

A short history of the common cold

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Abstract

A tickling in the nose, frequent sneezing, chills and a runny nose, followed by a scratchy throat, fatigue, a light headache and lots of thick mucus. Who does not know these symptoms of the classic common cold? For about 50 years, we have known the culprits to be rhinoviruses or other subgroups of the so-called picornaviruses, which lead to short-lived infections in the mucus membranes of the nose, throat and sometimes the bronchial tubes. If we look at the history of mankind and its illnesses, then the 50 years of certain knowledge about the cause of the cold make the discovery seem quite recent. This article offers insight into the history of medicine and examines the evidence – usually hidden – for the cold in various epochs and cultures. Between intuition and surprisingly exact descriptions from the past, sometimes with a blink of the eye, the focus is trained on the nose and the mucus accumulating there, in order to find out how the cold's appearance was construed. Therapeutic recommendations have ranged from black cumin to cauterizing irons to snuff. Sometimes the suggestions are completely foreign, yet at times they appear surprisingly modern, although ancient in origin.

Stone slabs and herbal arrows: Pre and early history

We know practically nothing about the medical ideas of Stone Age humans. How illness was understood, and how precisely it was treated, are things we can mostly only speculate about. Paleopathologists attempt, on the basis of changes in preserved bones, to draw conclusions about diseases that left traces between 5000 and 10000 years ago on the human skeleton. In this category are, for example, degenerative changes or the results of dietary deficiencies, such as rickets. Everything else is conjecture. Nothing certain is known about colds in the Stone Age.

Despite our lack of specific knowledge, we can be relatively sure that colds existed at that time. Once humans started living in large families and village-like communities, the ground was laid for the cold to spread, because where people live close together, colds thrive.

Many areas of life in the Stone Age were associated with the magical-mystical. The cycle of the seasons, success at hunting or the reason for an illness were attributed to a greater power that determined the lives of humans. Humans secured the favor and advocacy of this power through magical rites. Religious acts are therefore difficult to distinguish from medical ones and findings from this time period are not easy to interpret. It has been proven, however, that trepanation – the making of a hole or drilling in the skull – was performed on the living. Yet whether they intended to make an opening for the spirit of the disease to leave the body or they did it to relieve a person's headache has to remain speculation. It does not seem outside the realm of possibility that they also considered the head as the seat of a cold [1]. But whether they opened the head speedily on that account remains completely uncertain.

Since the earliest times, healing plants have been used to cure illnesses. The findings and observations from the corpse of the man from Hauslabjoch, better known as Ötzi, provide one source. Ötzi was carrying birch bracket, a polyporous bracket fungus, with him that possibly served as medicine [2]. Next to that – and here we find the magical mythical component – was a stone slab that has been interpreted as an amulet to ward off evil spirits. Tattoos on his skin pose a riddle. They can be seen as therapeutic manipulations, in which healing plants were impregnated in the skin. The marks on Ötzi's body are found, interestingly enough, at the meridian points that are commonly used today in acupuncture for the illnesses with which he has been diagnosed by western medicine [3].

But whether Ötzi had a cold or even knew of one, how he understood a cold or treated it lies in the realm of speculation.

Needles and burning: China

Acupuncture, moxibustion (the burning of healing plants on acupuncture points) and phytotherapy are the preferred practices in the therapeutic arsenal of Chinese doctors. They are applied when the flow of Qi, or life energy in the body, is blocked or when the opposing forces of Yin and Yang are out of balance.

Chinese healing approaches sickness and its therapy in a completely different way from western medicine [4]. The guiding idea postulates a close connection between humans and nature. The world is ordered according to a complex and dynamic system of opposites and dualities. The best known element of the medicine of dualities is the tenet of yin (the shady side of the hill) and yang (the sunny side of the hill). During the first millennium B.C., a system of diverse, dualistic categories developed and expanded to include many other phenomena of life, such as darkness – sunshine, female principle – male principle, cold – heat, wet – dry. Later, correspondences between certain natural phenomena and human organs were established.

The fixed pairs, water – kidneys, wood – liver, fire – heart, earth – spleen, metal – lungs, provided orientation for medical treatments for prevention and healing.

A well-developed pharmacy developed very early, whose creator is said to have been the mythical emperor Shen-nong (ca. 3000 B.C.). His pharmaceutical writings, called *Pen-ts'ao king* were probably collected into a book by unknown authors about the time of the birth of Christ. The work includes 347 products from the animal, vegetable and mineral kingdoms. Chinese pharmacy groups these in high, middle and low remedies. The higher medicines like ginseng root and magnolia fruit are never poisonous, should enhance life and delay getting older. The middle substances are sometimes poisonous and can provoke a reaction. They are meant to serve the principle of life and to remove deficiencies. Belonging to this group are, among others, parts of the plant *Ephedra sinica*. Specific diseases are treated with low remedies, frequently very effective, such as rhubarb root for constipation.

The essential work of traditional Chinese medicine is ascribed to another mythical emperor, Huang-ti (mid 3rd millennium B.C.) [5]. The *Nei-king*, originating between the 5th and 3rd centuries B.C., is divided into a part on fundamentals about anatomy, physiology, pathology and therapy as well as a section concerning acupuncture. Classical acupuncture is also based on the yin-yang system. The fleshy organs – the heart, lungs, spleen, liver and kidneys – are assigned to the principle of yin; correspondingly, the hollow organs – the stomach, gall bladder, intestines, urinary bladder and the ‘three warmer’, which is not clearly localized – are ascribed to yang. Special pulse and acupuncture points are accorded to each of these organs that together make up individual meridians or channels in the body. Each meridian has six different function points (stimulating, calming, regulating, strengthening, alarming, meridian crossing) that simultaneously serve in the diagnosis of the pulse and the therapeutic intervention of the physician. Treatment with needles has a calming effect on yang and burning herbs (moxibustion) a stimulating effect on yin.

Healthy people have a balance between light, dynamic yang energy and dark, quiet yin energy. External causes, such as the wrong diet, cold, wind or strong emotions can disturb this balance. For millennia, traditional Chinese medicine has believed that a cold is an illness of ‘wind and cold’ [6]. Wind and cold enter the body through the pores of the skin and penetrate deeper depending on the constitution of the individual and progress through various stages of development there. In vivid terms, it is said that the cold that has attacked the body’s surface (chills at the beginning of a cold) becomes heat in the deeper layers of the body. If the body also protects itself by closing all the pores, then the cold can not leave the body. Fever results.

In addition to ‘wind-cold’ with symptoms like severe chills, low fever, neck pain, no sweating (dry skin), ‘wind-heat’ (few chills, more fever, noticeable sore throat, slightly moist skin, pulsing headache) as well as various

influences of moisture and dryness can also be diagnosed. Chinese medicine therefore does not treat every cold the same way. It must also be established precisely in which stage of the cold a patient is. The physician must ask questions, examine the tongue and diagnose the pulse before deciding which kind of therapy is optimal for the patient. The goal of treatment is the ‘opening’ of the surface and the expulsion of the factors causing the illness. Acupuncture (primarily along the intestinal meridian), moxibustion or the administering of healing plants (foods that are spicy, heat and therefore sweat producing, such as garlic, ginger and herbal infusions) can all serve this aim.

Lead and honey: Egypt

From the 3rd to the 1st millennium B.C. the old empire of the Egyptians blossomed in the eastern part of the Mediterranean area. The Valley of the Kings and the pyramids are still witnesses today of the highly developed technology of this culture. Medicine and healing also flourished under the pharaohs. Physicians, serving the upper class and the public concerns for which they were commissioned, usually specialized in one part of the body and its diseases, so that the Greek historian Herodotus could report in the 5th century B.C.: “And the whole country is full of physicians, for some profess themselves to be physicians of the eyes, others of the head, others of the teeth, others of the affections of the stomach, and others of the more obscure ailments” [7].

The Egyptians’ medicine was shaped by religion and magic. Thus certain gods, even more so than physicians, were responsible for individual parts of the body. Prayers, magic formulas and the use of amulets had great meaning. But empirical insights also found their way into therapeutic practice.

The Ebers papyrus and the Smith papyrus, both found in the 19th century and named after their discoverers, Georg Ebers (1837–1898) and Edwin Smith (1822–1906), belong to the most important Egyptian medical texts. The Smith papyrus provides information primarily about surgical measures, whereas the Ebers papyrus contains a description of numerous illnesses and suggestions for treatment with hundreds of incantations and formulas for remedies. The Ebers papyrus is considered the oldest medical book still in existence. Its 20-meter length points to its impressive coverage. Dating this document to deduce when these ideas emerged proves difficult. The writing was definitely used in the 16th century B.C. at the time of Pharaoh Amenophis I (ruled 1526–1506 B.C.), as evidenced by several calendar entries on the back. Yet the papyrus was probably written earlier and therefore reflects a much older medical tradition [8].

In addition to 20 different kinds of cough, the cold is also a topic in the Ebers papyrus. The formula for a spell that should drive the cold out of the body reads:

“Flow out, fetid nose, flow out, son of fetid nose. Flow out, thou breakest bones, destroyest the skull, and makest ill the seven holes of the head” [9].

The milk of a woman who has borne a son or aromatic resin is proposed as therapeutic remedies. The spell must be said four times over these healing items. In order to drive the cold out of the body, it is recommended to spread a mixture of lead, incense and honey on the nose for 4 days. Irrigating the nose with date juice should also bring relief and force the cold out of nose and head.

Humors and medicine: Greco-Roman antiquity

References to the cold become more concrete during the course of Greco-Roman antiquity than was the case in earlier times and in other cultures. In this epoch, for the first time, comprehensive medical concepts are described in detail [10]. The Greek and Roman explanation for disease in the human body is derived primarily from so-called humoral pathology. This theory can be found in the Hippocratic corpus, a collection of medical texts that was generated around the Greek physician Hippocrates of Cos (5th/4th century B.C.), and in the works of the Roman physician Galen (129–199/216 A.D.), who based his insights on the Hippocratic corpus and then expanded this knowledge. The Galenic approach to the body and to illness accompanied western medicine well into the 19th century.

“The human body contains blood, phlegma, black and yellow bile; Constitution, disease and health depend on them. Men are healthiest, when the mixture is balanced. Sickness occurs if one of the humors remains in great or minor quantity, when they separate from the rest or they are no more combined” [11].

This follows the precise formulation of Hippocrates’ idea that the four humors are fundamental to health and sickness. In relation to the cold, mucus or ‘phlegma’ is the essential substance. Its seat in the body, according to Galen, is the brain:

“Nature did not create an excreting organ for the phlegma, because it is cold and moist and a kind of half-digested nourishment. Therefore, the substance need not be carried out, it only needs to be changed. ... Perhaps it would be better to say mucin and not phlegma as people often do” [12].

Therefore, mucus in the nose is first and foremost a waste product, created when phlegma in the body is transformed, and not a direct sign for a serious imbalance of the humors.

Mucus is also associated with the season of winter. Hippocrates declared: “Phlegma increases in the human body in winter. It is closest to the nature of winter, because it is the coldest” [13]. The increased presence of mucus in the nose, noticeable several days after a cold begins, would have been interpreted by Galen, however, as a sure sign of sickness.

“The white-colored substance (the phlegma) collects mostly ... in those who have been chilled in some way” [14]. And Hippocrates wrote: “All diseases occur at all seasons of the year, but certain of them are more apt to occur and be exacerbated at certain seasons. – Of winter, pleurisy, pneumonia, coryza, hoarseness, cough, pains of the chest...” [15].

If we take a look at ancient pharmaceutical books, namely the *Materia medica* from Pedanius Dioscorides (1st century A.D.), we find medications that are useful against all kinds of symptoms of a cold: “mustard: ... has the power to warm, to dilute, ... and eaten to purge phlegm. ... If pounded mustard is brought into the nose, it stimulates sneezing” [16]. Furthermore, Dioscorides describes radishes as anti-inflammatory for the throat and a cough, and onion juice mixed with honey – still used today – as helpful in discharging mucus. Sulfur was also considered effective: “It helps against cough and internal ulceration if it is eaten with eggs or applied by smoking. ... It is useful against catarrh...” [17].

In addition to Hippocrates, Galen and Dioscorides, there were numerous ancient authors who documented their medical and therapeutic knowledge in writings. Among them, Pliny the Elder (23/24–79 A.D.) and Aulus Cornelius Celsus (1st century A.D.) are the most well known.

The religious aspect carried great weight in medical matters in antiquity. Alongside numerous gods that could be called upon in illness, the central god of healing, Asclepius, was considered accountable especially for cases of protracted sickness. The cold therefore hardly fell within his range of primary responsibility [18].

Medical knowledge and the religious component were passed down in the following centuries partially in the monasteries of the Christian west. The theoretical concept of humoral pathology, however, was transferred above all through the cultural area of the Near East to the rapidly developing Arabic medical world and returned *via* this channel back to Europe in the course of the 12th to the 15th centuries.

Sparks and cauterizing irons: Arabia

Medieval Arabic medicine fed in most cases on ancient authors. Hippocratic or Galenic works lived on through physicians and scholars and at the well-developed medical schools in the Byzantine Empire and in the neighboring Persian Empire of the Sassanids (Gundi-Schapur). The writings of antiquity they used existed in ancient Syrian, Persian or Hebrew translations or in the

original Greek. Following Mohammed and his followers' conquests, many texts were translated quickly into Arabic and thus enriched the knowledge of Arabic physicians in Damascus, Bagdad or Cordoba.

Qusta ibn Luqa (ca. 830–ca. 920) of Baalbek considered how infectious diseases came into being: “Contagion is a spark that flies from a sick body to a healthy one, wherein the same illness develops as was in the sick body” [19]. Similar to Galen, he explained the typical development of an infection as the inhalation of “evil vapors”, exuded from the body of the sick person, and the subsequent deterioration in the quality of the blood as well as the state of the organs. He did not mention the cold, however, as an infectious disease.

The cold is discussed in Arabic works dedicated primarily to pharmacy and dietetics. Mucolytic measures were advised according to the example of the ancients. A cold was thought to be caused by the cold in winter, but can be offset with appropriate clothing. A summer cold, however, declared the religious philosopher and physician Moses Maimonides (1135–1204) in Cairo, was caused by the seasonal heat that, “melted the hard excretions that are found in the brain and then they run down” [20]. Medicine to solidify the mucus needed to be used against this “acute catarrh”, but a hat could also help hinder the liquefying effect of the sun’s rays. Maimonides further advised in both cases to take preventive measures. One should avoid foods that “fill the head” such as milk and legumes, as well as alcohol that sedates the brain. Inhaling “aromatic scents of all kinds of spices” should also strengthen the brain’s substance. His recommendations ranged from ground cloves to rose perfume [21].

If a cold had already materialized, the Arabic physician drew on the known *Materia medica*. The wealth of Greco-Roman medicinal knowledge had been taken over directly in the translations of Dioscorides and Galen and had been extended by several hundred new drugs. In connection with the cold, one can find, for example, in the *Additions to Dioscorides* by Ibn Gulgul (944–after 994) recommendations like banana for a dry cough, or ambra, a metabolic product from the sperm whale, for “illnesses coming from thick mucus” [22].

If “the brain has been attacked by cold and moisture”, Arabic medicine advised the use of surgical measures.

The most well-known writer in the field of surgery is Abu l-Qasim az-Zahrawi (died 1013), born near Cordoba. The 30th book of his medical encyclopedia *Al-Tasrif*, dedicated to surgery, became the standard work for medieval Europe after its translation into Latin in the 12th century.

Abu l-Qasim believed cauterization to be an effective means for treating disease. This process involves destroying tissue with a cauterizing iron or a corrosive chemical. Ancient and medieval medicine used this radical method to burn out wounds, hemorrhoids, abscesses or growths, but also as pain therapy. The Syrian physician Ibn al-Quff (1233–1286) described in his manual for surgeons *Al-Umda fi sina at al-giraha* how one can fight

the causes of a cold with the cauterizing iron when dietetic and purgative medicines no longer bring relief:

“The method of application is as follows: the hair on the head is thoroughly shaven with a razor and the patient seats himself in front of the surgeon with crossed legs, hands on his thighs. Then the surgeon places the palm of his hand on the patient’s nose with his fingers between his eyes. He finds the place where the extended middle finger ends on the head and takes his hand away. After this, he heats the olive-shaped cauterizing iron until it glows and cauterizes the aforementioned place and twists the cauterizing iron until the skull (bone) is visible. If the pain is great, he cauterizes a second time until the membrane of the bone (periosteum) appears, so that its substance becomes thin, the pores are opened and the matter can easily flow outward. Then he moistens a strip of cotton wool in water in which salt has been dissolved and places it on the wound for 3 days, changing it twice daily. Then he covers the wound with a strip of cotton wool that has been soaked in fat until the scab has disappeared. Finally, he treats the wound with salves that help form a scar” [23].

When the soul sneezes and the stars blow their nose: The Middle Ages

The warring conflicts during the 5th and 6th centuries in western Europe signified a deep cut in the transmission of medical knowledge. In the sequestered atmosphere of the monasteries, the ancient medical texts were preserved and copied. An active discussion about the meaning of illnesses in the Christian context began: Are they God-given and must therefore be borne, or is it permissible for humans to intervene in the process? Spiritual and physical salvation begins to be seen as intertwined [24].

Folk medicine existed parallel to the Christian interpretation. It was based on an extensive knowledge of herbs, but also drew on magic. Only very few magic formulas against diseases have survived, likewise, folk medicine can hardly be found in written sources. Drawing a connection between sneezing and the presence of the devil (who is tickling someone’s nose) or a dark power belongs to this approach to the world. Written sources do not mention this idea until much later, but it appears to be completely plausible for the Middle Ages. Three sources from the early Middle Ages relevant to the history of the cold point to the foundation for the treatment of disease in the framework of monastic medicine. The first is the *Lorsch Pharmacopoeia* from the end of the 8th century that includes copies of numerous parts of ancient medical works as well as many recipes for medications [25]. The second is the 9th century ideal plan for the St. Gallen monastery, showing an herbal garden within the monastic walls, where medicinal herbs were planted [26]. This area was not far from the cells where sick monks were treated. Third, the 9th century poem *Hortulus* by the abbot Walahfried Strabo

(808/9–849) from Reichenau names the plants that were probably planted in his own monastery [27]. Among them are the time-honored salvia, radish and fennel that can be found in antiquity as well as in the pharmacopoeia of later centuries for use against a stuffy nose, cough and infectious illnesses in the nasal and throat area.

The most important woman among the representatives of monastic medicine was the abbess Hildegard von Bingen (1098–1179). Her *Book of Simple Medicine* (*Liber simplicium medicinae* or *Physica*) is a description of the effect of vegetable, animal and mineral healing substances. Hildegard's experiences stem primarily from the flora and fauna of her Rhineland home, especially evident in the plants of the abbey garden. For colds and coughs, she recommended tansy (*Tanacetum vulgare*) in soups, cake or with meat. Inhaling the powder of redstem filaree (*Erodium cicutarium*), Mount Atlas daisy (*Anacyclus pyrethrum*) and nutmeg should also bring relief [28].

Hildegard's theory of illness differed little from ancient humoral pathology. Above all, the *Book of Compound Medicine* (*Liber compositae medicinae* or *Causae et curae*) reflected the abbess's knowledge of Galen's theory of qualities. For her as well, a cold results from a collection of cold, moist substances in the brain that develop into a poison and that must be expelled. In this view, a person is just a reflection of the cosmos, because "the stars in the air also cleanse themselves in this way and the earth also rids itself of certain dirty, foul-smelling substances" [29]. Hildegard even saw in sneezing a self-cleansing mechanism of the body that can be vital: "When the blood in a person's vessels is not lively and quick, but rather lies there as if sleeping, and when his humors do not flow quickly, but sluggishly, the soul notices this of course and jars the whole body with sneezing and lets the person's blood and humors wake again and return to their correct condition. Namely, if water was not held in motion through storms and flooding, it would become putrid; and likewise, a person would also rot internally if he did not sneeze or would not clean his nose through blowing it" [30].

In order to reduce or purge these horrible humors, Hildegard recommended several recipes in her *Book of Compound Medicine*. For example fennel and dill should be heated, the steam inhaled and finally the remains eaten with bread. The smoke from heated pine wood also makes nasal mucus flow better. A lye solution can be made from the ashes, which can be used to wash the head [31].

In the 12th and 13th centuries, the popes ended medical activities at the monasteries through several conciliar decrees. Hildegard von Bingen thus became the last great representative of healing practice during the flowering of monastic medicine. Clerics were forbidden from practicing healing. This activity was transferred to the schools and universities that were slowly developing.

Already in the 10th century, long before the papal decrees, the medical school of Salerno represented the crucible of secular European medicine. Although many texts were translated later in Toledo at the translation

school there, in the southern Italian town a variety of ancient Arabic sources were also being made available in Latin. Constantine Africanus (1018–1087) was the most famous teacher and translator in Salerno. Under the aegis of Norman and Hohenstaufen rulers in southern Italy, the first training and licensing regulations for physicians were prepared and implemented [32].

Between the 12th and 15th centuries further places for learning and investigation were created, for example, in Paris, Bologna, Oxford or Montpellier. During the 13th century they began calling themselves universities. They held a privileged status from the king, emperor or pope and were communities to teachers and students (*universitas magistrorum et scholarium*), bound legally by a set of statutes. The medical faculties of the schools in Paris, Bologna and Padua formed the crystallization points for the communication of medical knowledge. Instruction, however, was provided for a very long time in schematic ways according to the scholastic method [33]: Teachers conveyed the writings of the ancient authors, usually Galen, without critique and students seldom questioned what they were taught. Humoral pathology with its specific diagnostics (taking the pulse, examining the urine) and therapeutic measures (blood letting, purging, vomiting) thus remained the guiding theory of illness during the Middle Ages. The typical ‘scholastic’ physician who had studied at a university carried out a type of medicine that was, in extreme cases, far from the physical realities of his patients. He was, however, well read in the relevant literature that he applied to each case. The practical side of medicine, on the other hand, remained in the background.

A short digression: The Dreckapotheke (dirt pharmacy)

Medicine in the early Mesopotamian high culture (Assyria, Babylonia) frequently took supernatural influences into account when considering the origin of illnesses. The influence of the gods on human health could not just be the healing of afflictions, but must also indicate punishment by allowing demons causing illness to get the upper hand in a person’s body. The goal of the doctor, therefore, was to carry out treatments that would irritate or expel the interloper, i.e., the source of illness, from the human body. In order to achieve this goal, he would prescribe bitter or nauseating substances, such as urine, feces, menstrual blood or rancid fat of human or animal origin. Egyptian and Greco-Roman medicine also resorted to these kinds of substances for treatment. Thus Galen said of feces: “You do not just need it as an additive in remedies that you apply externally, but also in ones you use internally” [34].

Urine and excrement also found use in fighting coughs. Pliny the Elder prescribed jaguar urine and hare feces to be used internally [35]. The late ancient author Sextus Placitus gave coughing children crow excrement to be used internally [36].

At the end of the 17th century, the medical work of Paullini's *Heilsame Dreck-Apotheke* (Healing Dirt Pharmacy) [37] recorded in more than 200 pages a list of diverse cases of illness where human and animal waste products could find use. Thus colds should be able to be healed by applying human feces and urine externally, as well as the excrement of sheep, cattle, goats, pigs, horses and doves. For the physician Christian Franz Paullini (1643–1712), feces, dirt and earth were all one. The human was earth and returned to earth:

“God is and remains the old potter, and thus daily turns and forms all manner of things from feces on his wheel. How do we retain the complete health we have or regain our lost health? With remedies made from herbs, roots, animals and minerals. If you investigate all of their origin, however, you will find Dreck (trans: dirt, here: feces) and nothing more.... Whoever disrespects feces, disrespects his origin” [38].

Folk medicine also knew prescriptions from the Dreckapotheke. Slavic tradition, for example, recommended taking ground stork excrement in honey water for a sore throat; for a cold you inhaled it as fine dust [39].

Here as elsewhere the consumption of one's own urine is repeatedly advised, for example, against a cough:

“First thing upon waking, pass some urine, then take some of the mid-stream in the palm of your hand and inhale it deeply into the nose. Continue this several mornings. It will clear your head” [40].

A look at the best seller list proves that the Dreckapotheke is still considered effective today: One of the most successful reference works in 1993 was a book with the title *Ein ganz besonderer Saft – Urin* (A Very Special Liquid – Urine) [41].

Herbal books and good advice: The Early Modern period

In the 15th and 16th centuries changes were introduced that altered the (western) world dramatically. The invention of printing with movable letters by Johannes Gutenberg (1400–1468) made knowledge in times thereafter slowly more accessible, while also offering the possibility of publishing one's own knowledge. The fundamental reforms in education beginning in the 16th century went hand in hand with the new technology. Medicine also profited from this development. In addition to the books that were used at the universities and in the medical faculties, publishers also produced numerous volumes about healing plants. These books, based in part on the works of ancient authors, gave a botanical description of numerous healing plants and explained how they worked. Moreover, the representations of the plants became ever more realistic.

The 16th century herbal book (*Kräuterbuch*) of Hieronymus Bock (1498–1554) was of great importance [42]. Bock tried to identify precisely

the plants growing in Germany and to summarize their healing properties. Unlike most of his predecessors, he wrote in German.

For example, among healing plants for the cold, one finds helleborus. It works when it “is received in the nose with marjoram. It cleans the brain and makes you sneeze.” The brain was still understood as the seat of mucus according to an understanding of the body based on humoral pathology. In analogy to Hildegard von Bingen, the expulsion of the bad parts of this humor is always the goal, in order to free the body from illnesses associated with mucus. Radish is also mentioned by Bock. Through its properties – hot and dry in the third degree – it was a good healing means for a ‘moist-cold cold’.

The printed herbal books were at first only available to an educated public. With time they were expanded to include contemporary concepts alongside pharmacological knowledge from antiquity. Plants were added that were found in the New World discovered by Christopher Columbus (1451–1506) and later brought to Europe. Toward the beginning of the 16th/17th century, as shipping and other transportation improved, the exchange of goods including healing plants, minerals and medications from other cultures intensified and increased.

With tobacco and emetics: The 18th century

The 18th century is considered the era of the Enlightenment. It was characteristic of thought at the time to encourage people to use reason to free themselves from their “self-incurred immaturity” [43]. To achieve this end, the use of critical faculties is necessary. Criticism should be based on the natural sciences and aimed at authoritarian, irrational ideas, such as certain forms of Christian faith and superstition. This approach was picked up in the course of the century and echoed in the great European encyclopedias: The *Encyclopédie* (1751–80) or the *Encyclopaedia Britannica* (1768–71) represents the knowledge of their time in France and Great Britain. In Germany, enlightened contemporaries reached for Johann Heinrich Zedler’s *Großes vollständiges Universal-Lexikon* (Great and complete universal lexicon) [44]. The most comprehensive encyclopedic work of the 18th century, it promised to illuminate all “sciences and arts which have hitherto been invented and improved by human reason and wit.” The common cold also receives a place with extensive articles on “catarrh” and “gravedo” (cold in the head) [45]. Showing the critical spirit of the times, the articles distance themselves from the humoral pathological ideas of the ‘ancients’, who had localized the source of the illness in the head alone and had undertaken to differentiate according to qualities and elements. Modern medicine favored looking at only one ‘humor’: Diseases began in the blood, the cold as well. They then manifest themselves either in a location (runny nose, cough, hoarseness) or in the entire body (Catarrhus universalis), appear either

sporadically or as an epidemic and influence the quality of the blood (fluid and hot, thick and slow). The traditional concept of a sluggish or corrupted humor, of too little or too much blood, remained valid: “The direct cause of a catarrh is of course without doubt the impeded movement of the seri [of the blood], which, if it begins to slow, causes growths and pain to ensue, such as to be seen with a growth in the salivary gland” [46]. Consequently, therapy must be aimed at getting the fluids to move again, to remove them or to add them. If the blood is too thick then it is advisable to drink a lot of tea or milk. Conversely, a reliable measure for ‘evacuating’ would involve administering a mild laxative. According to the encyclopedia, aches due to a cold can be treated by rubbing the limbs externally with frankincense and mastic gum, camphor or menthol [47].

Very traditional views, some from the Middle Ages, can also be found in Zedler’s universal lexicon. The idea that sluggish blood can be stirred up artificially with mixtures such as snuff and castoreum appears to come in a direct line from Hildegard von Bingen – but without her cosmological framework! The advice to use surgical measures in the case of chronic colds that do not respond to any dietetic and pharmaceutical measures seems to be taken directly from medieval manuals on wound healing. Creating a fontanelle, i.e., an artificial wound in the skin that is then prevented from healing by applying a foreign substance, is supposed to allow corrupt fluids a channel by which to leave the body. An alternative was to set a setaceum, a string that was pulled through a fold of skin, and allowed to remain there until the pus that accumulated led to a discharge [48].

This reference work also reported about what makes colds contagious. The cause is sometimes “poisonous impurities in the air”, so-called Miasma malignum, that are breathed in through the lungs. The illness can thus be avoided if one constantly spits. Otherwise, the damaging substances are mixed in the mouth with saliva after breathing and then swallowed and from there pass through the stomach and intestines into the “milk vessels” (lymph vessels) and from there into the blood. Salivants, such as myrrh, mastic gum, burnet or also tobacco smoke in the mouth should aid in spitting. If the miasmas have already reached the stomach, a light emetic should be administered [49].

Advisory literature developed in the 18th century parallel to the encyclopedias. Eventually, there were instructions and tips for all areas of life, including illnesses. When should one consult a doctor? What is the proper diet? What measures should one take and when?

“Various preconceptions prevail in regard to the cold, all of which could have terrible effects. The first is that a cold can never be dangerous. This error has cost many people their lives every year.... In fact, you do not die of a cold, so long as it is a cold, but if you miss it, then it turns into a chest illness that can be deadly.... A further error is that people not only do not think a cold is dangerous, but also actually think it is healing. Of

course it is better to have a cold than some worse disease; but it would be better, not to have any....” [50].

Thus wrote Samuel August Tissot (1728–1797), Swiss physician and scholar, in his work, *Gesundheitliche Ratschläge für das Volk oder Abhandlung der häufigsten Krankheiten* (Health Advice for the People or Treatise on the Most Common Illnesses), published in 1761. In this book he explains about illnesses and their symptoms, gives therapeutic advice and recommends when it would be necessary to visit a doctor. In the chapters, “Inflammation of the Chest”, “About Sore Throats” and “About Colds”, he expounds on the symptoms of the common cold. For Tissot, all of the symptoms in the nose, throat and chest have the same origin: the reason for the illness is an inflammation of the blood or an exhalation or perspiration that has been held back. As in ‘Zedler’, blood seems to be the central bodily fluid that causes illness.

The idea that a cold has something healing about it appears to have been widely believed and goes back to the concept that mucus is a waste product of the body. Tissot neither believed the cold to be dangerous in and of itself, nor did he understand it as a cleansing and healthy process of the body. Tissot saw how the entire breathing apparatus was interconnected and the signs of inflammation common to various illnesses. A light cold, together with a light cough and fever, lasting about 5 days, could therefore not be disregarded. With a severe cold, he recommended blood-letting. An evening footbath should help fight a cough, fever and headache. In addition to avoiding meat and an increased consumption of fruit and vegetables, he advised drinking an elderberry infusion with milk or barley soup. An enema should free the body of substances that were caught or stuck.

Cold and electricity, infections and microbes: The 19th century

In the first half of the 19th century, the general concepts of humoral pathology still dominated views of the common cold and the mechanism that caused it. However, the main point of attack for the illness changed to the skin. If the skin is exposed for shorter or longer periods of time to low temperatures or a draft, then the person will become chilled and get (a) cold. According to beliefs at the time, the function of the skin was to “evaporate moisture continuously and unnoticeably; if the necessary skin warmth is replaced too quickly by cold, then the pores of the skin close and perspiration is interrupted. Consequences: inflammations, rheumatism, catarrh.” Quite obviously, wearing appropriate clothing protected from the illness. However, “the best means of keeping this great enemy of health at bay is hardening, since hardened skin is not kept from functioning when a little air blows in its direction”. The “hardening” could be attained primarily by going outdoors in any weather, moderate heating in winter as well as washing in cold water in all seasons [51].

In the 19th century, if one still got a cold, advice for household use could be found in numerous medical guidebooks similar to Samuel Auguste Tissot's work. In the *Hauslexikon der Gesundheitslehre für Leib und Seele* (Household lexicon for a healthy body and soul) from 1873, individual illnesses are ordered alphabetically. The common cold can be found under the term 'catarrh'. Like the Ladies Lexicon, it gives the reason for the common cold as poor functioning of the skin through too much cold or great changes in temperature. The function of the skin is interrupted and the electricity in the skin is disturbed. The body reacts to this problem with an inflammation. If this reaction affects the mucus membranes of the air passages, then a cold is the result, a so-called 'good catarrh'. The following symptoms appear: "The feeling of a blocked nose is followed by a dry heat in the nose, sneezing and reddening of the eyes, frequently with feverish disquiet and headache, the senses of smell and taste are diminished, a prickly, watery discharge that irritates flows from the nasal openings, until finally, when the irritation lessens, mucus that is at first clear and then thicker is discharged and within 6 to 8 days normality has returned" [52]. The goal of therapy must be to restore the functioning of the skin. This can be brought about by the warmth of the bed, taking a tartar emetic mixture or Danish elixir (a mixture of licorice juice, fennel water, liquid ammonia and anise oil). Taking a walk in the fresh air is as important for regaining health as visiting a doctor if the symptoms continue.

In the guide book, influenza is clearly distinguished from the common cold. Influenza is an illness with fever that comes 'from the air', attacks primarily older and weak people and can even lead to death.

The physician Carl Hueter (1838–1882) already held the opinion in the early 1860s that colds were caused by a kind of infection, resulting from the intake of tiny organisms Hueter called "monads". Based on the prevailing humoral pathology, he believed the pressure of drafts squeezed the monads into the skin pores that, once opened by a strong secretion of sweat, offered an entry port for the harmful organisms. This theory led to treating colds prophylactically by dousing the skin with denatured salicylic acid [53].

As scientific methods in medicine became more accepted, researchers used physiological experiments in an effort to understand what local and systemic consequences attended large changes in body temperature. The resulting knowledge that cold stimuli could provoke temporary anemia, cramps in the vessels and inflammatory processes in the affected tissue, did not, however, help physicians further. The advice of the pastor Sebastian Kneipp (1821–1897), on the other hand, proved to be very successful. In the 1880s and early 1890s, his traditional humoral pathological ideas from folk medicine enjoyed exceeding popularity. The prescribed applications of cold and cold water procedures against a "Verwärmung" – as Kneipp called a cold – however, only followed the traditional opposition of a softened and a hardened human physique.

Although physiological experiments were known at this time that refuted a connection between a temporary cooling and a catarrh, there were physicians around 1900 who still “emphasized the possibility for the generation of a nose and throat cold, perhaps also tracheitis or bronchitis, completely as the result of a reflex.” These authors believed they had frequently observed that a cold comes so hard on the heels of a cold stimulus, that it “would be difficult to imagine the whole path of a bacterial development and establishment of an inflammation in such a short time” [54]. Slowly it was recognized that colds could not merely be attributed to meteorological conditions, but rather to an acute infection. Proponents of the infection theory first associated the pathological microbes that caused illness with bacteria or simply called them “cold pathogens” [55]. From time to time, known pathogens were made responsible for the common cold: streptococcus and pneumococcus, which were frequently found in the air passages of patients with colds. The view that one could ward off a cold by taking measures to harden the body slowly but surely became untenable in medical circles (yet is still believed in wide parts of the population).

The basis for knowledge about the cold came from the new medical field of microbiology, where many new insights were being gained. Above all, the research of Robert Koch (1843–1910) led medical science to perceptions that allowed a closer understanding of the origin of infectious disease. Koch was able to prove the existence of tiny organisms in tissue samples of sick patients, to isolate them, to grow them in their pure form and then to prove that they caused infectious diseases. In this way he discovered the bacterial pathogen for anthrax (1876), tuberculosis (1882) and cholera (1883).

Despite all progress in making bacteria visible, there was increasing evidence for the existence of pathogens that were too small to see with an optical microscope. For the first time, in 1892, Dimitri Iwanowski (1864–1920) used the mosaic disease on the tobacco plant to confirm that a disease could be caused by a substance that could not be removed through filtration and whose particles must therefore be significantly smaller than bacteria [56]. The first proof of an animal virus succeeded in 1898 when Koch’s former assistants, Friedrich Loeffler (1852–1915) and Paul Frosch (1860–1928), discovered the foot-and-mouth-disease virus [57].

The discovery of the rhinovirus that causes the common cold, however, was not to happen for several decades.

The rhinovirus: The 20th century

The search for the cause of the cold was difficult on two accounts. First, the cold could not command the attention of researchers because much more serious infectious diseases such as typhus or the frequently fatal influenza demanded research to find a cure for, as well as a way to eliminate or at least restrict, these diseases.

Second, the question about the pathogen responsible for coughs, colds and hoarseness turned out to be problematic. Up to the 1930s there was no consensus in medical research about which group of pathogens caused the cold. The idea that it could be a virus continued to circulate along with the assumption that aerobic or anaerobic bacteria were the cause, even though the first evidence for a viral infection had been found in 1914 [58].

The hygienist Walter Kruse (1864–1943) and his staff carried out experiments at his Leipzig University institute after one of his colleagues came to work with a cold. The secretion of the nose, generally free of the classic bacteria in the air passages, was prepared and given to other staff members to inhale into their noses. Many of them developed typical symptoms of a cold, so that it became clear to Kruse that only a virus could be the trigger since the bacterial components had been removed. Yet he could not prove his theory. Thus, his work remained unnoticed in research for some time. In addition, the outbreak of World War I diverted the attention of scientists to infections caused by wounds and the great epidemics. In the 1920s and 1930s in America and England, efforts were again made to find the cause of the common cold. Under the direction of Alphonse Dochez (1882–1964) in New York, the idea of a viral infection according to Kruse was reexamined. Experiments with chimpanzees and later with humans took place. The English virologist Christopher Andrewes (1906–1998) met Alphonse Dochez coincidentally in America and became very enthusiastic about his work. Back in England, he began his first experiments, but had to interrupt them because the money for his research was slashed due to the world economic crisis. Andrewes turned again to studying influenza. In the years 1918/19 it had claimed more fatalities in England than World War I and was, therefore, a more urgent matter [59].

The Common Cold Research Unit [60]

After World War II, new efforts, primarily in England, were again undertaken to research the cold. The focal point was the former Harvard Hospital in Salisbury/Wiltshire in the south of England. The institution had been established in 1939/40 by Harvard University in Boston and the American Red Cross to support Great Britain against the German Empire in World War II. It served to study infectious disease and as a hospital. Interest in research on the cold had not lapsed completely during wartime; as an economic factor it remained present consistently for a broad public. At peak times the illness incurred a high number of sick-days in the workplace that amounted to economic losses of many millions of pounds or dollars. During the war, the British government therefore started a campaign to alert people of the necessity for physical hygiene, the use of handkerchiefs and the danger of spreading infection.

After the end of the war, the American government gave the British government the building and its inventory. In 1946 the Common Cold Unit (CCU) was established.

The CCU thus served as the cornerstone for systematic research on the common cold. The researchers worked with volunteers who were willing to spend 10 days in isolation and be infected with the pathogen. Their lodging was paid and many were prepared to endure a simple cold in exchange for good, if temporary accommodations. Until the CCU was closed in 1989, more than 20000 volunteers took part in the experiments to identify and treat the cold.

The first years were plagued with many uncertainties, but in 1956 there was a decisive breakthrough. For a long time the existence of the pathogen had been known and had thus provided the conditions for specific experimentation. For the first time, it was possible to make a fragment of the so-called B 814 virus visible in tissue. The rhinovirus had been found. [61]

Over the years it became clear that there are many forms of the virus responsible for the common cold. Numerous subgroups of the so-called picornaviruses are the main cause of a cold.

Medical research today is still concerned primarily with the question of treatment and prevention of colds. In cooperation with the WHO, worldwide research and prevention programs are carried out with the aim of restricting the radius of action of cold viruses and preventing serious complications and secondary infections. The changeability of the rhinovirus makes it impossible to eradicate the common cold. But knowledge about the virus offers possibilities for new, innovative therapies.

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