pamphlets published in San Francisco by organized labour.

Feature	*Meat vs. Rice*	*The Mongolian Problem*
Orientals not welcome	X	X
Birth rates		
Miscegenation		
Organized crime	X	
No conception of civic duties	X	
Unfair competition	X	X
Taking control	X	
Overcrowding	X	
Immorality	X	
Opium use	X	
Spreading disease	X	
Appeal to US nationalism	X	X

Many of these were standard themes relating to unwelcome outsiders. The only one specific to this particular ethnicity was the element about opium addiction. The allegation was that the drug was spreading from hardened Chinese to American women and girls. [11 p20] Opium might be a Chinese vice equivalent to alcohol among white workers, though it is somehow understandable that hard and demanding lives require a form of escapism.

Gompers and Gutstadt could not lay claim to being intellectuals, but utilized the works of academics such as the Australian historian Charles H. Pearson. Their pamphlet

was not of utmost probity since both Gompers and Gutstadt might be reckoned as outsiders themselves. Both were first-generation Jewish immigrants. [13 p8] Perhaps they saw themselves as assimilable, while Orientals were too alien to become American. The originator of the melting-pot idea, the British playwright Israel Zangwill, was also Jewish. [14 p22] The 1908 printing of *Meat vs. Rice* included warnings that Japanese people were a similar 'menace' today. [11 p4] Thus East Asian looks and cultural traditions trumped the higher economic status of the Japanese, whose country had copied Western industrial practices after 1868. The only group of East Asians who could not be kept out were Filipinos, who had citizenship stemming from their homeland becoming an American colony in 1899.

II

Visible differences made Orientals the first targets for exclusionary mechanisms. The science of anthropology extended the reach of race into public debates. It was possible to operationalize the research findings into justifications for restrictions on immigration. Published in 1899, William Z. Ripley's tome *The Races of Europe* was a response to earlier scholarship attempting to find the cradle of 'the white, the Indo-Germanic, Caucasian, or Aryan race'. [15 p55] Ripley wrote that it was a mistake to locate this in the Caucasus and no other such homeland is likely ever to have existed. His alternative was to discern three main races in the Old Continent, called Teutons, Alpines and Mediterraneans, living in respectively the north, middle or south. Colouring provided a distinguishing feature and cranial index was another. When measuring the breadth of the skull as a ratio of its length, rates of 0.8 and above were brachycephalic, while 0.75 and below were dolichocephalic. [15 p37] The longer skull of the dolichocephalic Teutons separated them from the brachycephalic Alpines with a rounder skull. [15 p121] The complexion and colour of the hair then separated Teutons from Mediterraneans, who like them were dolichocephalic. A synonym for Teuton was Nordic and many popularisers preferred this term because they did not wish to purport German anthropological origins to the United States. Ripley conceived Europe as a patchwork of physically varied types just as it became important to scientifically ward off people of northern European descent from newcomers arriving from other parts of the continent.

Whatever Ripley's scholarly intentions, his work would have an impact on addressing the changing nature of immigration to the United States occurring from the 1890s. *The Races of Europe* occasionally commented on immigration to America, though without any vituperation. Nor was it an elegy to Nordic people. Quoting a French and an Italian social scientist, Jacques Bertillon and Enrico Morselli respectively, it was proposed that this ethnic group was more prone to divorce and suicide than people of Latin descent. [15 p519] Neither of these practices was condoned by nineteenth-century society. The reason given for the higher divorce rate was that Nordics had a habit of brooding over ills suffered, which could eventually lead to a household being dissolved by a judge. Being

cold-blooded and reserved, they eschewed an immediate release of tension to which many Latins would resort, possibly including violence. Similarly, introspection and the rational mind of Nordics were associated with suicide. The higher the proportion of Nordic bloodlines in a country, the greater the propensity to suicide, according to Morselli. Emile Durkheim investigated this notion in *Suicide: A Study in Sociology* (1897) and dismissed it, except that he agreed the suicide rates were highest in Scandinavia.

In 1916 Madison Grant, a zoologist and conservationist, recorded his indebtedness to Ripley in the preface to what would become his most famous book, *The Passing of the Great Race*. The title alone revealed the pessimistic outlook of Grant, a scion of a wealthy and prominent family. He took an intellectual approach to the subject of immigration. Grant's work contained his version of European history, such as where particular peoples had settled and what ethnicity they were, interspersed with commentary about the implications of immigration for America. As a prime destination for overseas migrants, the United States had the luxury of choosing its own population. Grant supported the curtailment of immigration from any country which was not Nordic. In 1909 he had become a vice-president of the Immigration Restriction League. [16 p74] His belief was that old-stock Americans were dying out or losing their control over society. Eugenist Henry Fairfield Osborn provided a scientific justification for the book's contentions, based on August Weismann's experiments showing that acquired traits are not inherited. Assimilation was deemed impossible for the latest arrivals. Dutch, French, German and Scandinavian immigrants had learnt to speak English and gradually adopted American ways, but the inclusion of southern and eastern Europeans caused 'degeneracy'.

Due to the multinational and multiracial nature of American society, its version of eugenics aligned closely with racism. It takes time to establish oneself in a new country, even one with many opportunities. Therefore, the descendants of early settlers were on average wealthier and more influential than the Irish and Germans who had started arriving in sizeable quantities in the 1850s. The latter in turn outranked Italians and subjects of the Habsburg Empire, who had arrived in significant numbers from the 1890s. As the British and early settlers had come from north-western Europe, newer arrivals in the 1850s from the continent's north or middle and the most recent ones from the south and east, a rudimentary racial theory lay there for the taking. Grant utilized Ripley's categories, fashioning them and European history to make out that the first and second waves of immigrants had been Nordic, unlike the latest one. History came in useful in turning Britain into a 'Nordic' country. Grant classified it as such by reason of its being settled by Angles, Saxons and Jutes in the fifth century. Turning Ireland into a Nordic country was a conundrum, but it had suffered Viking invasions and been colonized by English Protestants and Lowland Scots. Though the facts were selective, Grant essentially worked from outward appearances and the Irish were pale. He categorized Poland as a Nordic country perhaps because many Poles are blond. Osborn noted that Grant was 'never before a historian'. [17 pVII]

In fact, Grant's object was to stand up for his own country, which he regarded as a repository for blond or light-haired bloodlines. He claimed that New England from colonial times had been more Nordic than England itself. [17 p74] Since Nordics were 'a race of soldiers, sailors, adventurers, and explorers' they might leave their ancestral home in greater numbers than their fellow subjects. [17 p198] In Grant's case, racism was combined with an extreme form of eugenics. It would be beneficial to begin by sterilizing the criminal, the diseased and the insane before moving on to 'weaklings' and perhaps ending with 'worthless race types'. [17 p46-7] He joined eugenics organizations like the Galton Society when it was founded. [14 p188] Grant repeatedly took aim at Polish Jews in his book, explaining that they were unassimilable due to their physical appearance and mentality. [17 p14, 81] New York, where Grant always lived, was becoming a 'cloaca gentium' in which Jews, although speaking English and unethically adopting the names of the colonial stock, were pushing the latter to the kerb. They had no means of understanding the ideals or religion of old-stock Americans.

Grant's hometown was especially affected by immigration, which in part explains why he was so worried about racial amalgamation and pessimistic about the future. Being on the East Coast and enjoying excellent maritime links, it was the main destination for ships carrying emigrants from Europe. In 1900 New York had a population of 3.5 million, making it the second largest city in the world after London. More than eight in ten were first or second-generation immigrants. [9 p361] Aspects of cohabitation may have presented a challenge to many who had roots in the city. There were 'nearly twice as many Irish as in Dublin, about as many Jews as in Warsaw, and more Italians than in Naples or Venice.' [9 p62-3] It was not just patricians like Grant who resented this. Organized labour was losing its control over the supply of manpower due to an almost unlimited pool of reserve workers being available. When some recent immigrants allowed themselves to be used as strike breakers, it was perhaps inevitable that racism and prejudice should form part of the response from American workers.

For Grant who valued trees and the habitat of animals, it did not represent a seismic shift to be concerned about the human stocks of his nation. Distinguished families like his had set the tone for how America was run. The labour movement too feared its influence would wane with outsiders entering industry. There was an assumption that their preferences need not be justified extensively as they struck a chord with the people. Grant admitted that Mediterraneans might be intellectually superior to Nordics and were certainly more artistic, but this did not change his attitude towards racial amalgamation. [17 p198] Grant applied the concept of Nordicism as a convenient unifier of the American population as it had existed traditionally. The vital call to action came on the penultimate and final pages. Sentimentalism and outdated notions were sapping America of its strength. It had already become an 'asylum for the oppressed' and was fast heading towards a racial abyss. [17 p228] The colonial stock, which he described as 'the great race', was evaporating in the melting pot and would soon exist only as a memory.

It was one of those occasions when a book, whatever its faults and inaccuracies, encapsulated the zeitgeist. *The Passing of the Great Race* had touched a nerve. It went through four editions in six years. Consequently, it would have substantial influence on immigration legislation. In 1921 Calvin Coolidge, not considered to be particularly racist during his tenure as president 1923-1929, wrote an article in *Good Housekeeping* entitled 'Whose country is this?' It showed signs of Grant's thinking such as: 'The Nordics propagate themselves successfully. With other races, the outcome shows deterioration on both sides.' [6 p104] Such views could even be extended onto the world stage. Just like Henry Fairfield Osborn had introduced *The Passing of the Great Race* and linked it to eugenics, Grant passed the baton on to his associate Lothrop Stoddard, who advocated eugenics globally.

III

Stoddard was an historian and journalist. His *The Rising Tide of Color* was published in 1920 with an introduction by Grant. Interestingly, as Stoddard shared Grant's elite background, the book combined the rhetoric and concerns of the labour movement with a commitment to 'world eugenics'. Stoddard exhibited the maps from the book at the Second International Congress of Eugenics in New York in 1921. [18 p55] It also contained long quotes from the hereditarian arguments of Prescott F. Hall, one of the Immigration Restriction League's founders. Stoddard described recent arrivals as 'the alien hordes of the European east and south'. [19 p263] He also included a new eugenic argument apart from the obvious racial and demographic ones. The preponderance of the new elements on the East Coast had resulted in the decline of the birth rate of the old stocks. This had not been replicated in the mid-West or southern states, largely untouched by such migration. [19 p256-7] The interpretation was that the colonial stocks reduced their breeding to spare their younger children the competition from the newcomers. Elder sons usually received more of the family's resources, while younger ones and daughters might well be embroiled in the same economic sphere as first or second-generation immigrants.

Grant's introduction revealed his hopes that Nordic workers would realize the economic danger posed by southern and eastern Europeans as well as Orientals. [19 pXX-XI] Democracy worked reasonably well if the population was homogeneous. [19] With his total defence of white societies, Stoddard's aims were not at odds with the labour movement's. He even explained how the National Sailors' and Firemen's Union in London were facing competition from Chinese workers. [19 p296] The British socialist H. M. Hyndman was referenced on historical Asian migration into Europe. [19 p237-8] Stoddard believed that the Chinese Exclusion Act was successful. [20 p43, 45] However, the Gentlemen's Agreement with Japan did not cover farmers. Their numbers were growing due to sending for their wives or contracting marriages in their homeland. By dwelling on geopolitics and race in tandem, Stoddard ventured off the beaten track. Like Grant before him, he viewed the First World War as a 'civil war' between Europeans. He

blamed it on Europeans not understanding the anthropological categories discovered by Ripley. [21 p12] Stoddard nonetheless classified Germans as primarily Alpine, with only a small minority being Nordic. [19 p202] Thus they were not ideal immigrants in America, whereas Grant had classified them as Nordic. These were not completely outré opinions. Woodrow Wilson, president 1913-1921, had supported the ban on Chinese and Japanese workers in his first campaign for the highest office in the land. [19 p286-7]

In his next notable work, *The Revolt against Civilization* (1922), Stoddard contributed to a renewed discourse about immigrants as radical agitators, occasioned by Wilson's Red Scare 1919-1920. [22 p25, 55] *The Revolt against Civilization* concerned how 'under-men' were turning to Bolshevism in an attempt to bring down the established order. Stoddard gave sociological reasons for why such people were disproportionately Jewish. Jews did not feel completely at home inside their respective polities and revolutionary sentiments included an international outlook. [23 p151-2] They were analytical enough to find faults with society and might be tempted by high positions in the Bolshevik forces. Since the United States had taken a million Jews between 1898 and 1910, it was well-known that many were refugees from oppression in Tsarist Russia or had faced similar persecution elsewhere in eastern Europe. [24 p19]

Stoddard's reasoning was mostly based on anthropological categories. He viewed the old colonial stock as the superior strain in the population. Southern and eastern Europeans were 'decidedly inferior' and black people, according to the prejudices of the time, stood lowest of all. [23 p62-3] Eugenics vouchsafed methods of fine-tuning which Stoddard applied. Those who had arrived recently from the same parts of northern Europe as the Yankees were less highly selected than before. Therefore, they were only second in rank. The country was now rich and a magnet for people who simply wished to earn money, rather than possessing the pioneer spirit. [25 p69] American eugenists were nonetheless highly attuned to ethnicity. In Europe the question of the birth rate concerned merely which elements in a unitary people should be encouraged to reproduce, but in America eugenics was tied up with demographic change. [23 p112] The composition of the population was thought to have wide-ranging implications for ideals, institutions and national character.

It did not mean that social class was neglected. Stoddard recommended methods which were controversial at the time, namely birth control. He believed that it had been a mistake to make information on contraception difficult to obtain. [23 p119-20] The result was that high fecundity continued to be prevalent among the masses, while the cultured classes had made the effort and thereby had reduced their numbers. Theodore Roosevelt popularized the term 'race suicide' in an American context in 1909. Between 1905 and 1909, there had been more than thirty-five articles published on the topic in general magazines. [26 p40] 'Race suicide' affected especially what was seen as valued members of the community. In what can scarcely be reckoned the most accurate model, the biologist Charles Davenport calculated that two hundred years hence a thousand Harvard graduates would only have fifty descendants. This contrasted with the same

number of Romanians in Boston by then having become a hundred thousand. [23 p113] It symbolized the lowering of standards in terms of social class, with Davenport seeing the two terms as fixed. He did not take into account that they might well overlap in the future, nor that Romanians would become Americanized and marry outside their ethnic group. More prosaically, in 1891 the economist Francis Amasa Walker, who belonged to the Immigration Restriction League, had observed that immigrants were breeding at a higher rate than native-born Americans. [27 p72]

Purely racist allegations were enough to challenge and thwart immigrants from what was perceived as alien places. Nothing they brought with them was considered valuable. Willingness to work hard and interest in 'passing' as Americans could instead be seen in a negative light. Foreign religions, cultural practices and divided loyalties were seen as suspect traits. 'I do not believe in hyphenated Americans,' wrote Roosevelt in a book of 1918, though also making clear that 'transplanted or second-rate Englishmen' were no better. [28 p202-4] Eugenic validation then solidified the arguments through either stating that their birth rates were too high, that they reduced the birth rates of long-time citizens or that they could never be assimilated since their heredity was too different. A few humanitarians and melting-pot enthusiasts, like Roosevelt, existed, but the only groups to benefit economically from immigration were steamship owners, industrialists and capitalists. It is true that they had clout. They may have been an influence on presidents Grover Cleveland and William Henry Taft vetoing legislation requiring the passing of a literacy test for admission to the country in 1897 and 1913 respectively. Attaining the presidency is often connected to the ability to raise revenue for campaigning from capitalists.

IV

A literacy test aimed to restrict immigration from countries which had less developed educational systems. Illiteracy was thought to be higher in southern and eastern Europe than in the core countries where long-standing Americans originated. The debate could be conducted in terms of wanting thrifty and energetic new additions to the country. Someone who had not learnt to read their own language by the age of sixteen did not come across as such. The proposal was less openly discriminatory than the Immigration Act of 1882, which prevented physically and mentally incapacitated migrants from entering. The Immigration Act of 1891 required entrants to undergo a medical examination to determine their fitness to land on American soil. In contention was whether they carried infectious diseases, sometimes picked up during the voyage in steering class, or were physically disabled in any way. Every member of a family had to pass these medical tests, raising the bar for success. Apart from the check-up the emigrant was asked questions designed to weed out ex-convicts, polygamists, rabble rousers and anyone who had been dependent on doles in their homeland or was suspected of potentially being so in the United States. Those with more money, evidenced by a first or second-class passage, were only liable to a cursory medical exam before being free to step ashore. [9 p44]

Was there already a theoretical underpinning to the restrictions regarding mental and physical ability, character and race? Eugenics was not unknown in the United States in 1882 and 1891. However, it had not yet been institutionalized in the American Breeders Association (founded 1903), Race Betterment Foundation (founded 1914), Galton Society (founded 1918) and American Eugenics Society (founded 1926). Charles Davenport had not yet made his study trip to London to meet Francis Galton and Karl Pearson, which occurred no later than 1902. [27 p45, 311] Ideas of preserving society from unproductive members or malefactors are older than eugenics. Eugenics, a scientific theory of heredity, was not at the heart of the 1882 or 1891 immigration legislation. Weismann only showed, to the satisfaction of contemporary biologists, that heredity could not be altered in 1883 in Germany, and it took time to filter into American debates.

Eugenics started to matter after further restrictions had been passed in 1917. At that point the literacy test was introduced over Woodrow Wilson's veto two years earlier. The 1917 Immigration Act prevented further migration from an 'Asiatic Barred Zone', including British India and the Dutch East Indies, and extended the categories of disabled people who were not allowed to enter. Immigrants sixteen years or older had to be able to read a passage in their own language. After 1917 eugenists like Harry Laughlin sought to gain ownership of who exactly were disabled, epileptic, insane or psychopathic. [14 p188] They attempted to anchor it in heredity, which required fuller investigation of kinship than was possible on Ellis Island, the main processing centre for immigrants in New York's harbour. This could be achieved through attaching a eugenics advisor to American consulates in Europe.

In the late 1910s and in the 1920s this desideratum became a reality. Nearly 80 per cent of would-be emigrants from eleven European countries, were screened for their fitness to be received in the United States. [14 p205] Only three of them were in southern or eastern Europe (Italy, Czechoslovakia and Poland) but the literacy test might be an impediment to emigration from these. The investigations at the consulates were not wholly to the detriment of potential emigrants. Burning bridges by selling one's home and purchasing passages to the New World was a risky endeavour as one could end up being turned away at its gates. [9 p56] The implemented system barred about eighty-eight in every thousand applicants from emigrating. It did not continue beyond the mid-1920s due to funding restrictions and difficulties arranging bilateral agreements with emigrant countries. After all, as nativists in the United States correctly reasoned, it happened to be in the interests of European countries that their 'surplus' population moved overseas. Eugenics also lost momentum in the United States after 1929 as the Great Depression began to bite. That cataclysmic event proved that poverty or ill health was not necessarily caused from within. [29 p344]

The case for eugenics had been buoyed in 1923 when Carl Brigham's *A Study of American Intelligence* was published. It was based upon mental tests administered during the First World War and indicated that southern and eastern Europeans were less intelligent than Americans of Nordic descent. [30 p10] Brigham, a psychologist at

Princeton University, was a close friend of Robert Yerkes, who had been responsible for testing large swathes of American recruits 1917-1918. These were group tests of intelligence called Army Alpha, for literate English-speakers, and Army Beta for illiterates and those who did not speak English. The data deriving from the project was analysed in Brigham's study including whether ethnic groups differed in measured intelligence. White Americans attained a mental age of 13.77 years and black Americans 10.41 years. Among the foreign-born the English topped the list at 14.87 years, Germans achieved 13.88 years, Irish 12.32 years and, as had been assumed, Greeks scored 11.90 years, Russians 11.34, Italians 11.01 and Poles 10.74. [31 p124]

Brigham originally believed this verified the tenor of what Madison Grant had claimed. [31 p180-1] He gave credit to *The Passing of the Great Race* in the preface and also relied on Ripley's division of Europeans into Nordics, Alpines and Mediterraneans. The main results, known in 1919, attracted attention and repeated agonizing. [32 p222-4] Brigham's refinement in terms of group differences was a separate development. A social explanation of the new data might have been attempted. A test in English naturally favours those who speak it well. Both Army Alpha and Army Beta measured familiarity with Anglo-American culture. People from the countryside in eastern or southern Europe may not yet have acquired an understanding of revolvers, gramophones or tennis. If someone was illiterate or did not speak English despite living in the United States, it suggested that they had not undergone rigorous schooling. The exam-taking situation in itself was often unsatisfactory due to crowded rooms, unclear instructions and many recruits being unaccustomed to the concept. Brigham himself recanted in 1930 and began warning against individual results being aggregated by group membership. [26 p17]

Like most psychologists studying individual differences, Brigham had interacted with the eugenics movement. However, there was variation within this school of thought as well. [6 p78-9] William McDougall, a British psychologist who had been part of Francis Galton's inner circle, emigrated to the United States in 1920, when he became a professor at Harvard. In 1905 he had been interested in whether intelligence varied between races and the effects of miscegenation. [33 p69] He reacted to the United States' army intelligence tests in a series of lectures in Boston in 1921. The ominous title *Is America Safe for Democracy?* stemmed from the average mental age of thirteen found for citizens of his adopted country. McDougall quoted research showing ethnic and social differences in intelligence and stated he was convinced by it. [34 p63-7] However, he also used contrary results obtained by K. T. Waugh and presented at the American Psychological Association. They showed no overall difference in intelligence between American, Chinese and Indian college students. There were disparities on individual items within the battery, sometimes to the disadvantage of a group which nevertheless made up for it on other items. McDougall drew social conclusions from the data: Indian lack of will-power, operationalized from the test item 'concentration of attention', might be the reason why their country had been colonized by the British. [34 p68, 70] Indians were still of good mental capacity as proved by the sum total of the tests. If American, Chinese and Indian students did not

differ in overall intelligence, it surely implied that wider tasks or a different set of questions potentially could eliminate differences between European ethnic groups.

Such enquiry was of the future. The bare bones of the army tests did give nativists useful ammunition for immigration restriction based on the desirability of newcomers from various countries. This overlapped with the concerns of eugenists. The unique contribution of eugenics to the debate was to recommend probing into the heredity of potential immigrants. The exclusion of obviously disabled people as well as felons, dole recipients and those with learning difficulties was merely a beginning from their point of view. Immigrants, said Harry Laughlin in 1920, needed to match the physical, mental and moral qualities which Americans sought. This should be evaluated on a family basis, rather than with regard solely to the individual. It would help prevent the entry of 'tainted' germ plasm which might break out in later generations. [14 p189] Family pedigrees were highly useful in this matter. Leading up to the passing of the Johnson-Reed Immigration Act of 1924, charts of the genealogy of inadequate families were on display in the halls of Congress to remind legislators of the social costs of harbouring 'deviants'. [35 p47]

Albert Johnson, a Republican congressman, socialized with many eugenists. In 1923 he became the honorary president of the Eugenics Research Association. [6 p108] In 1921 Congress had agreed an emergency quota act, restricting annual immigration to 3 per cent of any nationality among the foreign-born appearing in the census of 1920. It paved the way for the Immigration Act passed in April and May 1924. This Act was firmly aligned with the discourse of hindering immigration from what was seen as the hinterlands of Europe. The principle on which the emergency quotas were based endured. No more than 2 per cent of the total shown for that nationality among the foreign-born in the census of 1890 could be admitted. As discussed, before 1890 the sources of immigration had largely been the British Isles, Germany, Canada and Scandinavia. Under a provision of the 1924 Act, those who could not be naturalized in the United States were not accepted as immigrants either. In the Naturalization Law of 1870, it was impossible for Asians to be made American citizens. When Calvin Coolidge, by now president, signed the Act on 26 May 1924, he openly stated that he disagreed with its exclusion of Japanese immigrants. [9 p180] He said that in the main he agreed with its provisions and therefore would be signing it into law.

The implementation of the Immigration Act of 1924 was not as smooth as its supporters would have liked. Various stalling measures and delays made it less effective than envisaged. Then, in 1927, the principle was adjusted so that it became the national origins of the population in 1890 which counted, rather than the actual immigrants. [14 p204-5] Although this skewed the selection even more towards Great Britain, it made the task of determining quotas harder. In early January 1927, the government said it had not been able to ascertain the figures. Later that year, Congress passed a resolution delaying the implementation of the quotas by a year. The occurrence was repeated in 1928, before they finally took effect in 1929. The new president, Herbert Hoover, used the 1890 census as planned, but in 1931 the quotas were revised according to the 1920

census. Nevertheless, immigration restrictions of a wide-ranging type had been imposed. The 1924 Immigration Act would apply until replaced by the McCarran-Walter Immigration and Nationality Act of 1952.

V

This article has investigated racist and eugenic literature in an attempt to understand the reasoning behind immigration restrictions in the United States in the late nineteenth and early twentieth century. Racism clearly had a direct effect, while eugenics was used as an 'optional extra' to fine-tune mechanisms of exclusion. The two are nevertheless separate categories. [30 p59] Only racism existed fully in 1870 when the Naturalization Law applicable in this period was passed. Yet by its provisions Asians could not be naturalized, and it was not expected that many black people would arrive. The two main opponents of immigration examined here were intellectuals and the labour movement. The former were much more likely to use eugenics to support their case, while racism was common to both.

Rezime

U radu se istražuju ograničenja imigracije u Sjedinjenim Državama oko 1880. do 1930. godine, sa naglaskom na retorici i argumentima koje su koristili pristalice ograničavanja priliva imigranata. Posle 1890. godine, rastao je procenat doseljenika iz južne i istočne Evrope. Očekivana rezultirajuća demografska promena bila je zabrinjavajuća za tradicionalističke Amerikance i za radnički pokret. Pa ipak, njihova zemlja je uvek napredovala zahvaljujući dolascima iz inostranstva. Kako su mogli da formulišu mehanizme isključivanja koji su pravili razliku između ljudi koji su slični njima i onih koji su doneli nešto novo? Rasistički konzervacionista Medison Grant oslanjao se na antropologiju i istoriju za svoju tvrdnju da su Amerikanci velika fuzija pionira iz severne Evrope. Istoričar i novinar Lotrop Stodard nastavio je ovu liniju razmišljanja. Obojica su bili pristalice eugenike, doktrine koja se koristila za „fino podešavanje" rasističkih diskursa. Eugenika je postala faktor tek u poslednje dve decenije tog perioda. Radnički pokret i drugi su mnogo pre toga tražili ograničenja imigracije, podstaknuti na akciju posebno dolaskom kineskih radnika. Pamflet „Meat vs Rice" vođa Američke federacije rada Semjuela Gompersa i Hermana Gutštata, prvobitno objavljen 1902. godine, sadržavao je grubi rasizam sa idejom da ograniči kinesku konkurenciju na tržištu rada. Društvo je povuklo liniju razdvajanja između onih koji su mogli postati Amerikanci i onih koji nisu mogli, potkrepljeno Zakonom o naturalizaciji iz 1870. i Zakonima o isključenju Kineza iz 1882. i 1902. godine. Negativni stavovi protiv imigranata iz manje poznatih mesta imali su značajan uticaj na Zakon o imigraciji iz 1924. godine. Iznosi se tvrdnja da su intelektualci iz severnih delova SAD često shvatali Ameriku kao vrstu britanske republike, u kojoj su srodni narodi bili vredni i koji su mogli biti asimilirani.

Ključne reči: imigracija; demografija; rasna predrasuda; antropologija; negativna eugenika; mentalni test

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THE IMPACT OF THE GREAT WAR ON URBAN HEALTH: A CASE STUDY OF CONTAGIOUS DISEASES IN THE DUBROVNIK CIVIL HOSPITAL, 1914–1924

Abstract: Infectious diseases were a leading cause of mortality among soldiers and civilians during World War I. While most of these pathogens were known prior to the conflict, wartime conditions catalyzed their transition into widespread epidemics. Although vaccines for typhoid, cholera, and tetanus significantly reduced mortality, their implementation was often delayed or met with public resistance. This study analyzes the epidemiological profile of the Dubrovnik Hospital, which functioned as both a civil and military institution. Strict infection control was maintained, notably through mandatory smallpox vaccination for all hospital admissions. During the war, the hospital treated an average of 1,100–1,200 patients annually, one-third of whom were military personnel. While Dubrovnik recorded cases of louse-borne spotted typhus, it avoided the catastrophic outbreaks seen on the Eastern Front. However, the proximity of the Neretva River marshes, combined with the influx of infected soldiers, resulted in high malaria mortality. The final year of the war was marked by the emergence of the Spanish flu, which caused a high death toll in 1918 due to severe pulmonary complications. Tuberculosis remained a persistent threat throughout the period, while the high incidence of sexually transmitted diseases among soldiers significantly impacted military readiness. Other diseases such as diphtheria, tetanus, erysipelas, and scarlet fever further complicated the public health landscape. This research also addresses the challenges of fragmented archival records and the loss of documentation from the Military Garrison Hospital and St. James's Lazaretto, which limits a complete statistical reconstruction of certain war years and child mortality rates.

Keywords: First World War; urban health; infectious diseases

Non MeSH: Dubrovnik hospital; epidemiological profile; wartime medicine

Introduction

During the First World War, Dubrovnik struggled with an inadequate water supply, transport isolation, a lack of both food and medicine, a shortage of medical staff, and a large number of soldiers who were stationed in the City or sent there from the battlefield for treatment. The city was placed under strict military censorship. Landmarks were repurposed for the war effort; for example, the copper roofs of the Dubrovnik Cathedral were famously stripped to be melted down for ammunition. The local economy, which had begun to rely on early tourism, was completely halted. Trade was restricted by naval blockades in the Adriatic, leading to chronic shortages of basic goods like sugar, textile products, and coal. [1] By 1915, severe food shortages led to the introduction of food stamps for bread. [1] Resources were so scarce that vegetables like potatoes and beans were distributed only occasionally, often requiring women and children to wait in long lines overnight at public squares for small rations. [1] According to the census, in 1914 the city of Dubrovnik had approximately 14,000 inhabitants, while the broader district of Dubrovnik reached roughly 50,000 people. Regarding the military presence, Dubrovnik served as a significant garrison for the Austro-Hungarian Imperial and Royal Army (k.u.k.) and the Imperial-Royal Landwehr. At the start of World War I in 1914, the permanent garrison was approximately 2,500 to 3,000 soldiers. This number fluctuated significantly during the general mobilization in late July and August 1914 as troops were deployed to the Serbian and Balkan fronts.

The Dubrovnik Provincial Hospital during World War I provided services to the civilian population of the Dubrovnik and Kotor districts, as well as to soldiers, despite the existence of military health institutions such as the Home Guard Hospital in Gruž and the military hospital in city. In terms of administrative rank, it was the Royal Provincial Public Hospital. [2] In 1914, the hospital complex consisted of five buildings without organized departments that were created in 1922, initially the surgical, venereal and internal diseases departments, and in 1924 the tuberculosis department. [3] Until 1922, two doctors worked in the hospital, one primary physician who was also the director of the hospital, and one secondary physician. According to the Report on the Development of Medical Institutions and the Material Survey from 1919 to 1936, the Pulmonary Diseases Pavilion of the Dubrovnik Banovina Hospital, built of reinforced concrete, was built in 1910 when it had 10 beds, and in 1918 it had 15 beds: two rooms with five beds each, two with two and one with one bed. Just before the renovation in 1920, it had 17 beds. [3] The organization of the hospital strictly monitored the number of health personnel, especially nurses capable of providing medical care to civilians and soldiers. There were 24 nurses per 150 beds, 22 under the age of 20 and two under the age of 30. [1]

Sources and Methodology

This study is based on a systematic analysis of primary archival sources held at the State Archives in Dubrovnik (DADU), primarily within the collection HR-DADU-186 (General Hospital Dubrovnik 1880–1941). The research corpus encompasses 39 archival units (boxes) containing:

1. Patient Movement Reports: key documentation for the years 1914, 1917, 1918, and 1919, as well as the post-war period (1921–1926).

2. Military and administrative correspondence: weekly military reports (e.g., Box 108) and official correspondence from the District Prefect's Office in Dubrovnik and the Dalmatian Governorate in Zadar.

These are supplemented by specialized registers, including municipal records of the Municipality of Dubrovnik (Register of Prostitutes 1909–1925), death registries from the Diocesan Archives, and archival materials from the Franciscan Monastery.

Methodology

A quantitative analysis was applied to the data extracted from hospital registers and patient reports to reconstruct the institution's epidemiological profile. This involves statistical processing of morbidity and mortality rates for infectious diseases. Furthermore, a comparative method was used to distinguish between civilian and military patient demographics.

Archival Limitations

A significant challenge in this research is the fragmentation of the archival material. Due to the lack of preserved documentation for the Garrison (Military) Hospital and the St. James's Lazaretto, the presented figures should be interpreted as baseline minimums. While the gaps in documentation for specific war years (particularly regarding child mortality and certain military sectors) prevent a complete statistical reconstruction, the available data are sufficient to identify dominant epidemiological trends and the hospital's response to wartime crises.

Diseases

Typhoid fever

It was known from earlier wars how much diseases affect war success. [4] The medical report of the Austro-Hungarian Army's military health institute, in its semi-annual analyses, specifically monitors whether there is an increase in the frequency of measles, cholera, typhoid fever, spotted typhus, dysentery, tetanus, and frostbite. In a report from February 1916 for a period of 6 months earlier, three patients died of typhoid fever and four of dysentery in the Dubrovnik hospital. [1] Typhoid fever in the Dubrovnik hospital

was recorded throughout the war, but also in the years before the war. Thus, in the "List of Diseases" from 1898, there are five hospitalized patients with typhus. In the "List of Disease Types" (Verzeichniss der Krankheitsformen), there were no strict divisions according to age or gender of patients. In a report from January 1900 for the year 1899, six people were treated for typhus, of whom one person died. [1] Eight years later, there were 16 patients with typhus. [1] In the year before the war, in 1913, four typhus patients were treated. [1] The chronic water supply issues in Dubrovnik, stemming from the 1806 crisis in Šumet and inadequate infrastructure, directly contributed to the persistence of typhoid fever during the war. [5] The problem of water supply was exacerbated by the growth of the population in the first half of the 19th century, and in the second half by a further increase in the need for water, due to the construction of a new hospital, tourist facilities and private houses to which water was supplied. [6] Due to inadequate care by the authorities, water often ran out even in the fountains that were also used for washing clothes during the 19th century and early 20th century. [5] A serious and systematic approach to solving the water supply problem was only taken in the 1950s. [5] While qualitative evidence suggests a deterioration of hygienic condition, granular epidemiological data for specific war years reamins fragmentary due to archival losses. The weekly military report from 14 to 21 October 1914 lists three patients with typhus. [1] For the semi-annual military hospital report from 1 September 1914 to 28 February 1915, there is a requirement to fill in the columns from where soldiers came for treatment with "faithful accuracy". [1] The analysis shows that the largest number of soldiers came from the garrison, then from other health institutions and the least from the battlefield. Although the ban issued by the Chief of General Staff was lifted at the beginning of the second year of the war and vaccination against typhus became available to soldiers, it was very unpopular. [7]

Household epidemics of typhus occasionally occurred among the civilian population. In August 1916, in a family in Zaton (Zaton near Dubrovnik), three girls fell ill with typhus but could not be admitted to the St. James (Sv.Jakov) lazaretto for Infectious Diseases because a soldier with spotted, "black" typhus had been admitted there. [8] According to the available material for 1917, 44 people were treated for typhus in the hospital and no hospital deaths from the disease were recorded that year. Two months of that year stand out by the number of affected patients, namely June with eight and July with 24 patients. [1] According to reports on the movement of patients in Dubrovnik Hospital, in 1918 there were 20 patients treated for typhus in Dubrovnik Hospital and two died. In 1919 and 1920 there were two patients treated for typhus each and in 1921 there were five cases with three deaths, a year later there were nine patients but no deaths. However, typhus was not easy to overcome and in 1925 eleven people were treated in the hospital and one person died. [1]

Famine and typhus did not spare the Dubrovnik monasteries either. Thus, from the monastery of the Little Brothers, Urban Talija, who was a guardian of the monastery writes a letter to General Klumper on January 25, 1924, in which he describes the situation in the monastery during the war.

"During the war, but also after the war, Dalmatia and Istria were short of food, and people suffered and died of hunger. In the Dubrovnik monastery, two old men died of hunger, and some young people fell ill with 'Hungerstyphus' (a disease caused by Rickettsia typhi and Rickettsia felis and spread by rat fleas, op. a.). [9] In those terrible moments, the poor priests, tormented by hunger, walking corpses, had to use everything to save their lives, which they did. Anyone who has not found themselves in those terrible situations when their knees buckle under the weight of their bodies, due to weakness, cannot understand, but I know this because I experienced it. Memories are still vivid and fresh of what the monks did to avoid starvation. If the Visitor reflects on these facts, he speaks the truth; but in these circumstances, the religious were not to blame, it was their own existence." [10]

Cholera

In the first three years of the war, 16,266 soldiers of the Austro-Hungarian Monarchy died of cholera in Galicia, the Russian part of Poland and in Bosnia and Herzegovina. [7] World War I emerged during the sixth cholera pandemic. It is a disease accompanied by profuse diarrheal stools and is caused by ingestion of food and water contaminated with Vibrio cholerae. In Dubrovnik at the end of the 19th century, measures were taken to prevent the spread of cholera in the city.

The measures include that innkeepers report the arrival of foreigners to the authorities, that innkeepers make sure that their eating utensils are clean and well tinned, that citizens clean and disinfect drains and toilets, that apartments are kept clean and that they do not throw garbage and any other abomination into the drains, that there are no manure stores in houses and yards, that toilets and human excrement are not discharged into public drains.[1]Four years before the start of World War I, due to a new threat of a cholera epidemic in Dubrovnik, the hospital, on the recommendation of the Dalmatian Viceroy, attempted to organize healthcare provision under epidemic conditions. A list of doctors who could treat and implement public health measures was compiled. Doctors who worked during the epidemic were called "cholera doctors" or "epidemic doctors." They would be paid for their travel expenses, provided with free housing in the places where they worked, and granted a daily allowance of 30 - 40 crowns, depending on the financial capacity of the local authorities where they would work. If a doctor fell ill with cholera during his work, he would be paid for treatment in a first-class nearby hospital. In the event of the death of a doctor who had contracted the disease while performing his duties, his widow and orphans were entitled to certain fees, according to the decision of the Ministry of the Interior of 6 May 1856, No. 113. Doctors who accepted to be "cholera doctors" would also have priority when applying to a position in civil service. Municipalities would be obliged to provide free housing and transportation in the places where they would work. [1]

At the beginning of the war, there was great fear of a cholera epidemic. The Cholera Instruction issued in October 1914 stated that cholera is a disease transmitted

from a person who excretes disease germs in his feces. Caring for cholera patients is safe "if you avoid any contamination with their feces, do not eat, drink, or smoke in the patient's room." [11] The danger also lies in objects that are contaminated with the feces of cholera patients. It is stated that it does not spread through the air and that hygiene measures are very important: "cleanliness of the body, especially washing hands after every defilement (e.g. after using the toilet, op. a.) certainly before every meal; cleanliness of the apartment (especially the kitchen and toilet); keeping flies away, avoiding the use of suspicious drinking water (boil dirty water!)." [11] A light diet consisting mainly of fruits and vegetables is recommended. It is emphasized that they have no benefit in treatment: "protective medicinal products: brandy, cholera drops. Alcoholic beverages do not protect against or cure cholera. Recently, anti-cholera vaccination has often been recommended. In cholera, a period of half a day to five days elapses between infection and the onset of the disease. The most obvious are severe diarrhea of the "rice slime" type, vomiting, unquenchable thirst, cessation of excretion, urination, muscle cramps with pain (especially cramps in the calves of the legs), hoarse voice, and severe exhaustion." [11]

In World War I, cholera was treated by isolation and by giving lemon slices and water with a few drops of iodine. [12] The introduction of the cholera vaccine also led to a significant decrease in mortality. According to the instructions for cholera vaccination, the vaccine was a "dead vaccine" without the risk of causing infection. It was produced at the State Bacteriological Institute in Budapest. The vaccine was kept in a closed jar in a cool place and had to be shaken before use. First, the vaccine was poured into pre-heated porcelain dishes and then, after the skin was cleaned, it was injected. A Pravaz syringe was to be used for vaccination. Charles-Gabriel Pravaz (1791-1853) introduced into medical practice the use of the hypodermic syringe. The syringe was provided with an external nut working on a thread cut about the piston so that the contained liquid could be extruded drop by drop. Another novel item of this syringe was a slip joint, the needle being of steel and the hub of hard rubber. [13] The needle was changed after each vaccination. The needles were then boiled. A single dose of vaccine with a larger volume could be given or a double dose of vaccine, where half a cubic cm of vaccine was injected the first time and the entire cubic cm of vaccine was injected a week later. Since local reactions such as swelling or a rise in temperature and weakness could occur, soldiers had to be vaccinated at least a week before going to the battlefield. For two days after the vaccination, soldiers were spared from everyday activities. According to the military doctrine in Austrian army of the time in 1914, it was thought that about 600 soldiers could be vaccinated over two mornings in a 5-hour period. [14] Refusal to be vaccinated was considered military insubordination. [15] Depending on the severity of the insubordination, the punishment could be up to the death penalty. [15] During the war, there were mostly sporadic outbreaks of imported cases of cholera.

Dysentery

The newspapers of the time wrote about the dangers of dysentery: "Dysentery is a transmissible intestinal disease that affects children and adults and can be fatal. It usually manifests with abdominal pain, straining, and bloody-mucous bowel movements. Dysentery can be defeated not only by treatment but even more so by prevention of infection, so cleanliness is the most effective tool." [16] Dysentery appeared in Dubrovnik even before the war. In 1898, 11 people were treated for dysentery in the hospital, of whom three died. A year later, there were 17 patients with no fatalities. In 1908, there was not a single case of dysentery, but with the arrival of the war, the situation changed. It was clear that the deterioration of hygienic – epidemiological conditions and the arrival of a large number of soldiers created the conditions for a large number of sick people. The newspaper *Narodni list* first warned more extensively about the danger of dysentery in September 1914. In the following years, there were occasional epidemics of dysentery in Dalmatia, and the situation was exacerbated by the arrival of sick soldiers. Dysentery is a disease characterized by abdominal cramps, frequent bloody and mucous stools, and tenesmus. The causative agents of dysentery are bacilli of the genus *Shigella*. [9] Vaccination against dysentery began in the Austro-Hungarian army in the second year of the war, only after more than 120,000 soldiers fell ill and 5,000 died.

In 1917, there were a total of 99 cases of dysentery. The following months stand out: July with eight cases and two deaths, August with 39 cases and two deaths, and September with 42 cases and two deaths. The following year, in 1918, there were seven cases of dysentery, two of which died. In 1919, there was a further decline in the number of cases of dysentery, with only two cases. [1] Dysentery continued to occur sporadically, as in 1925 with three deaths and in 1926 with two cases. [1]

Tuberculosis

Tuberculosis is an infectious disease caused by *Mycobacterium tuberculosis*. The source of infection is a patient with pulmonary tuberculosis or tuberculosis of the larynx. [17] A patient with pulmonary tuberculosis excretes 10,000 bacilli in 1 mL of sputum, measuring 0.3–0.6 x 1–4 μm, so the disease is transmitted by droplets when the patient coughs, sneezes, sings, or spits. [19] It is believed to have existed for thousands of years. [17]

The First World War led to an increase in tuberculosis morbidity and mortality in most European countries. [18] In Germany and the Austro-Hungarian Monarchy, which Dubrovnik was a part of until the end of the war. there was a sharp increase that had not returned to the 1913 level even by 1920. [18] The state of war, poverty, and stress was exacerbated in 1918 by the influenza epidemic known as the Spanish flu, and tuberculosis mortality also increased due to the exhaustion of the body. [18] For example, in Austria in 1913, the annual mortality per 100,000 inhabitants was

259, while in 1918 it was as high as 403. [19] In the United Kingdom, the tuberculosis mortality rate increased again and interrupted its long-term decline, particularly in England and Wales. [20]

The recommendation of the Imperial – Royal Dalmatian Governorate in Zadar during peacetime was not to allow voluntary assistant caregivers to participate in the care of tuberculosis patients due to the possibility of "self-infection". [1] Under wartime conditions, the recommendation changed, allowing "voluntary caregivers to help those suffering from tuberculosis, but only those who have declared that they are ready and aware of the risk of contracting the disease, are trained, and reside in the institution under strict medical supervision and with regulated working hours". [1] During the first three years of the war in the Austro-Hungarian Monarchy, at least 100,000 soldiers died of tuberculosis, [21] and in the fourth year, another 17,000. [21] In wartime conditions, there was a shortage of medicines, vaccines, and medical supplies, while famine raged. [21] In 1916, 40% of newly infected people were recorded on the fronts due to inadequate supply and exposure to moisture and rain. [21] The disease was particularly prevalent among young soldiers. [21] In 1917, there were 433,000 tuberculosis soldiers in the Monarchy. In October 1918, a monthly report from the disabled welfare office of the Austro-Hungarian War Ministry listed nearly 40,000 tuberculosis invalids in hospitals in the hinterland alone. Over 50 percent of the disabled were Austrians, 40 percent were Hungarians, Slavonians and Croats, and slightly more than 7 percent were from Bosnia and Herzegovina. [21] The damage due to the care of the sick and the loss of working and military capacity was estimated at 160 million crowns. [21]

On May 22, 1916. Minister of the Internal Affairs for Cisleithania (the Austrian part of the Monarchy to which Dubrovnik belonged) Prinz Konrad of Hohenlohe-Schillingsfürst called for more energetic measures in the fight against infectious diseases, especially tuberculosis. [21] The reasons were the lack of militarily capable men, the decline in the birth rate, and the poor physical condition of children, who were future soldiers. [21] Tuberculosis patients were isolated in infectious and military hospitals in the hinterland and institutions organized by the Red Cross. [21] 18 million crowns were allocated for the construction of institutions and care for TB. [21] The reporting of the sick in the army was late, and it was only insisted upon from June 3, 1916. [21] The reporting of tuberculosis cases functioned completely only from February 24, 1919. [21]

Soldiers from the Dubrovnik area fought on numerous fronts (Serbia, Soča, East Prussia, Galicia, Greece) and fell ill and even died of tuberculosis. [6] The increased incidence of the disease among soldiers from Dubrovnik on the northern fronts was explained as a reaction to the colder climate. [22]

According to Austro-Hungarian military statistics per 1,000 soldiers, northern garrisons (Vienna, Budapest, and Graz) were less affected than southern garrisons transferred to the north (from Mostar, Kotor, Dubrovnik, and Zadar), while southern garrisons had fewer sick and dead from tuberculosis before the transfer. [22] According

to Dr. Orlić, at that time it was believed that soldiers from southern garrisons were accustomed to a milder climate and that heredity and national (!) disposition favored the development of tuberculosis. [22]

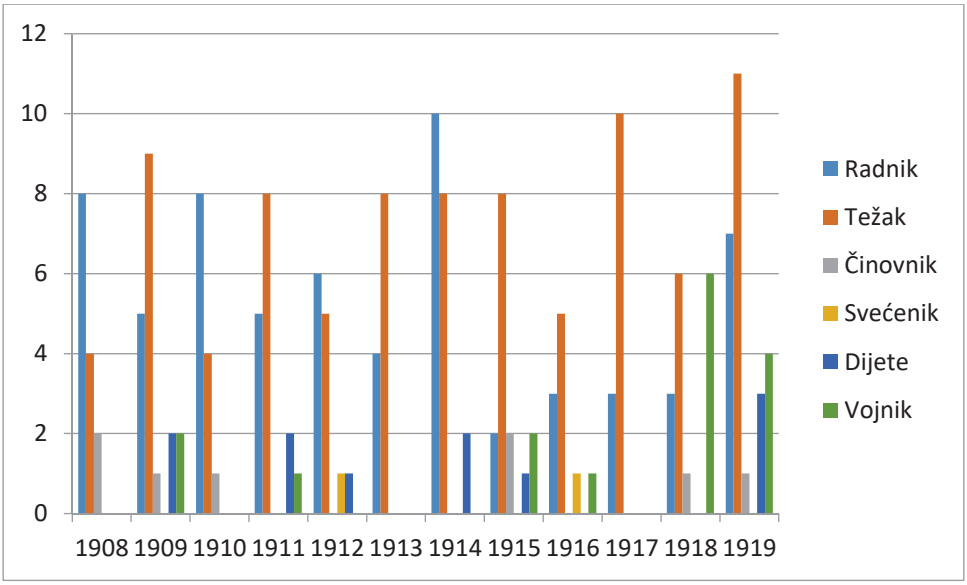
The longitudinal data from the Dubrovnik Hospital archives (1908–1919) reveals that pulmonary tuberculosis (TBC pulmonis) was the dominant clinical manifestation throughout the period, consistently representing the highest morbidity across all analyzed years. A gender-based distribution shows a persistent disparity, with males consistently outnumbering females, particularly during the peak years of the conflict. While the pre-war years (1908–1913) maintained a relatively stable baseline of about 10 deaths per sex per year, the onset and progression of World War I catalyzed a visible change in the hospital's epidemiological profile.

A significant surge is observed in 1914, likely corresponding to the initial mobilization and the arrival of the first waves of military personnel. However, a critical escalation of disease and death due to tuberculosis occurred in 1918, when a total of 49 people were treated, 26 died, 23 of them from pulmonary tuberculosis. [1] The high mortality rate remained the year after 1919, when 36 people died out of a total of 69 patients, 31 from pulmonary tuberculosis. [1] Beyond the pulmonary form, the data highlights the presence of more severe, systemic variations of the disease. Miliary tuberculosis and tuberculous meningitis — forms typically associated with high mortality and weakened immune systems — showed a notable clusters in 1918 and 1919. Other localized forms, such as intestinal and skeletal tuberculosis,remained sporadic but persistent, further complicating the clinical landscape. The emergence of generalized tuberculosis in the later war years underscores a total collapse of immune resilience among the treated population, serving as a stark indicator of the broader public health crisis that gripped Dubrovnik at the war's end.

In the increase of tuberculosis during the war years 1917–1919, the highest mortality of men and women is observed in the age group 16–30, and in 1918 and 1919, the highest increase in tuberculosis mortality among soldiers. [6] The category of soldier in tuberculosis mortality appears in the graph only from 1909, but it is most pronounced in the war years. The occupational data reveals that peasants and manual workers were consistently the most affected groups, reflecting their socio-economic vulnerability. However, the emergence of soldiers in 1918 and 1919 serves as a clear epidemiological marker of the war's end and the return of infected troops to the civilian hospital. The worsening of tuberculosis mortality in the war years of 1918 and 1919 among peasants and workers is a likely consequence of returning from the front and the Spanish flu. (Chart 1.)

Chart 1: **Distribution of patients by social status and occupation (1908–1919).**

Source: Antun, Car. *Skonsumacijun – Tuberculosis in Dubrovnik Society from 1825 to the mid-20th century. Dubrovnik: University of Dubrovnik; 2023.*



Legend:
Worker (*Radnik*), **Day Laborer / Peasant** (*Težak*), **Civil Servant / Official** (*Činovnik*), **Clergyman / Priest** (*Svećenik*) **Child** (*Dijete*), **Soldier** (*Vojnik*).

Malaria

Malaria is an infectious protozoan disease of humans caused by blood parasites of the genus *Plasmodium* and transmitted by the bite of mosquitoes of the genus *Anopheles*. It is characterized by periodic attacks of fever, splenomegaly, and anemia. [9] Worldwide, the danger of malaria was recognized and serious eradication measures were undertaken. Istria encountered malaria in the late Middle Ages. According to American medical historian Frank M. Snowden, malaria is a social disease, a marker of poverty, economic impotence, and general underdevelopment. [23] By engaging Robert Koch and his associates in Istria, through the proper administration of quinine to the population, petrolization, mechanical protection of household windows, and microscopic control of immigrants, significant success was achieved in the fight against malaria. [23] The First World War led to an "explosion" of malaria in the Kingdom of Italy. [23] Istria was close to significant malarial areas of Italy—the Isonzo (Soča river) front (between Austria and Italy, between the inaccessible Dolomites, the high areas of Trentino, and the coastal, lowland area between the Isonzo, Tagliamento, and Piave rivers). The conditions that worsened the malaria infection were the high concentration of people in a small area,

the importation of *malariae tropicae* from the Salonika front to the Isonzo front, the avoidance of taking quinine by soldiers hoping that they would be sent home after falling ill, and the creation of new mosquito habitats in deep craters caused by heavy artillery bombardments. [23]

At the end of the First World War, Italy still had a high mortality rate from malaria, about two million people annually. [4] In September 1915, more frequent illness and death from malaria were also noted in the Austro-Hungarian army. The Dalmatian Viceroyalty instructed hospital doctors to watch for possible malaria and, if they suspected it, to prove it with microscopic blood analyses and then to start treating it with quinine as soon as possible. The nearest large reservoir of malaria to Dubrovnik was the Neretva valley. Historically, along with the Neretva, Rijeka Dubrovačka, Ston, and Župa Dubrovačka were seats of malarial threats. As a small town in a field surrounded by water-filled inlets, Ston was particularly exposed to the infection. Some citizens of Ston still repeat the urban legend that the walls of Ston are in the shape of the letter M due to the 3 M's: Malaria, Maledizione, Morte (malaria, curse, death). There were several other malaria hotspots in the Dubrovnik area.

Rijeka Dubrovačka was a smaller focus first described in the Republic of Dubrovnik in 1459. At the beginning of the 20th century for malaria in Župa Dubrovačka, residents blamed the numerous excavations of Count Bernard (Brnje) Caboga's brick factory, where water would accumulate and mosquitoes would breed. Dubrovnik representatives even sought the intervention of the imperial government, but Caboga's influence was too strong. Nevertheless, the government began to carry out land sanitation and drainage channels before the war, but Count Caboga "continued to irrationally and without lawful permission, make pits in which water was retained even during droughts." [24] In the lists of diseases at the Dubrovnik hospital, the name *febbre intermitente* was used, and in the Dubrovnik area, also *f. algida* and *f. perniciosa*. [25] Pernicious fever is an outdated term used to describe a severe form of malaria, also called pernicious malaria, primarily caused by the parasite *Plasmodium falciparum*. It manifests with high fever and impaired consciousness and, if left untreated, can progress to coma and death. In the report for 1898, 27 people were recorded under the diagnosis *febbris intermittens*. [1] In the report for January 1900, there were 45 cases of *febbris intermittens*, and in 1908, already 68 cases. [1] It is interesting that despite such high numbers of hospitalized patients, there were no deaths, unlike the war years when exhausted soldiers, despite their youth, died in large numbers. Namely, at the end of the war, local Dubrovnik newspapers reported the names of dozens of soldiers who died of malaria in the military or city hospital. These were mainly soldiers who did not fall ill in these areas but were sent for treatment to Dubrovnik healthcare institutions. In *Prava Crvena Hrvatska*, the death of several young soldiers from malaria in Dubrovnik was recorded during one week. In another article in the same month, it was stated that during two weeks in October 1918, 48 soldiers, mostly from different parts of the Austro-Hungarian Monarchy, among them several

deceased soldiers of unknown identity and rare Russian prisoners, died of malaria in two military hospitals, in the city and in Gruž. [26] In 1919, 56 cases of malaria were treated in the Dubrovnik hospital, 55 a year later, and 17 cases of malaria in 1921. [1] In 1922, the gradual decline in malaria incidence continued with 20 patients. [1] However, there was no lasting reduction in the number of malaria patients. After 1923, the number of patients dropped to 11, and in 1924, there were 40 patients treated in the hospital, in 1925, there were 67, and in 1926, 17 patients were treated in the hospital. [1] Only later did measures to clean up malaria hotspots in the Dubrovnik area lead to the complete eradication of malaria years later.

Relapsing Fever

The Dubrovnik District Governorate warned on April 8, 1915, about the danger of relapsing fever (*febbris recurrens*) and the need to destroy the lice that transmit it. [1] Relapsing fever had existed in Europe since ancient times and was first described by John Rutty in 1939. In 1868, Otto Obermeier discovered the causative agent. The causative agents are various species of spirochetes of the genus *Borrelia*. [9] The letter from the District Governorate particularly drew attention to the characteristic symptoms of the disease, the alternation of periods of high fever and myalgic syndrome with spleen and liver swelling, followed by a period of profuse sweating with a drop in temperature when the patient feels well. It warned of the danger of infection during blood analysis or contact with the spirochete, the causative agent of the disease. It is evident that there were many cases of misdiagnosis of the disease due to possible combinations of infectious diseases: typhus, typhoid fever, and dysentery. The Governorate also recommended that *febbris recurrens* be treated with salvarzan or neosalvarzan and typhus symptomatically. [1] *Febbris recurrens* remained a problem for Dubrovnik for years, with seven patients still being treated at the Dubrovnik hospital in 1921. [1]

The Provincial Red Cross Aid Society for Dalmatia asked the Dubrovnik hospital to complete patient reports for the half - year period. In the "Remarks" section of the reports, the diagnoses of diseases that were specifically monitored were listed: measles, cholera, typhoid fever, typhus, dysentery, tetanus, and frostbite. [1] In a letter from the District Governorate titled "War, danger of smallpox," it was requested that all doctors, nurses, orderlies, and administrative hospital staff who had not been vaccinated in the last six years be urgently vaccinated against smallpox. [1]

Epidemic Typhus, Spotted fever

Epidemic typhus was a dangerous disease that spread explosively through Serbia in 1914, where around 150,000 people died in the first six months. [9] It is characterized by a sudden onset of illness, high-grade fever of the *continua* type, severe headache, a generalized rash, encephalitic symptoms, and a relatively high mortality rate. [9] Between 1917 and 1922, it is estimated that there were between 25 and 30 million cases of typhus,

with about three million deaths in Eastern Europe (including parts of what would later become the Soviet Union). [17] Given that epidemic typhus (*typhus exanthematicus*) is an acute infectious disease caused by the microorganism *Rickettsia prowazekii*, which is transmitted by the body louse (*Pediculus humanus corporis*), Vladimir Ilyich Lenin is said to have stated: "Either socialism will defeat the louse, or the louse will defeat socialism." [17] The pathogen, *Rickettsia prowazeki*, was discovered in 1916 by da Rocha Lima. He named it in honor of the American H.T. Ricketts and the Pole S.V. Prowazek, who both became infected and died while researching typhus. [9]

On the Western Front, the fight against lice was carried out with mobile laboratories, laundries, bathing, disinfection, and shaving of soldiers, as well as exposing clothing and laundry to steam, gases, and rubbing clothes with special anti-louse soaps. [17] The District Authority of Dubrovnik requested the director of the Dubrovnik hospital to strictly control for the presence of lice in sick soldiers admitted to the hospital, due to diseases transmitted by lice. [1] One Dubrovnik soldier described his encounter with body lice: "The nasty lice have attacked again like a wild pack. They give no peace, day or night!" [27] Epidemic typhus also appeared occasionally in towns surrounding Dubrovnik. For example, a case of typhus in a woman from the village Brgat is mentioned; she was later hospitalized in the infectious diseases lazaretto on St. James (Sv. Jakov), along with all her household members. According to local newspaper reports, she had a milder form of the disease and survived. [28] Two deaths from typhus were recorded at the Dubrovnik hospital in 1919 and 1921. [1]

Spanish Flu

Upon review of the documents from the Gendarmerie Stations, some of which are located in the Archive of the Dubrovnik Hospital, data on Dubrovnik and other subjects of the Monarchy who were killed, went missing, or died can be found. The Spanish Flu, or simply the "Spaniard", also took its toll. It is believed that during the six months of the most intense breakout, it led to the deaths of more than 25 million people worldwide. [4] "The disease did not originate in Spain, but it was named after it because uncensored reports on the extent of the disease came from there, which other countries did not want to publish due to the demoralizing effect, as well as the desire for enemies not to find out about losses in manpower." [18] This was followed by an epidemic of lethargic encephalitis in 1919–1920, and then another wave of the Spanish flu. It appeared in three waves. The first wave went almost unnoticed, but in August 1918, the second wave of influenza was accompanied by severe, often fatal pneumonia. It disappeared as suddenly and mysteriously as it had appeared. [17] Even so many years after the epidemic, there is no completely accepted scientific explanation for how it appeared simultaneously in various parts of the world, or whether it was a consequence of the disease spreading through asymptomatic carriers. It is estimated that the Spanish flu affected between one-third and one-quarter of the world's population. One soldier

from the Dubrovnik hinterland who contracted the Spanish flu said: "Then the Spanish flu appeared. First on my friend Andro Miloslavić from Buići, and then on me. This way, we could at least serve one another. I was very scared because I had a high fever. A lot of people were dying every day in Zadar and Arbanasi, but my illness took a turn for the better". [27]

In the City, schools were closed, there were about a thousand infected people in October, and entire families were falling ill. [29] The hospital, which only had 150 beds, certainly could not have accommodated thousands of infected people, so it is assumed that a large number of those infected died at home.

In Vela Luka, the Spanish flu claimed 48 lives between November 6, 1918, and February 8, 1919; 75% of them were women aged 18–37. [30] In the entire Korčula district, it is believed that 295 people died from the Spanish flu. [31] The worsening epidemiological situation on the island of Korčula, as well as in other areas, was accompanied by the return of soldiers from the front at the end of World War I and the transmission of the Spanish flu virus. The average age of death in the Korčula district was 27.7 years, with children and young people under 15 accounting for a quarter of all deaths, and strong, healthy people aged 20–39 accounting for 43.1%. [31] Recipes for treating the Spanish illness in its initial stages also appeared in newspapers: "As soon as the patient feels weak, let them lie in bed and take elderflower tea (*sambucco*), linden flower tea, or black tea every 2 hours. But now comes the most important part: the cross-shaped poultice. A towel should be soaked in water, wrung out well, folded once, and placed from the right shoulder to the left hip, and another one in the opposite direction, from the left shoulder to the right hip. A dry towel is placed over it all and held for 3 to 4 hours, during which time the patient must sweat. At the beginning of the illness, even if the patient has a fever of 40 or 41 degrees, the fever can be driven out with these poultices in one or two days". [32] Among numerous attempted treatments, salicylates, tea, and mulled wine were given. [31]

In 1918, 61 people were treated for influenza with pneumonia (Spanish flu) at the Dubrovnik hospital, and 18 of them died.[1]It is likely that, due to overlapping symptoms, some of those who died from the Spanish flu were also diagnosed with pneumonia or fever.

Diphtheria

Diphtheria is an acute infectious disease caused by *Corynebacterium diphtheriae*, which causes local inflammatory reactions of the mucous membranes of the nose, pharynx, or larynx with characteristic pseudomembranes. [9] Diphtheria primarily spreads through respiratory droplets (coughing, sneezing) and contact with infected wounds or lesions. Poor hygiene and sanitation, common in war-torn areas and overcrowded living conditions, facilitated transmission.

Due to the localization of diphtheria in the larynx, death by suffocation can occur. It can cause severe damage to other parts of the body through the action of its

toxins. The discovery of the anatoxin enabled active immunization and a successful fight against diphtheria. [9] Malignant forms had a high mortality rate. In more severe, complicated forms of the disease, patients most often die from myocarditis, and less frequently from suffocation. [33] It most often occurred in autumn and winter and was first mentioned in the City as a cause of death in Pile in 1862, and often affected children. [34] The number of diphtheria cases in the City increased sharply in 1917 due to the effects of World War I, poverty, hunger, and the lack of widespread vaccination at the time. Tracking the incidence in Dubrovnik in 1917, it was most common in September and October. According to some reports, almost 50 people have fallen ill, and one person died. Only one year later, in 1918, two people had diphtheria in the Dubrovnik hospital, one of whom died. [1] In 1921, two people were treated for diphtheria in the Dubrovnik hospital. [1]

Anthrax (Black Pustule)

During the war, no anthrax patients were found in the Dubrovnik hospital. After the war, in 1923, 1925, and 1926, individual cases of anthrax with fatal outcomes occurred in the Dubrovnik hospital. [1] For biological warfare, knowledge of spores as a method of disease transmission was important, as established by Louis Pasteur, thereby confirming that the causative agent of anthrax is *Bacillus anthracis*. Casimir Joseph Davaine and Aloys Pollender had previously hypothesized this, but could not prove it before Pasteur. Spores are very resistant to external influences and can survive for decades in the soil, on the skin, or in the wool of infected animals. In humans, the disease usually manifests as the cutaneous form, *pustula maligna* or malignant edema, and less frequently as the internal form, pulmonary and intestinal anthrax. [9]

Tetanus

Tetanus was a major problem during the First World War because the causative agent, *Clostridium tetani*, most often contaminated wounds caused by explosions of mines, grenades, or bullets. Tetanus was written about as far back as antiquity. Araeteus, a physician who also mentioned another important doctor for Dubrovnik, St. Blaise, the patron saint of the city, was the first to provide a detailed description of the disease itself. He described it as a disease of painful, life-threatening spasms. The body is so stiff that it cannot be turned or lifted, and this is followed by severe spastic spasms. If the body arches upwards, he speaks of opisthotonos, and if it arches downwards, emphrostotonus. From 1915, every wounded soldier received antitoxin (AnaTe), and tetanus was dramatically reduced. [4] Civilians, and even newborn infants, also died from tetanus due to the use of unsterilized instruments during childbirth. On September 27, 1918, a four-year-old boy died of tetanus in Vela Luka, and on October 26 of the same year, a child only 8 days old. [30] In 1919, one fatal case of tetanus was recorded in the Dubrovnik hospital, none

in 1920 and 1921, and two fatal cases in 1922. [1] In 1924, another fatal case of tetanus treated in the Dubrovnik hospital was recorded. [1]

Trench Fever

Trench fever was, by classification, the second most important disease after the Spanish flu that reduced wartime capability. [17] It is caused by *Rickettsia quintana*, which lives in the intestine of human lice. It is characterized by recurring fevers and a prolonged course of illness. In humans, the rickettsia was found in the blood for up to 443 days after infection, and its peculiarity is that it survives for a long time in clothing and bedding, so the wounded can also be infected through a wound via clothing and bedding. It is estimated that about a million soldiers fell ill with trench fever during the First World War. [9] From the available records of the Dubrovnik hospital, no patients with trench fever were treated during the war years.

Scarlet Fever (Scarlatina)

Scarlet fever is caused by beta-hemolytic streptococcus group A. It is transmitted via droplets, less often through contaminated objects and hands. It most often occurs in autumn. In the period without penicillin, such as the First World War, complications such as toxic arthritis, meningitis, or inflammation of the heart muscle or valves were common. [33] In 1917, 10 people were treated for scarlet fever in the Dubrovnik hospital, with no data on the severity of the disease; after a pause of several years, in 1921, one person with scarlatina was again recorded receiving hospital treatment. [1]

Erysipeloid

Erysipeloid in humans is caused by *Erysipelothrix rhusiopathiae* and clinically resembles a milder form of erysipelas, which is caused by beta-hemolytic streptococcus group A. In erysipeloid, the cause is most often a carrier pig, mucus from infected fish, or shellfish. It is believed that working with a sick animal or the occurrence of the disease in a large number of people results in more severe forms of the disease and its faster spread. [9] In the Dubrovnik hospital, for years, a disease called *vrbanac* (erysipelas) was diagnosed, which likely referred to both diseases with similar clinical pictures. However, erysipelas, due to its causative agent, led to a more severe clinical picture and occasional fatal outcomes. In modern medicine, these two diseases can also be distinguished therapeutically because sulfonamides are not effective against erysipeloid, and penicillin preparations are mainly given. In 1918, two people were ill with *vrbanac*, the year after, three with one fatal outcome, and in 1920, there were four patients and again one fatal outcome. Two people were ill in 1921, one in 1922, and three in 1925. [1]

Venereal Diseases

Before the First World War, there were letters to the management of the State Hospital Dubrovnik mentioning minor epidemics of venereal diseases among soldiers who were infected by local prostitutes. The Dubrovnik Municipality Police Regulations from 1913 stipulated that prostitutes had to be at least 17 years old, each had to have a separate room, a check-up before engaging in the profession had to determine that she was healthy and capable, and by going to the police commissioner she would be issued a health card and her personal documents would be kept. [35] It was stipulated that the health of the girls would be checked with the Wasserman test that they would be examined twice a week and that the findings would be recorded in their health cards and in the office book. [35]

All the infected prostitutes were treated at the Dubrovnik hospital. In November 1914, the Municipal Administration in Dubrovnik asked the hospital to keep infected prostitutes in the hospital for as long as possible due to the threat to public health. [1] During the First World War, the Meixler brothel became the largest, partly because they expanded their business to some smaller, earlier brothels. According to the register *Očevidnost bludnica* (Evidence of harlots) which covers the period from 1909 to 1925, records are kept of the health checks of prostitutes who, in addition to their names, also had "artistic" or rather, more attractive names for the work they did. For example, Vera was Ella, Katica was Violetta, one Marija was Bella, and the other Marija was Frida, while Stefanija became Vilma. There was also a practical reason, as there were many of the same names. The name Elizabeta was very common, so the Elizabetas themselves needed to be distinguished. At one point, there were three Elizabetas who became Vanda, Zelma, and Olga. [36] Regular examinations, which were recorded in the book Examinations of Harlots, were attended by police officers. Sometimes the doctors who performed the examinations were not satisfied with the activity of the police officers. The doctor's remark was that unskilled police officers were being sent: "Today's one did not know that he had to call the harlot in question by name and let her into the examination room. Warned that the doctor could be deceived by the harlots because there was already an uninvited Zeckier instead of Hutne on the table, he said to me – I won't be bothered!" [36] The doctor begged that such unprofessional police officers not be sent to him. If the doctor found that a harlot was showing symptoms of a venereal disease, he sent her to the hospital. In the period before the war, the number of prostitutes per examination varied from nine to sixteen. During the war, there was a great oscillation in the number of prostitutes, and their great mobility across the cities of the empire at that time was also noticeable. It seems as if they were employees of a larger organization that sent them to certain brothels and took care of how long they would stay there and where they would go afterwards. In the book *Očevidnost bludnica* (Evidence of Harlots), one can track where all the prostitutes were before arriving in Dubrovnik and where they went after working in the city. The most common cities from which they came were Sarajevo, Mostar,

Trebinje and Trieste, the last one being also as a frequent city to which the prostitutes go to. Among others mentioned are Pécs (Pecs, Funfkirchen), Sl. Brod, Kotor, Tyrol, Bileća, Mostar, Šibenik, Zagreb.

The example of the prostitute Elisabeth W. can be applied to most prostitutes. She came from a poor familiy that was further impoverished by the war. She was born in 1890 and was twenty-five years old when she was treated in the Dubrovnik hospital. All three of her brothers died in the war. Her sister remained in Hungary and Elisabeth tried to go as far as possible. So she was a prostitute in Herceg-Novi for two years in the Linenberger brothel, where she fell ill. The brothel manager, Sofija Linenberg, paid 120 crowns for the costs of her treatment. Since she was treated for a venereal disease, gonorrhea, and had no assets, the Herceg-Novi municipality subsequently compensated the costs to the brothel owner. Another prostitute from the Linenberg brothel, a Hungarian woman, twenty-four-year-old Iren, was left without both parents as a young woman. She was treated in a Dubrovnik hospital for a venereal disease. The costs of treatment were to be paid by the municipality of her affiliation, this time the Orphanage of the Pest-Piliš-Šolt County in Hungary.The hospital intervened on several occasions to have her costs paid because it was in a war zone and the money was late to the post office. The prostitutes were young. In the event that they contracted syphilis and could not continue prostitution, they sometimes stayed in brothels as maids. Working with Paul Ehrlich, the Japanese scientist Sahachiro Hata discovered a "yellow powder resembling a flower of sulfur," [37] a drug against the causative agent of syphilis, Treponema pallidum, and named it arsphenamine. This gave rise to Salvarsan ("salvation through arsenic") and then Neosalvarzan, which was also administered in the Dubrovnik hospital. [1]

Monitoring of hospitalized patients in the Dubrovnik hospital suffering from syphilis and gonorrhea from 1912 to 1918 does not show an encouraging decline in the incidence of sexually transmitted diseases (Table 1). [1] It should be noted that the increase in the number of people suffering from venereal diseases, which almost doubled from 1918 to 1919, proves that the end of the war and the return of the army (demobilization) brought greater pressure on the hospital than the war years themselves, probably due to the spread of the infection among the civilian population.

However, a slight decrease in the incidence of syphilis is observed towards the end of the period 1921 to 1924, when the war ended, and the number of soldiers in the Dubrovnik area decreased (Table 2). [1]

Table 1. Number of people suffering from venereal diseases in the Dubrovnik hospital from 1912 to 1918

Year/Disease	1912	1913	1914	1915	1916	1917	1918
Syphilis + Gonorrhea	105	100	118	97	111	105	59

Source: General Hospital Dubrovnik

Table 2. Number of syphilis and gonorrhea patients in the Dubrovnik hospital from 1918 to 1924

Year	Syphilis	Gonorrhea	TOTAL
1918	18	41	59
1919	40	60	100
1920	43	63	106
1921	47	39	86
1922	41	32	73
1923	18	52	70
1924	28	42	70

Source: General Hospital Dubrovnik

Despite institutionalized prostitution and the measures taken by Dubrovnik society, the decline in the number of infected people was very slow and indicated a permanent exposure to the infection supported by non-institutionalized prostitution, numerous brothels in Dubrovnik and the Bay of Kotor, and the large presence of soldiers in the Dubrovnik area.

Conclusion

The reconstruction of the epidemiological profile of the Dubrovnik Provincial Hospital during the First World War (1914-1918) and the immediate post-war period reveals a health system under extreme pressure. Although most of the infectious diseases analyzed - with the notable exception of the Spanish flu - were present in the city prior the 1914, the war acted as catalyst for their epidemic expansion.

The findings indicate that the hospital's role was dual: it served as a critical treatment center for the civilian population (primarily workers and peasents as shown in Chart 2) and as a necessary facility for the military garrison.The data suggests that a lackof a radical "explosion" in total hospitalizations, compared to the general front-line statistics, can be attributed to the parallel existence of dedicated military hospitals in the City and Gruž. However, the civil hospital remained the primary "buffer" for the local

population against diseases brought by returning soldiers and the collapse of urban hygiene infrastructure.The impact of the Great War on Dubrovnik's urban health was not merely a metter of numbers, but of shifting disease landscape. From the chronic challenges of typhoid fever caused by water shortages to the devastating peak of tuberculosis and Spanish flu in 1918, the hospital documentation reflects the socio – economic exhaustion of the era. This study confirms that the wartime epidemiological profile of Dubrovnik hospital is an essential mirror of the broader humanitarian crisis that defined the end of the Austro-Hungarian administration in Dalmatia.

Rezime

Zarazne bolesti bile su vodeći uzrok smrtnosti među vojnicima i civilima tijekom Prvog svjetskog rata. Iako je većina tih patogena bila poznata prije sukoba, ratni uvjeti katalizirali su njihov prijelaz u raširene epidemije. Iako su cjepiva protiv tifusa, kolere i tetanusa značajno smanjila smrtnost, njihova je provedba često bila odgođena ili je nailazila na otpor javnosti. Ova studija analizira epidemiološki profil Dubrovačke bolnice, koja je funkcionirala i kao civilna i kao vojna ustanova. Održavala se stroga kontrola infekcija, posebno obveznim cijepljenjem protiv malih boginja za sve prijeme u bolnicu. Tijekom rata bolnica je prosječno godišnje liječila 1100-1200 pacijenata, od kojih je trećina bila vojno osoblje. Iako je Dubrovnik bilježio slučajeve pjegavog tifusa koji prenose uši, izbjegao je katastrofalne epidemije viđene na Istočnom frontu. Međutim, blizina močvara rijeke Neretve, u kombinaciji s priljevom zaraženih vojnika, rezultirala je visokom smrtnošću od malarije. Posljednju godinu rata obilježila je pojava španjolske gripe, koja je 1918. godine uzrokovala visok broj smrtnih slučajeva zbog teških plućnih komplikacija. Tuberkuloza je ostala stalna prijetnja tijekom cijelog razdoblja, dok je visoka učestalost spolno prenosivih bolesti među vojnicima značajno utjecala na vojnu spremnost. Druge bolesti poput difterije, tetanusa, erizipela i šarlaha dodatno su zakomplicirale javnozdravstveni krajolik. Ovo istraživanje također se bavi izazovima fragmentiranih arhivskih zapisa i gubitka dokumentacije iz Vojne garnizonske bolnice i Lazaretta sv. Jakova, što ograničava potpunu statističku rekonstrukciju određenih ratnih godina i stopa smrtnosti djece. Rekonstrukcija epidemiološkog profila Dubrovačke bolnice tijekom Prvog svjetskog rata (1914–1918.) i neposrednog poslijeratnog razdoblja otkriva zdravstveni sustav pod ekstremnim pritiskom. Iako je većina analiziranih zaraznih bolesti – s izuzetkom španjolske gripe – bila prisutna u gradu prije 1914, rat je djelovao kao katalizator za njihovo epidemijsko širenje. Nalazi pokazuju da je uloga bolnice bila dvostruka: služila je kao ključni centar za liječenje civilnog stanovništva (prvenstveno radnika i seljaka kao što je prikazano na grafikonu 2) i kao nužan objekt za vojni garnizon. Podaci sugeriraju da se nedostatak radikalne „eksplozije" ukupnih hospitalizacija, u usporedbi s općom statistikom na prvoj crti bojišnice, može pripisati paralelnom postojanju namjenskih vojnih bolnica u Gradu i Gružu. Međutim, civilna bolnica ostala je primarni „tampon" za lokalno stanovništvo od bolesti koje su donosili vojnici koji su se vratili i kolapsa urbane higijenske infrastrukture. Utjecaj Prvog svjetskog rata na urbano zdravlje Dubrovnika nije bio samo pitanje brojki, već i promjenjivog krajolika bolesti. Od kroničnih izazova tifusa uzrokovanih nestašicom vode do razornog vrhunca tuberkuloze i španjolske gripe 1918. godine, bolnička dokumentacija odražava socio-ekonomsku iscrpljenost tog doba. Ova

studija potvrđuje da je ratni epidemiološki profil dubrovačke bolnice bitno ogledalo šire humanitarne krize koja je definirala kraj austro-ugarske uprave u Dalmaciji.

Ključne riječi: Prvi svjetski rat; urbano zdravlje; zarazne bolesti

Non MeSH: Dubrovačka bolnica; epidemiološki profil; ratna medicina

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Review

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REVIEW: *DE ZWEVENDE WERELD*, BY ANNEJET VAN DER ZIJL, AMSTERDAM: HOLLANDS DIEP, 2025, P. 352. ISBN 9789048874927

From Dutch author Annejet van der Zijl came forth *De zwevende Wereld*, "The floating world." *Van der Zijl*, famous for her biography *Bernhard* from 2010, about Nazi engagements of former Dutch prince consort Bernhard zur Lippe,[1] develops in a double biography the life of physician and Japanologist, *Franz von Siebold*, from the renowned Würzburg doctor´s family. Early in his life *von Siebold* went to Holland, in order to travel to East Asia as a medical officer, as researchers like Engelbert Kaempfer and Carl Peter Thunberg did before. Apart from colonies and possessions in Indonesia and the Pacific world, the Dutch, as the only foreign power, still owned the old-fashioned privilege of trade with the secluded Japan, if only for two ships a year. It happened on the island of Dejima in the bay of Nagasaki, which was arranged as a free-trade quarantine by the Japanese. *Von Siebold* must have presented himself smartly there, from his beginnings in 1823 until his extradition in 1829; his acquisitions and findings of flora and fauna, institutions, customs, culture, religion, and history from yearlong expeditions overarch colonial trading and bric-à-brac collecting by far in quality, scope, and content. For his medical teaching and a formal tribute delegation to the imperial court of Edo in 1826, *von Siebold* was allowed to leave the quarantine and travel the land. His fabulous conquests are contextualised in changing exhibitions by the lush *SieboldHuis* of the Leiden University.[2] Since 1845, *von Siebold* was married to *Helene von Gagern*, a distant cousin of the German "lion parliamentarian" Heinrich von Gagern. They had five children.

That was not his first long-term relationship however, and that's what brings *van der Zijl* to the double biography. Actually, *von Siebold* had a year-lasting relation in Dejima

1 Annejet van der Zijl, *Bernhard. Een verborgen geschiedenis*, Amsterdam 2010 ("Bernhard. A hidden story").

2 As well as anthropologica in the *Museum fünf Kontinente* in Munich. *Von Siebold* is honoured in Nagasaki as the transferrer of western medicine. The *Von-Siebold-Archiv* at Bochum University houses manuscripts, sources and paralipomena to his standards *Nippon* about country, culture, and geography and about flora and fauna of Japan, worked upon since the thirties of nineteenth century. For those wanting to know, we transfer *van der Zijl's* hint from p. 312 to the newly published book by Arlette Kouwenhoven, *Brandende Ijver. Siebold, de Biografie*, Utrecht 2025 ("Burning Zeal. Siebold, the biography").

with Japanese prostitute Kusumoto Taki, professionally *Sonogi.* They had a daughter Shiimoto Ine, *Oine*, who was born in 1827. It would have been a *fait divers* to his western world, having remained without sanction behind the curtains, even under increased interest, being not really different from western analogues. Europeans were forbidden to bring women to Dejima, or to have sexual contact with regular people of the country. *Going native* in a version of usual Japanese prostitution offered something to prostitutes and customers both, by traditional rules with social usualities and efficiently preserved the good condition of everyone engaged, not only from venereal disease. Concubines specializing in Dutch were called something like "Oranian", or "oranda yuki", and were allowed to leave the brothel established in 1642 in the brothel quarters of Nagasaki, from where they operated in pursuit of their profession.

This kind entanglement of different patriarchies, in which the Japanese notwithstanding dictated their version of prostitution and quarantine to which the Dutch adapted, monopolized the traditional Japanese version of capitalization of the body in distance of the market that was really assigned. Sex was only to be bought under such speciality, in order to trade, swap, exchange, and by under usual customs and traffic of goods, what there is, "silk and straw."[3] It is here, that *V. d. Zijl* finds her onus for the story of *von Siebold* and *Oine*, as double biography it is projected, in order to narrate the story in multiple perspectives. "The thought attracted me especially as a historian, that by choosing a `double biography´ as a form, I should get the chance to tell the same event from different points of view."[4] And so *v. d. Zijl* uses quotes and information that either come from firsthand sources, are supported by multiple sources, and those that appear coherent in historical context.[5]

Von Siebold, successfully collected specimens and testimonies, arranging them in Linnaeus taxonomy of life according to their types of procreation, as *Thunberg* had already begun for Japan. In the end, it didn´t turn out well for him. A so-called *von Siebold-affair* happened: somehow Japanese authorities discovered that *von Siebold* had borrowed a rare precise new map of northern Japan from one of his aboriginal witnesses in order to copy it, which was forbidden. After an investigation against any possible complicit, fifty judgements were enacted, ranging from one of capital punishment to jail of five days. *Von Siebold* was banned for a lifetime from all Japanese territories, and he left Dejima, *Sonogi* and *Oine* in 1830. In Europe he soon began decades of work on his tokens and achievements and his monumental writings.

3 Saga Jun´ichi, *Von Stroh und Seide. Erinnerungen aus Japans Provinz nach der Jahrhundertwende*, Göttingen 1994.

4 "Als historicus trok mij vooral de gedachte dat door een `Dubbelbiographie´ als vorm te kiezen, ik de kans zou krijgen hetzelfde verhaal vanuit verschillende gezichtspunten te vertellen," *v. d. Zijl*, S. 309.

5 (…) namelijk om alleen maar die informatie en citaten in mijn boek op te nehmen die hetzij 1) afkomstig zijn uit de eerste hand (zoals brieven en archieven) 2) ondersteund worden door meerdere bronnen en 3) in het licht van die tijd, de omstandigheden én de persoonlijkheden van de beschrewen mensen als plausibel kunnen worden beschouwd," *v. d. Zijl*, S. 320.

Sonogi von Siebold had bought freedom, they wrote to each other, love letters too. Later, the daughter wrote as well; he sent presents. In 1831 *Sonogi* married. Daughter *Oine* went for study to Okayama on Japan´s main island Honshu in 1845 to a former pupil of *von Siebold*, gynaecologist Ishii Sōken. *Oine* was tall, looked European to Japanese eyes and resembled *von Siebold* with light red, later lightly brown hair. In 1851 Sōken raped her upon return from a visit with *Sonogi*. *Oine* returned to her mother in Nagasaki and bore a daughter *Tada* in 1852. She continued her education and opened a medical practice in Dejima under the Japanese name of *von Siebold*.

After the opening of Japan for trade, customs und engagement with other countries in 1854, *von Siebold* waited until his ban was abolished and returned to Nagasaki, again in the service of the Dutch East Indian company, accompanied by his son *Alexander*. After a happy reunion, relations of everybody involved managed to turn sour soon: *Von Siebold* and *Sonogi* discovered that they did not desire each other sexually anymore and avoided living together. *Von Siebold* invited *Oine* to move in with him, but reproached that *Tada* appeared to dislike him. *Oine* lamented that one of the Japanese housemaids that *von Siebold* had reproached her and didn´t follow instructions. The maid was pregnant. That was a form of body capitalism known in the west as well. *Oine* herself avoided staying with *von Siebold* overnight. Meanwhile *von Siebold* brought together another important collection of Japan´s cultural and natural products.

Von Siebold aspired to the post of a Dutch ambassador and moved to Edo with *Alexander* in 1861. In Edo *von Siebold* was soon appointed as a counsellor to the Japanese government, annoying the other Europeans there, as well as Dutch authorities, especially as he tried not fully unreasonably to secure Japanese privileges to the Russians as well. After a bloody raid of militant Japanese anti Westerners on the British quarters near *von Siebolds* lodging in the Prussian embassy, the so-called *Tōzenij incident*, he took care of the injured. Soon after, his assistant and interpreter, the medic *Mise Schūzō*, who was engaged to *Tada*, was arrested and sentenced to five years of forced labour. *Von Siebold* left *Alexander* as interpreter with the British and went first to Nagasaki and arrived in Europe after a stopping in Batavia. Abandoning his aspiring son-in-law *Schūzō* shook his relationship with *Oine* considerably, probably finally. In Holland he only achieved his leave, his Japanese projects proffered to different governments unto his death in 1866, were all abased.

Sonogi died of cancer in 1869. *Schuzo* was released after three years and could marry *Tada*. He first became interpreter to a Dutch medic, then director of a clinic in Tokio, after he died in a pandemic in 1877. *Tada* married another director of a clinic, who died in 1886. *Oine* founded a clinic for gynaecology in Tokio, where she was treating clients from the court society. In 1877 she returned to Nagasaki. Both of *Von Siebolds* older sons *Alexander* and *Heinrich von Siebold* made excellent careers in different diplomatic missions, always in Japan, and later revised a second edition of their father's book *Nippon*.

After *Tada's* second marriage, *Oine* moved with her and her three children to *Alexander´s* house in Tokio. Tada died in 1938 in Tokio, aged eighty-six. The maid *Shio*,

the reason of dispute between *von Siebold* and *Oine*, had a daughter *Matsue* in 1861, who had *von Siebolds* Japanese surname *Shiimoto*. Quite young, she had a firm relationship with a European medic, who gave her money. She suffered from severe miscarriage in 1876, maybe because of an abortion. She died aged twenty-four in Osaka in 1885. *Oine* had taken care of her until after the miscarriage.

This is what *v. d. Zijl* reports from the lives of *von Siebold* and his Japanese daughter *Oine*. It portrays the professionalization as the allowing of transgression of the body limits as something common to both prostitution and medical intervention. It also gives the integration of such, allowing disposing the body limits into common order with specialising norms, professional honour, quarantine and professional law. The daughter of the "transferrer of western medicine" follows him in the beginnings of medical gynaecology in Japan. She was Japan´s first modern medic, but because of her maternal lineage, she was also unprohibited by the distancing rules of her clients. The development of anaesthetics during this time was left unexplored, whether it was the use of ether or the colonially traded goods such as alcohol, camphor and opium, which was designated as the "scourge of Asia."[6] The book that will soon find its *lecture* in Holland is congratulated to a manyfold of followings, completions, side-, main-, and centrepieces as well as parallels from many a discipline – and as well from Germany.

6 It is a little "so-so" for *von Siebold* to move to Bonn in 1852 which *v. d. Zijl* erroneously calls "the capital of North Rhine-Westphalia," "de hoofdstad van Nordrijn-Westfalen." Something with the name of the university there went wrong, too.

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