The rise of Chemical Peeling in 19th-century European Dermatology: emergence of agents, formulations and treatments

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Abstract

Background Considering the increasing number of chemical peeling applications, also the interest in the history of chemical peeling agents, has grown in dermatology. Research ascribes the first use of phenol as a chemical peeling agent to William Tilbury Fox (1836–1879) in 1871. Furthermore, Ferdinand von Hebra (1847–1902) is said to describe the properties of various peeling agents in 1874, and Paul Gerson Unna (1850–1929) adds resorcinol and trichloroacetic acid in 1882.

Objective To identify the first mentions of chemical peeling applications and agents in 19th-century dermatology.

Methods Nineteenth-century dermatologists were identified by an examination of literature of the last 30 years on the history of chemical peeling. Systematic examination of the medical textbooks of Hebra, Fox and Unna was conducted. It was proved whether the mentioned agents were used for chemical peeling applications.

Results The skin peeling property of phenol was already discovered by its first describer, the chemist Friedlieb Ferdinand Runge (1795–1867) in 1834. The Viennese dermatologist Hebra described phenol as a chemical peeling agent in 1860. Hebra and his associate Moriz Kaposi (1837–1902) stated that ‘Lotio carbolica’ was already used in London. Fox used phenol mostly as a disinfectant and not for chemical peeling since 1869. Unna described the chemical peeling property of salicylic acid in 1882 and gave the most comprehensive account of chemical peels of the 19th century in 1899. Unna also introduced the Gutta-percha plaster with salicylic acid and phenol. Around 1900, Unna was famous for his peeling paste with resorcinol in Germany.

Conclusions A new chronology of the introduction of chemical peeling in dermatology can be drawn from the results. The German-speaking dermatology pioneered the treatment of skin diseases with chemical peeling as well as for aesthetical purposes 21 years earlier than hitherto known.

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Introduction

Chemical peeling procedures are performed around half a million times by dermatologists in the USA.1 There, chemical peels are the most common procedure of facial rejuvenation.2 There is a growth of 20% in chemical peeling procedures in 2018 compared to the year 2000.3 Statistics for Germany and Italy reveal that chemical peeling procedures are among the top three non-surgical facial rejuvenation procedures in these countries.2 Since there is an increasing number of treatments with chemical peeling worldwide in recent years, the interest in the history of chemical peeling and its agents has also grown.4–8 To know where therapies come from and how substances were found for their right use, the history of the most effective chemical peeling agents is most interesting. Among all chemical peeling procedures, phenol chemical peeling has the most effective outcome, but also salicylic acid and trichloroacetic acid (TCA) are used most often with very good results.

While the earliest descriptions of chemical peeling agents are to be found in the ancient Egyptian Papyrus Ebers (ca. 1550
prior research states that the modern history of chemical peeling begins with the year 1871. According to the eminent articles by Brody et al., the British dermatologist William Tilbury Fox (1836–1879, Fig. 1) was a pioneer in describing a 20% phenol solution to lighten the skin in the year 1871. However, research did not describe the sources of the invention of Fox. Until now, also the role of the discovery of chemicals in 19th century has been understudied although this era is most important to the modern development of chemical peelings in dermatology and dermatology as a medical speciality. It is possible that phenol was used quite earlier as a chemical peeling agent than hitherto known.

Our objective is to describe the emergence of chemical peeling applications and agents in 19th-century European dermatology. Prior research identified three dermatologists in three European countries which have introduced chemical peeling agents and formulations. In the United Kingdom, there was William Tilbury Fox, in Hamburg (Germany) Paul Gerson Unna (1850–1929, Fig. 2), and in Vienna (Austria) Ferdinand von Hebra (1816–1880, Fig. 3). Lay peelers are out of our focus. Our hypothesis is that these dermatologists used sources for their developing of chemical peelings as a medical treatment. We will describe these sources and hereby antedate the uses of chemical peeling in dermatology.

Materials and methods
It has been proceeded in three steps. (i) To identify all relevant original writings of 19th-century dermatologists who are credited for advances in chemical peeling, literature on the history of chemical peeling was examined. A search in PubMed, Ovid and Google Scholar databases was conducted (keywords: ‘chemical peel/peeling’, ‘history’). Relevant literature of the last 30 years was identified, cross-references to additional literature were followed, and the original sources which described chemical peeling in the 19th century were identified.

(ii) Due to vague citation of original sources in research, bibliographies of the dermatologic textbooks of Fox, Unna and Hebra were created. The medical textbooks of these three physicians have been downloaded from archive.org or books.google.com because these files are processed by an optical character recognition (OCR). The OCR was necessary due to time-saving keyword search in these texts. These texts were examined in respect to chemical peeling ingredients, which are used even today: carbolic acid (phenol), salicylic acid, glycolic acid, trichloroacetic acid (TCA) and resorcinol. Additional
examination of the indices was also conducted. Since research states that phenol was the first agent used for chemical peelings in dermatology, the history of this active ingredient in terms of its first chemical analysis by Friedlieb Ferdinand Runge (1795–1867) up to its application as a wound disinfectant by Sir Joseph Lister (1827–1912) in medicine and by Fox in dermatology was also examined.

(iii) The identified text passages of dermatologic textbooks were checked in respect to whether the mentioned substances were used for chemical peelings. According to an established definition, chemical peeling is defined as ‘the application of one or more chemical exfoliating agents to the skin, resulting in a wound, and destruction of one or more parts of the epidermis and/or dermis. The chemical peeling results in regrowth of a new portion of skin’.

According to this definition, simple disinfection with an agent that can also be used for chemical peeling is out of our focus.

The limitations and focus of the chronological frame are twofold. First, one has to consider that dermatology as a medical specialty emerged right in the 18th century and 19th century by classifying dermatological diseases in medical textbooks. So-called protodermatologists of this era like Joseph Plenck (1735–1807), Robert Willan (1757–1812) and Julius Rosenbaum (1807–1874) were without common journals and specialist societies (Scholz et al. 2009:227). For only in the second half of the 19th century, dermatology as a distinguished medical discipline evolved. Second, chemical research and industry also emerged in the late 18th century. The chemical analysis and synthesis of substances like phenol by Runge in 1834 or glycolic acid by the French chemist Auguste Laurent (1807–1853) in 1848 had to be developed beforehand they could have been used in dermatology and for chemical peelings. Hence, focus on the 19th century was the logical consequence.

Results
We indicate the page of the printed book by abbreviating it as ‘p.’ (not of the PDF as retrieved via archive.org or books.google.com).

Historical research on 19th-century chemical peeling
Historical research of the last 30 years on the emergence of chemical peeling in 19th-century dermatology is presented in Table 1. Recent research does occasionally cite the English or French translations of the original sources of the 19th century, but in most cases secondary literature. Out of seven articles, only three refer to original sources of the 19th century.

Agents for chemical peelings according to original sources
Table 2 presents the first mentions of agents which are still used in dermatology nowadays for chemical peeling purposes in the works of Hebra, Fox and Unna. While glycolic acid has not been found, Hebra was the first who used carbolic acid as a chemical peeling agent in 1860. Fox used phenol primarily as a disinfectant in 1869. Unna added salicylic acid in 1882, and trichloroacetic acid as well as resorcinol in 1889.

William Tilbury Fox (1836–1879)
Between 1864 and 1873, there are four editions of the dermatologic textbook of Fox to whom research attributes the first description of chemical peelings in medical literature (Table 3). Research only refers to the third edition of 1871. Out of the substances under consideration, carbolic acid is the only agent Fox mentions. In the first edition of Fox’ dermatologic textbook, there is no mention of carbolic acid or a synonym (1864). In the second edition, carbolic acid and Acidum carbolicum are mentioned 12 times (1869, Table 4).

All mentions deal with the disinfectant property of phenol except one (Fox 1869:165) where it is used as a caustic. There is no mention of the use of phenol or a synonym for lightening of the skin. The text of the third edition (1871, USA) is identical to the second edition (1869, UK).

In the appendix of formularies of the first edition (1864), there is a list of caustics with nine recipes. In this list, there are iodine, nitrate of silver, chloride of zinc, Vienna paste (unslaked lime and caustic potash mixed with alcohol), Plenck’s caustic (ingredient among others: acetic acid) and several other caustic chemicals (Fox 1864:294–5). The appendix of formularies of the second edition (1869) adds to the former edition soap with carbolic acid, formulary no. 167 (carbolic acid and glycine in case of Tinea decalvans) and formulary no. 173 (carbolic acid, glycine and aqua rosa in case of ringworm).

Ferdinand Karl Franz Ritter von Hebra (1816–1880)
Hebra wrote several medical textbooks on dermatology. His first textbook dates to 1860. There, he mentioned the term ‘Aetzmittel’ (Hebra 1860:31). Hebra distinguishes between agents with a limited recommendation due to their disadvantages (Acidum sulfuricum, Acidum nitricum, Acidum muriaticum concentratum, Botyrum antimonii and Zinkchlorid for removing exudates, neoplasms and tumours) and advisable agents for chemical peelings (Table 5). In the group of the advisable agents, there are several etching pastes (p. 32). Beside these etching pastes, Hebra also mentions sulphuric copper, alum, Pulvis frondum sabinae, sublimate, calomel as ‘Aetzmittel’ (p. 32).

Hebra has tested the substances resinon, resinon and resinin (p. 403). He states that they are similar to tar but more caustic. He recommends them in case of Psoriasis, Eczema squamosum, Eczema rubrum and Lichen exsudativus ruber. However, Hebra prefers carbolic acid to these three substances because it is very handy in praxi: it does not smell like tar distillates and is soluble in water, alcohol and glycine. He applies it to the face and hands. Hebra’s textbook does not contain any pictures of treatments. He mentions exact application times of...
Hebra states that a weak Lotio carbolica is already used in London ('Rp. Acidi carbolici drchm. semis, Glycerrh. Alcoholis ana unciam semis, Aqu. dest. unc. sex.', p. 403). He tried this Lotio carbolica but it was too weak for his purposes compared to the preparations of tar. So, Hebra composed a modified formula ('Acid. carbolici drchm. duas, Glycerin. et Aeth. sulf. ana unciam semis, Aqu. dest. unc. sex.', p. 403).

### Table 1: Research, its sources and results on the emergence of chemical peeling in 19th-century dermatology

| Researchers | Author | Date  | Agent and indication | Sources |
|-------------|--------|-------|----------------------|---------|
| O’Connor et al. 2018⁵ | Fox | 1871 | 20% phenol to lighten skin | Brody et al. 2000⁵, Krueger et al. 2013⁶³ |
| Hebra | 1874 | Iodine tinctures, croton oil, mustard seed, cantharides, sulphuric acid, acetic acid, nitric acid, hydrochloric acid, borax, alkalis and corrosive sublimate for disorders if increased pigment | Brody et al. 2000⁵, Nikalji et al. 2012⁵⁶ |
| Unna | 1882 | Described properties of phenol, resorcinol, salicylic acid and trichloroacetic acid | Krueger et al. 2013⁶³ |
| Weissler et al. 2017⁷ | Fox | 1871 | Phenol for furuncular infections and pemphigus; first description of chemical peeling in the modern medical literature | Fox 1871¹⁴, Hebra and Kaposi 1874¹⁸ |
| Hebra | Not mentioned | | | |
| Unna | 1882 | Published on the effects of phenol, trichloroacetic acid and salicylic acid on the skin, and created a chemical compound composed of zinc oxide, resorcinol, ichthammol and petrolatum to treat dyschromia and actinic keratosis | Not specified |
| Krueger et al. 2013⁶³ | Fox | 1871 | 20% phenol to lighten skin | Brody et al. 2000⁵ |
| Hebra | Not mentioned | | | |
| Unna | 1882 | Described properties of phenol, resorcinol, salicylic acid and trichloroacetic acid | Brody et al. 2000⁵ |
| Nikalji et al. 2012⁵⁶ | Fox | Not mentioned | | |
| Hebra | 1874 | Treatment of melasma, Addison's disease and freckles | |
| Unna | 1882 | Described the actions of salicylic acid, resorcinol, trichloroacetic acid (TCA) and phenol on the skin | |
| Brody et al. 2000⁵ | Fox | 1871 | Described the limited use of 20% phenol to lighten the skin and for freckles | Not specified |
| Hebra | Mid 1800s | Treated freckles and melasma in the mid-1800s by using exfoliative agents in various combinations | Hebra and Kaposi 1874:22-3¹⁸ |
| Unna | 1882 | Described the properties of salicylic acid, resorcinol, phenol and trichloroacetic acid; Unna’s paste of zinc oxide, resorcinol, ichthammol and petrolatum applied for 3 days promoted ‘rejuvenation’ of skin that was wrinkled from irregular pigmentation and actinic keratosis | Letessier 1989:101⁷²⁶ |
| Brody 1992¹² | Fox | Not mentioned | | |
| Hebra | Not mentioned | | | |
| Unna | 1882 | Description of salicylic acid, resocin, phenol and trichloroacetic acid | Letessier 1989¹²⁶ |
| Unna | Early 1900s | Unna’s peeling paste (resorcinol, ichthammol, petrolatum and zinc oxide paste) | Eller 1941⁵⁷ |
| Letessier 1989²⁶ | Fox | Not mentioned | | |
| Hebra | Not mentioned | | | |
| Unna | 1882 | Descriptions of salicylic acid, resorcin, phenic acid (phenol), trichloroacetic acid and methoxyphenol as ‘lepismatiques’ | Unna 1908⁵³ (French translation of Unna 1899¹⁵) |

### Table 2: First mentions of chemical peeling agents in the works of Hebra, Fox and Unna

| Agent/author | Salicylic acid | Carbolic acid (phenol) | Glycolic acid | Trichloroacetic acid | Resorcinol |
|--------------|----------------|-----------------------|--------------|---------------------|-----------|
| Hebra        | /              | 1860:403, 406, 408, 497¹⁶ | /            | /                   | /         |
| Fox          | /              | 1869:165              | /            | /                   | /         |
| Unna         | 1882:128⁷⁸    | 1882:128⁷⁸            | 1899:823¹⁵   | 1899:787, 826, 857, 875, 878, 884, 889, 918, 939, 931, 934¹⁵ |

Rise of Chemical Peeling in Dermatology 1893

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unam. Alcohol, unc. sex.’, p. 403). Hebra states that his modified formula does not yet act like an ‘Aetzmittel’ but good results can be achieved in cases of Eczema squamosum or rubrum. Hebra also mentions croton oil as an agent for an experiment supporting his theory of eczema, but not as an excipient for phenol peeling (p. 335).

Paul Gerson Unna (1850–1929)
Unna gives the most comprehensive account on agents, applications and indications for chemical peelings in a chapter on therapy of dermatological diseases in the year 1899. The sources of this chapter are Unna’s own clinical findings and recent dermatological literature of his time like the textbook of Henry Granger Piffard (1842–1910) who was a pupil of Fox in London. Unna cites the name ‘Hebra’ seven times and the name ‘Fox’ not once, probably due to language barrier.

Unna used different terms for chemical peelings: ‘Schälmittel’ (scaling agents) or ‘Lepismatica’, ‘lepismatische Mittel’ or ‘abschälende Mittel’ (scaling agents), ‘Keratolytica’ or ‘hornzerstörende Mittel’, and ‘Aetzmittel’ (caustics) (pp. 814–26). Unna uses the term ‘Schälcur’ for chemical peeling. Unna defines etching the skin as ‘more or less deep and rapid mortification of a skin area, whereby it is indifferent which chemical process leads to a necrosis’ (p. 815). Caustics are carbolic acid, lactic acid, Liquor stibii chlorati and sublimate. Beside these, he recommends nitric acid (p. 817), trichloroacetic acid against warts, calluses, corns, condylomata, Lupus, and angiomas (p. 823), Hebra’s ‘Kaliilage’ (potash lye: potash, caustic lime, caustic soda, 33%) in case of Lupus, leprosy, ceratosis and dry skin catarrh (p. 824).

Keratolytica are alkalies (lye, soda lye, ammonia and green soap) and acetic acid especially in case of acne (p. 855). Lepismatica are introduced as a new principle of therapy. Unna recommends different plasters and mulls with salicylic acids (p. 856). Salicylic acid is compared to resorcinol and other phenols like carbolic acid and β-naphthol as its main competitors (p. 857). For Unna, resorcinol is the most important agent, because it is very versatile and widely used in his time (p. 857). Unna states that his ‘Zinkoxyd-Resorcin-Paste’ is yet too little appreciated, but has most striking effects (p. 884). It contains 50% resorcinol and 10% kieselguhr (p. 857). Unna prefers it compared to chemical peelings with other phenols because it is safe, satisfying and brings good curative as well as cosmetic results (p. 858). The chemical peeling application lasts one week with three-day resorcinol paste in a raising dose from 10% to 50%.

By self-reference in the chapter of Unna, the article ‘Eine besondere Eigenschaft der Salicylsäure’ (A special Property of Salicylic Acid) has been found in the first issue of the ‘Monatshefte für Praktische Dermatologie’ (Monthly Journal for Practical Dermatology, 1882). There, Unna reports the chemical peeling effect of salicylic acid. In the same issue of the journal, there is another short article by Unna about the Gutta-percha plasters. Connected with this article, there is an advertisement of 25 different plasters which contain e.g. phenol, salicylic acid and tar offered by Paul Carl Beiersdorf (1836–1896) (Unna 1882:33, Fig. 4).

Discussion
Chronology of the introduction of chemical peeling in dermatology
The history of the discovery of phenol in chemistry is important to its later use in medicine and dermatology in particular. The

Table 3 Mentions of carbolic acid or Acidum carboelicum in the four editions of Fox’s textbook Skin Diseases*

| Editions of ‘Skin diseases’ by Fox | Carbolic acid or Acidum carboelicum |
|----------------------------------|-----------------------------------|
| 1864: 1st London edition         | Not mentioned                     |
| 1869: 2nd London edition         | 12 times                          |
| 1871: 1st American edition identical with the 2nd London edition | 12 times |
| 1873: 3rd London edition         | 13 times                          |

Table 4 Mentions of carbolic acid (phenol) and its indications and purposes in Fox’s Skin Diseases (1869)

| Substance or formulation | Indication                                      | Purpose               | Page |
|--------------------------|-------------------------------------------------|-----------------------|------|
| Carbolic acid lotion      | Ecthyma cachecticum                             | Disinfectant          | 154  |
| Carbolic acid ointment    | As a stimulating and caustic application after recovered carbuncle | Chemical peeling     | 165  |
| Mixture with carbonic acid | Acute Pemphigus                                  | Disinfectant          | 191  |
| Carbolic acid             | Lupus                                           | Disinfectant          | 211  |
| Carbolic acid lotion      | Tinea kerion                                     | Disinfectant          | 336  |
| Strong carbolic acid lotion | Onychia parasitica                               | Disinfectant          | 358  |
| Carbolic acid             | ‘army itch’                                      | Disinfectant          | 420  |
| Carbolic acid             | Scabies                                          | Disinfectant          | 420  |
| Weak carbolic acid        | Equinia or Glands                                | Disinfectant          | 428  |
| Carbolic acid             | In soap                                          | Disinfectant          | 436  |
| Acidum carboelicum        | Part of formulary no. 167                        | Disinfectant          | 453  |
| Acidum carboelicum        | Part of formulary no. 173                        | Disinfectant          | 454  |
chemist Friedlieb Ferdinand Runge (1794–1867) first described the properties of ‘Karbolsäure’ (carbolic acid: phenol) in 1834. He already recognized a heavy effect on the skin: after application of phenol to the skin, there was a burning impression and a white spot emerged (Runge 1834:69), nowadays known as frostng and indicating the depth of the chemical peeling. After some minutes, the spot changed its colour to red. After some days, the skin died, became shiny and peeled off. After its discovery, it took 26 years until phenol was used in dermatology by Hebra in the year 1860.

In 1860, Hebra published a 638 pages strong dermatologic textbook as volume three of Rudolf Virchow’s (1821–1902) book...
series ‘Handbuch der speziellen Pathologie und Therapie’ (Handbook of special Pathology and Therapy). The collaboration with Moriz Kaposi (1837–1902) on this textbook is attested by letters between Hebra and his publisher Ferdinand Enke (1810–1869) since 1852. Kaposi, whose surname originally was Kohn, was Hebra’s son-in-law as he was married to his daughter Martha. There is a controversy about the reasons why Kaposi changed his surname to the name of his hometown Kaposvár. The first hypothesis is that he was worried about the possibility that his scientific work would mistakenly be credited to colleagues bearing the same surname. The second hypothesis is that Kaposi changed his surname due to his conversion from Judaism to Catholicism because he had concerns about his scientific promotion due to prevalent antisemitism.

Another reason is also possible: the marriage to Hebra’s daughter, who was Catholic. Anyway, Kaposi followed Hebra as director of the department of dermatology and venereology in Vienna in 1881.

In the German edition of Hebra’s textbook (1860), he already mentioned ‘Aetzmittel’ or ‘Cauterien’ (p. 30–2) and described the properties of concentrated mineral acids like carbolic acid (p. 403). Hebra mentioned a certain Lotio carbolica that was already in use in London. He stated that he himself also used it, but in a stronger mixture. Although it contains still a relatively low concentration of phenol, it can be considered a chemical peeling, because a low concentration of phenol penetrates the skin deeper than a high concentration. Since phenol in high concentration produces a rapid and complete keratin coagulation in the epidermis, a higher concentration does not effect in a deeper peeling. The resulting coagulant layer acts as a barrier to further penetration of the acid. Since phenol has an effect on the cardiovascular system due to resorption through the skin, it is not recommended in high concentration anymore. However, phenol is still used in chemical peeling together with croton oil but its concentration has been reduced, and the chemical peeling has to be performed slowly (1 face per hour) to avoid cardiovascular complications. By this, unwilling side-effects can be shortened: a deep peel with phenol does no longer effect a radical depigmentation while simultaneously e.g. most wrinkles and also skin tumours are removed.

It was not Hebra alone who published on the properties of several substances for chemical peelings as Brody et al. have stated. Instead, the publication of the medical textbook ‘On Diseases of the Skin’ (1874) was also edited by Moriz Kaposi (1857–1902). The substances of the Hebra-Kaposi textbook of 1874 – to which research ascribes the first mentions of iodine tinctures, croton oil, mustard seed, cantharides, sulphuric acid, acetic acid, nitric acid, hydrochloric acid, borax, alkalis and corrosive sublimate for disorders of increased pigment – can also be found in his textbook of 1860. Previous research only used the English translation (1874) of the German edition of 1860. We conclude that Hebra’s discussion of the properties of carbolic acid was published nine years before the publication of Fox’ textbook of 1869. Contrary to previous research, Hebra is the first who introduced carbolic acid to dermatology as a chemical peeling agent.

William Tilbury Fox was the first dermatologist at a teaching hospital in the UK, the St. Johns Hospital in London. Phenol is not mentioned in the first edition of Fox’ textbook (1864) but later in the second (1869). This is probably due to the series of articles published in The Lancet by Sir Joseph Lister on the disinfectant property of phenol in 1867. These articles popularized phenol as a disinfectant in wounds and amputations. We suggest that due to Lister’s article series, Fox was inspired to use phenol as a disinfectant. The fact that Fox knew the not intended peeling effect by repeated wound disinfection supports this suggestion.

Research states that Fox mentions a 20% phenol solution to lighten the skin in 1871. We were not able to verify that. Instead, we found that Fox recommended phenol as a chemical peeling agent for superficial application in only one case already in 1869, but not for the purpose that research states. Carbolic acid ointment as a stimulating and caustic application after recovered carbuncle is one out of twelve mentions of this substance both in Fox’ textbooks of 1869 and 1871. The ratio of the ingredients and indication is given only in one formula of phenol with glycerine (1:12) in case of Lupus (Fox 1869:134). We conclude that a new timeline of the rise of chemical peeling in European dermatology of the 19th century has to be drawn (Fig. 5).

**Advances in chemical peeling substances by Paul Gerson Unna**

Paul Gerson Unna was trained a dermatologist for 7 months during the year 1876 in Vienna by Ferdinand von Hebra, Heinrich Auspitz (1835–1886) and Moriz Kaposi. Later on, he was famous for his private institute and clinic, the so-called Derma tologicalum in Hamburg, his scientific output, and for his preparatory work concerning the Nivea® crème which is sold by Beiersdorf company since 1911 (Scholz 1999:56–8 and 198). He was the first dermatologist in Germany in private practice. After 1900, Unna worked mostly biochemically and tested the effects of substances on skin.

Unna was strongly influenced by the Viennese dermatological school of Hebra but he deserves his own place in the history of chemical peeling due to the advances he made in terms of the new substances. In 1882, Unna was the first who pointed to the therapeutic and peeling properties of salicylic acid. This is well-known to research, but we were not able to verify the occurrence of other substances like phenol, resorcinol and trichloroacetic acid by Unna already in 1882.

The ascription of these substances to Unna and the year 1882 was made for the first time by the French dermatologist Serge M. Letessier in his chapter on ‘Chemical Peel with Resorcin’ in the year 1989. As source, he used the French translation (1908) of Unna’s ‘Allgemeine Therapie der Hautkrankheiten’ (General
Therapy of Skin Diseases, 1899). There Unna introduced a new class of substances he called ‘Schälmittel (Lepismatica)’ (Unna 1899:856). The term ‘Lepismatica’ is derived from ancient Greek ἱερόν, lepisma which means something that is peeled off. According to Unna, these ‘Lepismatica’ are phenol, resorcin, β-naphthol and salicylic acid (p. 861). However, none of the references to these substances in the footnotes points to the year 1882 except that reference to salicylic acid (p. 856).

We conclude that Unna can only be held responsible for introducing salicylic acid as an agent for chemical peeling to dermatology in 1882. Beside this, Unna gives an eminent discussion of peeling properties of various substances which are already used in 19th-century dermatology for chemical peeling applications. This is the most comprehensive account on chemical peeling agents and applications in the 19th century. This account is unknown to previous research on the history of chemical peels, probably because it was written in German language, and Unna used a different terminology for chemical peeling applications and agents.

Around the year 1900 in the German-speaking scientific community, the ‘Schälcur’ was strongly associated with Unna. This ‘Schälcur’ lasted 3-4 days with applications twice a day and was thought to rebuild the skin for therapeutic purposes. Dermatologists also recommended ‘Unna’s paste’ (or ‘Pasta lepismatica’) with up to 50% resorcinol on a gutta-percha plaster (Bloch 1908:359).

Since Unna worked together with the pharmacist Paul Carl Beiersdorf on Gutta-percha plasters, the pharmacy of Beiersdorf sold several plasters that can be used for chemical peeling. Beiersdorf advertised 25 different plasters with e.g. phenol, salicylic acid and iodine directly after an article written by Unna about the Gutta-percha plasters in the first issue of ‘Monatshefte für Praktische Dermatologie’ in 1882. This is another evidence for the wide distribution of chemical peels already in the 19th-century German-speaking dermatology, their role in dermatology not mainly for aesthetic purposes, but for medical indications as well as the role of accessory advertising in the 19th century. Nowadays, plasters are used directly after chemical peeling procedures, e.g. with phenol to let the chemical peeling agent penetrate deeper into the skin and provoke a deeper exfoliative effect. Guttaplast® is a product that is still in use for warts nowadays and is produced by Beiersdorf company, Hamburg (Germany).

**Conclusion**

In 19th-century European dermatology, chemical peeling applications and agents were described earlier by German-speaking dermatologists than hitherto suspected. A new chronology for the emergence of chemical peeling can be drawn from the results of this article. Runge was the first who discovered the skin peeling property of phenol, at that time called ‘Carbolsäure’ or ‘Acidum carbolicum’, in 1834. Before Lister used a 5% phenol solution as a wound disinfectant in 1865, the Viennese dermatologist Hebra described phenol as a chemical peeling agent already in 1860. Hebra and his collaborator and son-in-law Kaposi worked on their dermatological textbook since 1852. They stated that a certain Lotio carbolica was already used in London at least since the 1850s. Hebra cited its formulation, improved it and used it in his own clinic in Vienna. Beside our discovery of the hitherto unknown Lotio carbolica, Hebra enumerates several caustic pastes of his father’s generation, the so-called protodermatologists like Plenck. These formularies have to be subject for further medico-historical research on chemical peeling in the 18th century.

The British dermatologist Fox used phenol since 1869. Contrary to Hebra, he recommended it in most cases only as a disinfectant and not as a chemical peeling agent. This might have happened due to the popularization of phenol by Lister’s article series in The Lancet as a wound disinfectant in 1867. Fox has not used 20% phenol to lighten the skin as previous research stated.
Unna was the first who described the chemical peeling property of salicylic acid in 1882. In the same year, Unna developed the Gutta-percha plasters with phenol and salicylic acid together with Beiersdorff. These plasters contained chemical peeling agents. At the end of the 19th century, Unna gave the most comprehensive account of chemical peeling in 1899. Unna called chemical peeling ‘Schälcü’ (scaling cure) and was famous for his peeling paste with up to 50% resorcinol in the German-speaking dermatology. Unna has not described the properties of resorcinol and trichloroacetic acid already in 1882 as previous research stated. This is due to a false citation of the French translation of Unna’s textbook of 1899.

To conclude, previous historical research on the rise of chemical peeling in 19th-century dermatology has not examined its very first mentions in the original sources of the authors Fox, Hebra and Unna. Instead, previous research has built upon later translations or secondary literature. A close look into original sources reveals that phenol was used at least 21 years earlier than hitherto known. The other chemical peeling agents salicylic acid, trichloroacetic acid, and resorcinol, that have been introduced in dermatology, have not described the properties of chemical peeling 'Schälcü' (scaling cure) and were famous for his peeling paste with up to 50% resorcinol in the German-speaking dermatology. Unna has not described the properties of resorcinol and trichloroacetic acid already in 1882 as previous research stated. This is due to a false citation of the French translation of Unna’s textbook of 1899.

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