ISSUE 18

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History of Pharmacy SIG

Pharmacy Chronicles: Past, Present, and Future

Welcome Message from the Chair, History of Pharmacy Special Interest Group

How do our academic years always go by so quickly? It seems like I just submitted my letter of introduction, and here we are, at the next transition point. It has been an incredible year for our SIG – much of the work happening behind the scenes – but so much has been done by an amazing leadership team I was delighted serve. Here are some highlights:

- Created updated 2024-2027 Strategic Priorities for the SIG that align to AACPs
- Developed 2 new awards that will launch next year
- Established a partnership with the University of Kentucky Center for Oral History to provide a webinar to our members as well as practicing pharmacists outside of academia
- Published 2 Peer-Reviewed Newsletters full of your amazing research and information
- Began discussions of creating a repository of mini-history of pharmacy lessons that faculty from across the association can access to help embed history throughout the curriculum

The idea of embedding mini-history lessons is one that never ceases to excite me. In our week-long P1 orientation last year, I did a pharmacy history fact of the day every morning, attempting to ground our newest students in the origins of their profession. This spring I had the privilege of taking a group of students to England to learn about pharmacy practice and education in the United Kingdom. As we met in our pre-departure course, we researched each of the site-seeing locations we were going to. In simple 5 minute timed challenges, my students worked in teams to see who could come up with the most interesting fact or legend about the location that related to the history of pharmacy. They discovered that the medieval monks of Bath Abbey were the ones who created the medicines for the community and hosted a leper colony. And on site at the Roman Baths they were able to sample "healing waters" of the mineral springs that drew Regency and Victorian era Englanders to Bath.

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INSIDE THIS ISSUE:

Meet the Editors

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THANK YOU!

The Editors would like to thank the volunteers who performed the peer reviews and editing for this issue.

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Message from the Editor

Welcome

We are pleased to present the 18th issue in our 11th year of publishing, of the History of Pharmacy SIG Newsletter *Pharmacy Chronicles: Past, Present, and Future*. Our spring/summer issue is the first for 2025, and we are looking forward to a fall/winter issue later this year, thanks to the interest of our readers and to the authors who labor to provide us with outstanding articles. We must give a big 'shout-out' to our peer reviewers who respond quickly and with constructive comments to the authors, resulting in a higher quality publication. We always welcome volunteers to be peer reviewers; we appreciate your efforts and the burden is light.

Of course, the peer-reviewers must have something to read, so we also gratefully acknowledge the authors who have taken the time to provide insightful and interesting stories to better illuminate our professional history. In that vein, we encourage our readers to enlist the aid of your students to add to our pages.

As many of our readers are teachers of pharmacy in so many disciplines, please take a moment as you organize your courses and lectures to incorporate some historical facts or context.

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I hope you find many bits of inspiration, perhaps some that could be turned into mini-lessons, in this edition of our newsletter.

With much appreciation for our wonderful editors and those who contributed to the content.

Your chair,

Jessica Mercerhill

Figure 1: Roman Baths with Bath Abbey in the background.

Editor Message…
Continued from pg 2.

We welcome a short, newsy piece of trivia or a full article for peer review (1500-2000 words). Pictures are always good! To volunteer, contribute as author or peer reviewer or just have a question or suggestion, please feel free to contact either Megan Undeberg or Bernie Olin. We are always happy to hear from you.

—Bernie Olin, PharmD.,
Auburn University,
Harrison College of Pharmacy

RECOGNIZE YOUR STUDENTS FOR THEIR ACTIVITIES RELATING TO THE HISTORY OF PHARMACY!

The American Institute of the History of Pharmacy offers certificates to students to recognize their achievements in the area of History of Pharmacy. Nominate deserving students at the link below. The certificates could be sent directly to the students or to the schools for presentation at an awards ceremony.

Link: #AIHP/ Student recognition certificate

Dispatch from the American Institute of the History of Pharmacy

We at the AIHP are excited to share that we have just published our latest issue of *History of Pharmacy and Pharmaceuticals [https://hopp.uwpress.org]*, focusing on pharmacopeias. This issue features many open-access articles, so if you aren't an AIHP member, you'll still be able to enjoy some of them. Recently, we had Dr. Stuart Anderson give a talk about US and British Pharmacopeias. This talk, along with all our public presentations, is available on our YouTube channel [https://www.youtube.com/@americaninstituteofthehist2275]. If you missed it live, you can view it at your convenience.

We are still working on our digitization project, and are adding new material to our digital collection [https://cdm17532.contentdm.oclc.org] as fast as we can process it. Recent additions include specimen bottles featuring some substances with very brilliant colors and pharmaceutical promotional materials collected by a hospital pharmacist. AIHP Executive Director Lucas Richert was recently interviewed by the University of Wisconsin-Madison School of Pharmacy for their newsletter [https://aihp.org/aihp-executive-director-talks-with-discoverx-about-digital-collection/].

In April, we continued our discussion of pharmacy fatigue and burnout by co-hosting Dr. Jason Perepelkin, who gave a talk on the subject. His talk, as well as Dr. Taylor Watterson's on pharmacy fatigue from our Kreminar last year, were both recorded and are available to the public on our YouTube channel [https://www.youtube.com/@americaninstituteofthehist2275]. Dr. Watterson provides a historical perspective on the topic, integrating it with her research on pharmacy fatigue, while Dr. Perepelkin conducted interviews with pharmacists to gather their firsthand experiences.

Finally, we have a new Assistant Director and Program Manager. Beth Fisher has been promoted from Curator to Assistant Director, and Kristen Huset has been promoted from Digitization Specialist to Program Manager. This change is designed to help us offer more programming opportunities and expand our offerings and organization. With these changes, we look forward to providing more content that our members and viewers have requested.

Lucas Richert, PhD

Professor & George Urdang Chair in Pharmacy History, UW-Madison

Executive Director, American Institute of the History of Pharmacy

Transdisciplinary Center for Research on Psychoactive Substances

Editor at Social History of Alc & Drugs / History of Pharmacy & Pharmaceuticals

Kristen Huset, BA, MLIS

Program Manager, American Institute of the History of Pharmacy

History of Tincture Merthiolate

By Ingrid Lund-Mikkelsen, Jolie Doan, and Jane E. Krause
Purdue University
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Background

Known for its vivid red, brown, and pink stains and unforgettable sting when applied topically, Tincture Merthiolate was once a cornerstone of home first-aid kits.[1] Starting in the 1930s, Tincture Merthiolate was commonly used as an over-the-counter antiseptic for minor cuts and scratches.[2] Tincture Merthiolate was the brand name formerly given to the topical preparation of thimerosal (1:1000 or 0.1%) in alcohol (**Figure 1**).[2,3] According to the United States Pharmacopeia (USP), a tincture is defined as an alcoholic or hydroalcoholic solution prepared from vegetable materials or chemical substances.[4] Germicides are defined as an agent that can kill microorganisms, while an antiseptic is a germicide that is applied to living tissues on the body, such as skin or mucous membranes.[5] Another category of germicides is a disinfectant, which is an agent used on non-living surfaces. Tincture Merthiolate was manufactured by Eli Lilly and Company in Indianapolis and was a great success, becoming a household name for many years.[6,7] A few drops of the tincture were applied topically to the affected area(s) using the applicator connected to the lid (**Figure 2**).

Figure 1: Tincture Merthiolate Label (1950s)[3]

Discovery of Thimerosal and Related Patents

Thimerosal (sodium ethylmercurithiosalicylate) was developed in 1927 by Moris Selig Kharasch, an organic chemist working at the University of Maryland and later at the University of Chicago.[7,8,9,10] It is an ethylmercury-containing compound which is approximately 50% mercury by weight (**Figure 3**).[6] In 1928, Kharasch patented the creation of thimerosal (patent dates 1928-1945), declaring that the drug and other chemically similar compounds were "well-suited for intravenous injection" and "effective therapeutically as germicides".[9] In 1931, Kharasch studied the ability of thimerosal to inhibit bacterial growth as compared to phenol.[10] Thimerosal was found to be 40 - 50 times more effective than phenol against *S. aureus*, *B. typhosus*, *B. coli*, tetanus bacillus, and other streptococci. Thimerosal was tested in serum, globulin, broth cultures, and agar plates. Toxicity tests were run via intravenous injection into 22 patients and no adverse events were reported. This research became the basis of evidence for thimerosal's continued use in humans as an antiseptic.[4,10] For this reason, thimerosal has also been used as a preservative in vaccines.[11] Of note, this research was conducted prior to the Food, Drug, and Cosmetic Act of 1938, which required drug manufacturers to prove the safety of new products before it could be marketed.[12] While safety data existed, it was limited compared to what would be seen for products brought to market today.

Figure 2: Tincture Merthiolate bottle and applicator (1980s)

In 1932, just four years after thimerosal was originally patented, Kharasch published a second patent (patent dates 1932–1949) where it was noted that thimerosal may not be ideal due to burning sensations produced by the product.[13] To help with this, stabilizing thimerosal with the addition

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Tincture Merthiolate

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of an antioxidant was suggested. This second patent highlighted monoethanolamine as the preferred antioxidant to help stop the burning sensation from occurring. In 1935, Kharasch filed a third related patent (patent dates 1935-1952), where the use of ethylenediamine as an antioxidant was found to be preferred over the previous monoethanolamine.[14] The second and third patents were necessary because of formulation changes. Ultimately, the burning sensation that users of Tincture Merthiolate recall is likely attributed to the alcohol and acetone included in the product.[3]

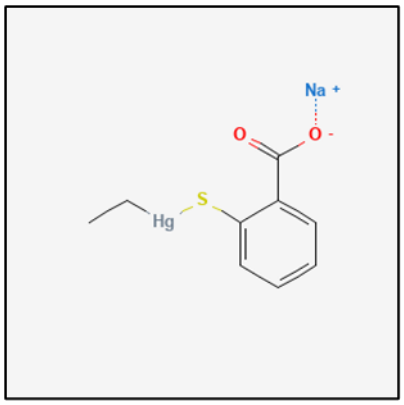

Figure 3: Structure of thimerosal.[6]

Mechanism of Action of Thimerosal

The mechanism of action of thimerosal is not fully known, but it likely enacts its antibacterial and antifungal activity by inhibition of sulfhydryl-containing active sites of certain enzymes and by binding to sulfhydryl compounds.[6] It also acts on calcium channels in the endoplasmic reticulum and may disrupt calcium-dependent cellular functions. When thimerosal metabolizes, the product created is ethylmercury.[15] This compound is different from methylmercury, which is a mercury product that can accumulate in the body and cause toxicity.[16] Ethylmercury is cleared from the blood faster, does not accumulate, and does not have the same toxicity properties as methylmercury.

Methylmercury Toxicity and Controversy with Thimerosal

The most dangerous form of mercury is methylmercury as 90% of methylmercury ingested is absorbed into the bloodstream from the gastrointestinal (GI) tract.[17] In 1961, researchers in Japan correlated elevated urinary mercury levels with the mysterious Minamata Disease. It was determined that during the 1950s, Minamata Disease was caused by the consumption of fish contaminated by methylmercury which was discharged by an industrial plant into Minamata Bay. With this event, the world started to notice concerns with mercury toxicity. Toxicity can result from mercury vapor inhalation, mercury ingestion, mercury injection, and absorption of mercury through the skin and most commonly affects the neurologic, gastrointestinal (GI), and renal organ systems.

Due to increasing concerns about mercury poisoning, many manufacturers in the United States, including Eli Lilly and Company, began to phase out the use of thimerosal in over-the-counter products throughout the 1980s and 1990s.[18] In 1997, the Food and Drug Administration (FDA) Modernization Act was introduced and required the FDA to compile information on the status of mercury in drugs and food. In comparison to other mercury products, thimerosal was safer due to its metabolism to ethylmercury as opposed to methylmercury. However, since it is a salt form of mercury, it was heavily scrutinized.

In the late 1990s – early 2000s, there was some concern that the use of thimerosal in vaccines was linked to autism in children.[15] This theory has been disproven as extensive studies have been published finding no concerns. Still, the FDA phased out the use of thimerosal in all routinely recommended childhood vaccines to decrease mercury exposure in children. Thimerosal is still used in some multi-dose presentations of flu vaccines, with rationale for its continued use based on cost and proven safety of the product as a preservative.[11] However, this is not commonly seen as the popularity of single-use vaccine dosage forms increases.

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Clinical Pearl: Teaching the History of Pharmacy

The "Tools of the Apothecary" Presentation Slides

By David M Baker

Western New England University
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Upon learning of the passing of long-time American Institute of the History of Pharmacy (AIHP) member George Griffenhagen in 2019, I became interested in his many publications regarding pharmacy history. A set that was of particular interest to me was a series of ten articles entitled "Tools of the Apothecary" that were published in 1956-57 in the *Journal of the American Pharmaceutical Association.* Upon finding the articles in JAPhA archives, I determined they could become the basis for short presentations on each of the former apothecary tools discussed, which could become nice short presentations at the Alpha Chapter meetings of the American Institute of the History of Pharmacy Student Association (AIHPSA) at Western New England University.

Hence, in early 2020, I began to create PowerPoint presentations based on each article in the ten-article series to be used by AIHPSA members at Chapter meetings. I created the presentations for the first five articles, and before "everything came crashing down" (i.e., the COVID-19 pandemic), the Chapter had the opportunity to enjoy two of the presentations, one by me and the second by a student-member. The two successful presentations demonstrated to me that there was a place for these presentations, and that it was a unique way to introduce and interest students in the history of pharmacy.

Accordingly, as the Chair of the Teaching Pharmacy History Committee of the AACP History of Pharmacy SIG, I polled the members of the Committee as to their interest in a project involving the development of PowerPoint presentations for all of the ten "Tools of the Apothecary" articles. The interest was overwhelming and over the last three years, our ever-evolving committee has worked together as a group creating, refining, and reviewing our ten "Tools of the Apothecary" PowerPoint presentation programs. Each presentation was based on the original article written by George Griffenhagen, but then was expanded with new information and/or more pictures of the apothecary tools described. The presentations were designed to take about 15 to 30 minutes to present, and start with an opening question to generate both interest and discussion in the topic.

This announcement is to inform all of you that these PowerPoint presentation programs are now available to all members of the AACP History of Pharmacy SIG in the SIG library in the "Teaching History of Pharmacy Assists" folder in the subfolder entitled, "Tools of the Apothecary" Presentations. Feel free to download, review, and use these new presentations any way that might assist you in teaching or presenting another wonderful aspect of pharmacy history: the tools of the apothecary.

A consistent observation made over two decades of teaching hospital pharmacy practice, is that most learners have an innate interest in history, the curiosity about what happened before. For a modern example, reflect on teaching and learning styles pre-pandemic (in person), during (virtual), and after (endemic hybrid). Bridging this to pharmacy, how can preceptors (new or seasoned) take the extra effort to arouse that inquisitive nature in students, to pique interest in learning more about a medication's historical development? How can the preceptor bridge the history of a drug's development to the modern pharmacist?

~David M. Baker, BSPharm, MBA, JD

Chair, Teaching Pharmacy History Committee of the AACP History of Pharmacy SIG

Professor of Pharmacy Administration & Director of Graduate Studies
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Pharmacy Through the Hollywood Lens, Part VIII: "Thinner"

By David M. Baker

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Key words:
Pharmacy, Pharmacist, Drugstore, History, Movies, Horror, Fantasy

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Unfortunately, the eighth in our leading-role pharmacist character movie articles from a 1990s movie, the 1996 film, *Thinner*, does not have a leading role pharmacist character. Despite years of searching for a film in the 1990s with a leading role pharmacist character, none was found (out of 20 movies found in the 1990s with a pharmacist or pharmacy depiction). So, *Thinner* was selected as it does depict a pharmacist character, albeit in a minor supporting role, and interestingly enough, the actor depicting the pharmacist was none other than the author of the novel upon which the movie was based, Stephen King.[1,3]

Release date: October 25, 1996
Playing time: 93 minutes
Availability: Available in DVD and Blu-ray formats; and on various online streaming services.
Production Company: Spelling Films
Distributed by: Paramount Pictures (United States) and Spelling Films International (International)
Rated: R
Director: Tom Holland
Producers: Mitchell Galin (producer), Andrew Golov (executive producer), Randy Jurgensen (associate producer), Stephen F. Kesten (executive producer), A. Welch Lambeth (associate producer), Richard P. Rubinstein (producer)
Writers: Stephen King (novel), Michael McDowell and Tom Holland (screenplay)

Cast:
Robert John Burke – Billy Halleck
Lucinda Jenney – Heidi Halleck
Bethany Joy Lenz (as Joy Lenz) – Linda Halleck
Time Winters – Prosecutor
Howard Erskine – Judge Phillips
Joe Mantegna – Richie Ginelli (Mob boss)
Terrence Garmey – Bailiff
Randy Jurgensen – Court Clerk
Jeffrey Ware (as Jeff Ware) – Max Duggenfield
Antonette Schwartzberg – Mama Ginelli
Terence Kava (as Terrence Kava) – Gabe Lempke
Kari Wuhrer – Gina Lempke
Adriana Delphine – Romani Woman
Ruth Miller – Billy's Secretary
Walter Bobbie – Kirk Penschley
John Horton – Judge Cary Rossington
Daniel von Bargen – Chief Duncan Hopley
Michael Constantine – Tadzu Lempke
Irma St. Paule – Suzanne Lempke
Stephen King – Pharmacist (Jonathan Bangor)
Sam Freed – Dr. Mike Houston
Elizabeth Franz – Leda Rossington
Patrick Farrelly – Henry Halliwell
Bridget Marks – Ginelli Bar Girl
Mitchell Greenberg – Male Clinic Doctor
Angela Pietropinto – Female Clinic Doctor
Michael Kevin Walker – Clinic Waiter (as Michael Walker)
Ed Wheeler – Detective Deevers
Peter Maloney – Biff Quigley

~Continued on page 9

Jonathan Bangor (Stephen King) in his pharmacy counseling Tadzu Lempke (Michael Constantine) about the sore on his nose. Tadzu's daughter, Suzanne Lempke (Irma St. Paule), is watching. His great-granddaughter, Gina Lempke (Kari Wuhrer), and great-grandson, Gabe Lempke (Terence Kava), are in the background.[2]

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Robert Fitch – Flash Enders (as Robert Fitch Sr.)
Sean Hewitt – 'Dr' Fander
Josh Holland – Frank Spurton
Allelon Ruggiero – Delivery Boy
Kenneth Londoner – Andrew Richards[3]

Movie Summary:

Thinner is classified as both a fantasy and a horror film, which also makes it unique amongst the films that have been previously reviewed for this series.[3] The premise of the movie is that an obese lawyer, Billy Halleck, angers a Romani clan (note: in the novel and the movie, the term "Gypsy" is used throughout – I have substituted this with the current designation: "Romani"), resulting in him being cursed by the leader of the Romani clan, Tadzu Lempke. How does a community pharmacy fit into this dilemma? It is on the street outside the pharmacy where the obese lawyer kills the daughter of the Romani clan leader with his car, for which he suffers no legal consequences due to his "friends" (the judge and the prosecutor) at the resultant coroner's inquest.[1]

The tragic accident scenario begins (at about 12 minutes, 45 seconds into the movie) with the Romani clan leader, Tadzu Lempke, going into a local pharmacy with his immediate family (daughter, great-granddaughter, and great-grandson), to get a prescription filled with which to treat the open sore on his nose. After giving his prescription to the pharmacist, Jonathan Bangor, and the pharmacist going into his back room to fill it, his elderly daughter, Suzanne Lempke, says, "Papa, it is cold, I go get my coat." As the pharmacist is filling the prescription, he looks up into a reflection mirror to see the old woman, Suzanne, leaving the pharmacy, as well as the other two younger Romanis perusing through store merchandise. As Suzanne crosses the street in front of the pharmacy, Billy hits her with his car as his wife is distracting him with sexual favors while he is driving. Unfortunately, Suzanne does not survive the crash, immediately dying in the street.[1]

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Current Status of Tincture Merthiolate

A variety of drug manufacturers (e.g., DLC Laboratories, Inc. of Paramount, California) currently use the brand name, Tincture Merthiolate, for a topical preparation of 0.13% benzalkonium chloride in alcohol (**Figure 4**).[19]

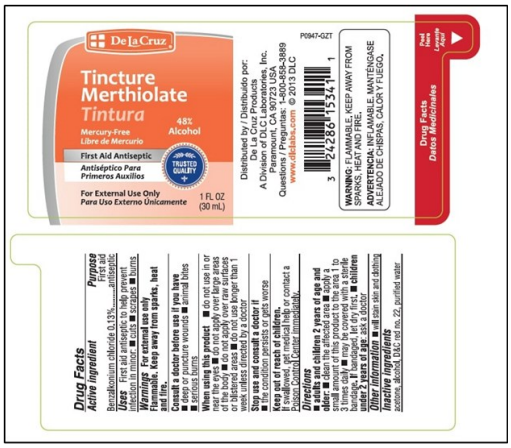

Figure 4: Current Tincture Merthiolate Label[19]

Since the original thimerosal patents mentioned earlier have expired, the brand name, Tincture Merthiolate, is able to be used today. Benzalkonium chloride is a quaternary ammonium salt which is used as an antiseptic and disinfectant.[20] This compound was discovered in 1935 and has been used for various purposes since, although it likely did not take on the Tincture Merthiolate name until the discontinuation of thimerosal by Eli Lilly and Company.[21] This "new" Tincture Merthiolate maintains the original indication, for use as an antiseptic to prevent infection in minor cuts and scrapes.[19] Some packaging is reminiscent of the original product, although most labels now contain a short phrase indicating that it is "mercury free". The new formulation also includes red dye, likely to mimic the coloring of the original product.

Conclusion

With its fiery sting and unmistakable stains, Tincture Merthiolate left a lasting impression on generations as a go-to antiseptic. Its formulation underwent scrutiny and adaptation as the world's understanding of mercury poisoning expanded. Even though the original thimerosal-based antiseptic has been replaced with a mercury-free alternative, the name Tincture Merthiolate continues, symbolizing medical advancements and changing public health priorities.

—Ingrid Lund-Mikkelsen, Purdue University College of Pharmacy, PharmD Candidate Class of 2025, Jolie Doan, Purdue University College of Pharmacy, PharmD Candidate Class of 2025, and Jane E. Krause, Clinical Associate Professor of Pharmacy Practice, Purdue University College of Pharmacy

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"Thinner" . . .

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Subsequently, a coroner's inquest is held to determine Billy's culpability for the pedestrian's death and whether criminal charges need to be filed. At the inquest, pharmacist Bangor first states he saw the woman running because "they" (the younger Romanis) were stealing from his store, but then says he can't be sure since he was in the back room. Next, the town police chief states that Billy was driving the speed limit, based on witnesses and an analysis of his skid marks. In addition, the chief states that Billy was not inebriated, based on a breathalyzer test, which was actually not done. Accordingly, the judge finds that the death was accidental and no criminal charges will be levied against Billy. Upon leaving the courthouse, Billy is stopped at his car by the Romani clan leader, Tadzu, who brushes his thumb against Billy's cheek and says one word, "Thinner."[1]

After this point in the movie, neither pharmacist Bangor nor the pharmacy is seen again. The curses placed by Tadzu on Billy, the judge, and the police chief continue to progress with dire consequences. As for Billy, the former obese lawyer is now losing vast amounts of weight, despite eating up to twelve thousand calories a day. Billy seeks advice and help from his former client, the mob boss, whose mother tells him that only the one who cursed him can remove the curse. Even a medical clinic that treats eating disorders, at which Billy is an inpatient, is unable to slow the progress of his emaciation. So, Billy visits the others who were cursed. Unfortunately, their health continues to worsen, with the curses progressing, becoming more gruesome, and eventually resulting in the death of the police chief.[1]

Through the rest of the story, Billy takes many actions to try to get the curse removed. He hires a detective to track down the Romani chief, Tadzu. He confronts Tadzu and his clan multiple times, cursing the Romanis all with the "white man's curse from town." The confrontations do not end well, as the judge dies in a vehicle crash and Billy gets shot by Tadzu's great-granddaughter in his hand.

The mob boss then comes to Billy's assistance, as he had promised after Billy had gotten him cleared in his criminal trial. Of course, the mob boss uses increasingly violent tactics against the Romanis to convince Tadzu to remove the curse from Billy. Eventually, Tadzu provides Billy with a method to remove the curse, but only by Billy passing the curse on to another person or persons. For those of you who enjoy horror movies, I will not disclose what happens – I will let you watch it and learn for yourself!

Pharmacy Depiction

In the brief pharmacy scene, *Thinner* portrays what appears to be a rural, small-town, independent community pharmacy of the 1990s, owned and operated by a local pharmacist, Jonathan Bangor. Despite *Thinner* allegedly taking place in the 1990s, in some ways the pharmacy depicted more closely resembles those in existence from the 1930s to the 1950s. The store is rectangular in shape with large front glass windows to display flyers, advertisements, and the goods sold inside. Most of the store consists of rows of glass display cases with product inside the closed glass doors and stacked on top of the cases. The long wall behind the pharmacist, who is standing behind one of the glass display case rows, consists of high wooden shelves containing lots of over-the-counter products. Unfortunately, none of the products in the glass cases or on the high shelves are accessible to the public, and accordingly, would require pharmacy staff to procure. In other words, the pharmacy is not set up for self-service, which was common by the 1990s.[4]

~Continued on page 14

Pharmacist Bangor notices movement in drug store (Romani woman leaving store and younger Romanis perusing through store merchandise).[2]

Tincture merthiolate

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The Hadacol Caravan: A Medicine Show Like No Other

By Wesley Sparkmon, PhD, MPH

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Dudley J. LeBlanc was not a doctor, nor a pharmacist, nor a scientist, nor health researcher. LeBlanc was a state senator, a representative of Cajun culture in his native Louisiana, and, most notably, an astute salesman.[1] Being well-educated, well-connected, and bilingual made Dudley LeBlanc an important ally and a successful businessman. Much of LeBlanc's success in life was predicated on being what some might consider fast and loose regarding his principles.[2] A political rival in Louisiana once said of the man known as "Coozan Dud", "You can't buy LeBlanc. You can only rent him."[2] Dudley LeBlanc's morals could be considered questionable, but he was able to grow his success by selling anything and everything he could.[2] LeBlanc supported himself by selling shoes, tobacco, funeral insurance, and patent medicines.[3] Patent medicines became a particular interest to LeBlanc, who worked as a French-speaking salesman for the Chattanooga Medicine Company.[4] LeBlanc proved to be such a success selling *Wine of Cardui* across south Louisiana, that in 1920, he received a commission check for over $14,000.[4] This experience, particularly the financial windfall from his initial sales success, led him to found the Happy Days Company in the late 1930s.

LeBlanc's Patent Medicine Venture

The Happy Days Company began producing Happy Days Headache Powder and Dixie Dew Cough Syrup. LeBlanc especially focused on selling Happy Days Headache Powder given how common headaches were among the population.[3] Two problems quickly popped up for the Happy Days Company. First, LeBlanc had moved into a tremendously crowded market for headache remedies, limiting his potential earnings. The more pressing matter was the Food and Drug Administration (FDA), which had recently received more regulatory authority following the Sulfanilamide tragedy, investigating the safety of the products produced by Happy Days for fraudulent intent in misbranding the medication.[5] The FDA seized samples of Happy Days Headache Powder from retailers after a libel lawsuit was filed in Virginia for misbranding, and the FDA's analysis showed the powder contained acetanilide, aspirin, caffeine, phenolphthalein, and milk sugar.[5] Acetanilide, an acetaminophen precursor, was found to be highly toxic by the FDA and was banned due to acetanilide overdose resulting in anemic anoxia due to the formation of methemoglobin, and anemia by the destruction of red cells.[6] Dixie Dew was less common than Happy Days Headache Powder, but its ingredients were similarly dangerous. The syrup contained alcohol, chloroform, peppermint oil, distilled pine oil, eucalyptus oil, menthol syrup, and the Mamou plant from south Louisiana.[7] LeBlanc was compelled by the FDA in 1941 to halt the production of both of his major products due to misbranding, false labeling, and dangerous substances revealed upon analysis.[5] Out of this, however, would come LeBlanc's true claim to fame in the patent medicine field.

According to LeBlanc's story, a New Orleans doctor was treating LeBlanc for a foot injury and gave him an injection of a B-vitamin elixir that cured the constant pain. LeBlanc would tell potential customers he had stolen a vial to attempt to replicate the elixir through reading and researching in medical textbooks.[3] This backstory would end with a concoction being made in his

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"Thinner"…

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As for the prescription area of the pharmacy, it also resembled more a 1930s versus a 1990s community pharmacy. For example, the prescription-filling area was behind the wall where the pharmacist had received the prescription from the Romani chief, and not visible from the store. In fact, for the pharmacist to observe the store while prescription-filling, he had to look in a rounded, rear-view mirror.[1] Clearly, the back-room prescription area had originally been the compounding area when compounding was common. However, by the 1990s less than 1% of prescriptions were compounded and prescription areas had been built or remodeled so that the entire area was in view of the public.[6]

In contrast, some items found on the pharmacist himself were authentic for the 1990s. First, Mr. Bangor wore a long-sleeved white lab coat over a dress shirt and tie, very typical of pharmacists in the 1990s.[1]

As pharmaceutical care became more prevalent in community practice in the late 1980s and early 1990s, neckties with white coats were commonly worn.[4] Second, Mr. Bangor wore a formal manufactured nametag bearing a Caduceus symbol (a common U.S. medical symbol depicting a winged staff entwined by two snakes – a Bowl of Hygeia symbol would have been more representative of pharmacy), his complete name, and "Pharmacist" under his name.[1] Such formal nametags became common in the 1980s, although they were probably more commonly worn by chain-store pharmacists.

Interestingly enough, the independent community pharmacy in which the movie was filmed was a real drug store, Boynton-McKay Drug Co., located in Camden, Maine.[7,8] The pharmacy had opened in 1893, and was still in business as a pharmacy when the movie was filmed, but would close shortly afterward – in 1997.[7,8]

Final Analysis

In summary, *Thinner* provides an accurate representation of an old-style independent drug store, built and designed in the early 1900s, but still in operation in the 1990s. Little had changed since its original construction and design, and like many such independent community pharmacies, it went out of existence in the 1990s due to its inability to compete with more modern-designed chain stores. As for the pharmacist, he was attired as a medical professional, who showed concern for a new customer with whom he was not familiar. However, he also demonstrated classic smalltown favoritism for locals over outsiders in his courtroom testimony. All in all, a well-written horror movie to watch with a unique cameo appearance of the story's author as a 1990s-era independent community pharmacy pharmacist-owner.

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Footnotes:

1. *Thinner*. Performed by Robert John Burke, Joe Mantegna, Lucinda Jenney, Bethany Joy Lenz, Time Winters, Howard Erskine, Terrence Garmey, Randy Jurgensen, Jeffrey Ware, Antonette Schwartzberg, Terence Kava, Kari Wuhrer, Adriana Delphine, Ruth Miller, Walter Bobbie, John Horton, Daniel von Bargen, and Michael Constantine. Directed by Tom Holland. Production Company - Spelling Films, 1996. Film.

2. *Thinner*. Performed by Robert John Burke, Joe Mantegna, Lucinda Jenney, Bethany Joy Lenz, Time Winters, Howard Erskine, Terrence Garmey, Randy Jurgensen, Jeffrey Ware, Antonette Schwartzberg, Terence Kava, Kari Wuhrer, Adriana Delphine, Ruth Miller, Walter Bobbie, John Horton, Daniel von Bargen, and Michael Constantine. Directed by Tom Holland. Production Company - Spelling Films, 1996. Film. Screenshot from IMDb Thinner Photos. Accessed March 2, 2025. Available from: https://www.imdb.com/title/tt0117894/mediaindex/?ref_=tt_mv_sm.

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Editorial:

LIVING History

By Cynthia J. Boyle, PharmD, FAPhA, FNAP, FASCP

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Professor Emeritus/Practice, Sciences, and Health Outcomes Research

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In some respects, pharmacy educators view generations in pharmacy by the accreditation standards enacted during their academic careers. We can trace themes and focus areas to timely issues in the profession of pharmacy and healthcare at large. Often a new vocabulary arises- provider-ready, co-curriculum, APPE, etc. The Accreditation Council for Pharmacy Education (ACPE) approved Standards 2025 in June 2024 with an effective date of July 1, 2025.[1] We will map competencies and deploy assessments to document compliance, but how will we embrace new opportunities to improve and engage?

As members and friends of the AACP History of Pharmacy SIG met several times at the 2024 Annual Meeting, we found that our members are teachers of the history of pharmacy and more. We had polled the deans to identify the primary contact for teaching the history of pharmacy at each school/college. We have names for about half the institutions, so we have more to do. But in addition to teachers, we have members with various graduate degrees in history and related fields in social and pharmaceutical sciences; we have members serving on museum, association, and foundation boards; and we have many others who are self-professed 'hobbyists.' Together we learned innovative ways to embed the history of pharmacy in courses and activities to invest in students' professional identity formation and appreciation for professional progress.

In Appendix 1 of Standards 2025, the history of pharmacy is listed as a required element. It is described as the "exploration of the evolution of pharmacy as a distinct profession, the transition from a focus on the drug to a focus on the patient and the therapy (including pharmacist provided patient care), and major milestones and contributors in the evolution of pharmacy."[1] How will schools and colleges include history along with the many other topics in Appendix 1? It may be helpful to review the variety of strategies for Standards 2016, as described by Baker et al.[2] Will we make this a chore, relegated to the most junior overloaded faculty member, or maybe the one who has been there the longest? Or will we demonstrate initiative to show pride in our pharmacy profession, to recognize and honor notable people and milestones, and to promote civic engagement and leadership for future professionals?

I suggest we encourage LIVING History. History is meaningful when it includes more than collectibles and artifacts which we have in abundance on shelves at schools/colleges and at home. LIVING History is activities, or even attire and documents,[3] which bring people and their unique roles in society to life. NPR's StoryCorps,[4] which advances a mission "to help us believe in each other by illuminating the humanity and possibility in us all — one story at a time," offers online tools to get started. Faculty have created student projects in which experienced alumni are interviewed to gain insights about societal issues from segregation to the growth of women's professional roles. Through digitization of these interviews and other projects, connections can be strengthened, and the knowledge of both objective and subjective history can be advanced.

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LIVING History . . .

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While every pharmacist should know about the first pharmacopoeia and the first U.S. school of pharmacy, LIVING History is a more contemporary opportunity to understand the profession of pharmacy in context with societal, legislative, and regulatory parameters. For example, Dr. Deanna Tran, a faculty member and past president of the Maryland Pharmacists Association (MPhA), organized a spring gathering of MPhA women past presidents; June 2024 was the first time three women in a row would be president. For an organization founded in 1841, MPhA has elected only 15 female presidents. The first was in 1985, and all are living. All responded to a survey prior to the event, and I was amazed at the significant challenges and the outstanding leadership described over the four decades of their terms of office.[5,6] This history is accessible because it is living, and we can now access living legends in person and through videoconferencing to answer where have we been, who are we, and where are we going.

Action Plan and Commitment

What are actions we can take now to better engage our schools/colleges in the history of pharmacy? Commit to at least one.

1. Log into AACP Connect and look at current History of Pharmacy SIG members. Invite at least two people at your institution or sphere of influence to join. Consider your dean, chair, and student advisors.
2. Work with your Curriculum Committee to affirm how, by whom, and by when the required teaching of the History of Pharmacy will be accomplished for Standards 2025. How will you exceed the standards?
3. Access current or previous SIG newsletters for ideas to improve teaching or engage students.
4. Access the American Institute of the History of Pharmacy https://aihp.org/ and consider individual or organizational membership to support historical research in pharmacy and pharmaceuticals, digitization, programming, student recognition, and more.
5. Post ideas and questions in the AACP Connect discussion board as you consider ways to leverage the unique identity of your institution, even if a newer school, with pride in the profession for distinctive occasions and events.

Summary

Your favorite inspirational quote website may generate historical words to live by.

- Those who do not remember the past are condemned to repeat it (Santayana).
- We are not makers of history. We are made by history (M.L. King, Jr).
- History will be kind to me for I intend to write it (Churchill).
- History, despite its wrenching pain, cannot be unlived, but if faced with courage, need not be lived again (Angelou).
- I like the dreams of the future better than the history of the past (T. Jefferson).
- History never looks like history when you are living through it (J.W. Gardner).
- A generation which ignores history has no past and no future (R. Heinlein).

Find your favorite and encourage your students to do the same. LIVING history is our history for the future.

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Long Expired Drugs: Harmful, Inactive, Or Safe To Use?

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Occasionally, antique stores, estate sales, flea markets, and other similar locations sell old medication bottles, which are considered collector's items by some people. However, these bottles are not always clean and empty but contain traces of the dosage form they originally stored. In some online forums, there is discussion about how to reduce harm among those who would consider taking these old, long-expired medications, which we will be defining as "drug products manufactured more that 10 years prior." Many of the drugs talked about on these forums were drugs of abuse such as barbiturates, typical antipsychotics, amphetamines, or other narcotics such as opioids and cocaine. The question then arises: "What, if anything, could reasonably occur if a person decides to ingest these medications?"

The safest recommendation to make to people considering taking these medications is that the medications, being long past expiry and not prescribed to them, should be safely disposed of following guidance from the US Food and Drug Administration (FDA). The FDA and Drug Enforcement Administration (DEA) recommend mixing expired medications with an unpalatable substance such as dirt, kitty litter, or used coffee grounds, sealing the mixture in a plastic bag, and disposing of the bag in normal household trash.[1] Some locations offer drug take-back days, which are typically sponsored by the DEA, who will safely dispose of them. The FDA advises that once a medication is past its expiration date, there is no guarantee of safety or efficacy, and that the CDC estimates that 36,564 emergency department (ED) visits resulted from children under the age of 5 gaining unsupervised access to medications.[2] It is important to note that the majority of these very old drugs will not have labeled expiration dates, as the FDA did not require expiration dates as part of prescription labeling until 1979, but are long past any date that would be appropriate following FDA guidance for the establishment of expiration dates.

Proper storage, i.e. protection from light, oxygen, temperature fluctuations, and water or humidity, is essential to extending the effective and safe shelf life of medications, as storage in high heat/humidity and exposure to light can accelerate degradation of some drug formulations.[3] Additionally, certain dosage forms such as solutions and suspensions are less suited to maintaining stability over long periods of time, and have the risk of being colonized by bacteria. Representatives from the FDA and United States Pharmacopeia (USP) suggest that one should not take an out-of-date medication unless they have no choice.[4]

The literature is sparse for drugs examined past their labeled expiration date, especially of the types that are addressed in this manuscript. Multiple searches were performed on PubMed, JSTOR, and Embase using the following search strategies:

1). An initial search was performed using terms such as "(expired drugs OR expired pharmaceuticals OR past expiry OR out of date OR expired) AND (stability OR activity) NOT (breathing OR respire)." The breathing/respiring term was added after several results conflated expiration with breathing.

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Expired Drugs. . .

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2). While the initial search provided some promising results, additional resources were needed to address each class of medications listed in the question. This was achieved with search terms such as "(long term storage OR long term stability) AND (stability OR activity) AND (first-generation antipsychotic OR typical antipsychotic) NOT (in blood) NOT (efficacy)," with the term for the class of drug being changed for each class and 1-2 synonyms. The "in blood" term had to be added for opioids, barbiturates, and amphetamines, as the search term included many results regarding blood tests for the presence of these substances.

In 2019, the *Journal of Pharmaceutical and Biomedical Analysis* (JPBA) published a systematic review investigating the stability of drug substances beyond their labeled expiry dates.[5] This review examined 51 studies on drugs typically 1-5 years old but included research on drugs up to 83 years old (mfg. approx. 1935). This article detailed the common pathways of degradation including hydrolysis, oxidation, photolysis, polymerization, and isomerization. Most of the drugs examined, especially the ones from the last published report from the FDA's Shelf-Life Extension Program (SLEP) in 2006 were intended for parenteral use or were unprepared drug substances. Particularly relevant information includes: 2 brands of **amphetamine**-containing solid dosage forms between 28-40 years of age (unspecified) in their original containers had 44-54% active pharmaceutical ingredient (API) remaining, a **hydrocodone**-containing tablet in that study was measured to have 104% of the labeled amount, **cocaine** solution for injection dating from 1939 had 26.9% API, a **heroin** injection solution from 1934 had degraded to 0% heroin, 96.1% morphine and 3.9% codeine, and the prepared drug products more than 20 years old had an average API% of 82.4%, indicating that old drugs will often still have significant activity, even as aqueous solutions for injections or as solid dosage forms. [5,6]

No studies were found that specifically examined prepared **typical antipsychotics**. However, a 2019 article *in Drug Testing and Analysis* by the same group who performed the systematic review above tested 50 drug substances that had not been prepared for use but were stored in normal room temperature with varying light protection since manufacture.[7] No mention was made regarding the status of the containers the drugs were stored in. A chlorprothixene sample from 1985 was found to have an API content of 99.8±0.1%, with 0.15% impurities. Similarly, a perphenazine sample with an unspecified date of manufacture from before 1999 was found to have an API content of 100.4±0.3%. These results indicate that when stored at room temperature, out-of-date typical antipsychotics will retain potency for many years, but this may differ significantly in practice, as they are prone to oxidation, especially when exposed to light, and may vary in activity when prepared and stored improperly.[8]

1898 Bayer Heroin Bottle – image from https://museum.dea.gov/museum-collection/collection-spotlight/artifact/heroin-bottle

Morphine degrades to pseudomorphine and morphine-N-oxide under ambient conditions when in the presence of oxygen, with the rate of degradation increasing as exposure to light and the pH of the solution increases.[9] Pseudomorphine is not known to have any effect when taken orally or subcutaneously, but induces vasodilation in animal models, and has conflicting results about its penetration across the blood-brain barrier. Morphine-N-oxide was shown to have a weak analgesic effect in mice, and 3-8x weaker toxicity than morphine. A 1999 systematic review in the *International Journal of Pharmaceutics* titled "Stability and compatibility of morphine" included some analyses of drugs manufactured in the time period of interest.[10] These preparations ranged from 6 years to 43 years, with the newer solutions being in glass containers and the 2 oldest being a 43-year-old glass ampule (49% morphine, 6% pseudomorphine) and a 37-year-old glass syringe (105% labeled morphine content). The 5 glass

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backyard mixed with a boat oar. In reality, LeBlanc believed that if one vitamin was good, more vitamins must be better. Labeling requirements meant that his elixir had a tremendous amount of active ingredients listed on the front of the bottle. The ingredients listed included "Thiamin Hydrochloride, Riboflavin, Niacinamide, Pyridoxine, Pantothenic Acid, Iron, Manganese, Calcium, [and] Phosphorus".[3] All of these ingredients were delivered in an alcoholic elixir though the alcohol was "strictly a preservative".[3] Being 12-14% alcohol meant that the elixir had the same alcohol content as a bottle of wine, but it was far more readily available across the southern United States where counties and even entire states were still dry after prohibition.[8] Given his previous dealings with the FDA, LeBlanc marketed his new elixir as a dietary supplement instead of a medicine.[3] With product in hand, LeBlanc set out to do what he did best, sell.

A Medicine Marketing Behemoth

LeBlanc named his new elixir Hadacol, drawing from the name HAppy DAy COmpany, with an extra L thrown on the end for its proprietor's last name.[9] Even the naming of the medicine would be spun by the folksy Leblanc, who quipped in his thick Cajun accent "Well, I hadda call it something, didn't I?" [9] LeBlanc would advertise his product using paid testimonials that ranged from curative powers to gaining the ability to read and write.[3] The promotional brochures touted the elixir as being able to cure "diabetes, paralysis, epileptic fits, delirium tremens, neuralgia, migraines, arthritis, rheumatitis, high or low blood pressure, and the rundown condition following colds."[10] These were only some of the diseases which advertised in papers and on the radio would mention. Demand continued to grow, but eventually, Hadacol's wild claims caught the attention of the American Medical Association (AMA).

The AMA decried the elixir. A statement released by the association in 1951 stated, "It is hoped that no doctor will be uncritical enough to join in the promotion of Hadacol. It is difficult to imagine how one could do himself or his profession greater harm from the standpoint of the abuse of the trust of a patient suffering from any condition. Hadacol is not a specific medication. It is not even a specific preventive measure."[11] The concerns of the AMA did very little to stop the sales of Hadacol, especially given the marketing prowess of LeBlanc. Jingles were recorded and played on radio stations nationwide, while every manner of toy, comic book, almanac, and household good was sold with the Hadacol logo.[10] Hadacol's marketing budget at the time was second only to Coca-Cola.[3] The largest expense was not any piece of memorabilia sent abroad, but a touring promotional show drawing on the early days of patent medicine advertising.

A Return to Marketing Roots in Medicine Shows

In the days before the Federal regulation of prescription medications, patent medicines of varying repute were sold around the country primarily through in-person advertising by traveling shows. "Medicine shows" could trace their roots to the Dark Ages and had been commonplace in the United States since before the American Revolution.[12] By the turn of the 20th century, patent medicines were an 80 million dollar industry and the primary method of promotion were troupes that would travel from town to town with musicians and other entertainers going to locations that otherwise might not receive outside entertainment. Rural areas were particularly targeted for medicine shows as the proprietor of the medicine believed that rural people were not as well educated, so they were more likely to fall for the ineffective elixirs.[12] String bands played the music the rural folks enjoyed, while "the doctor" would demonstrate their wares. Whitey Ford, a medicine show comedian, once described medicine shows as always selling a tonic and the tonics being sold as having "pretty good alcohol content. It was about 50 percent alcohol." [13] The patent medicines sold at many medicine shows might have been quackery, but the cultural influence of medicine shows would be felt for generations while medicine shows themselves would lessen throughout the 1900's.

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A Dose of Change: Moses Amos and His Contribution to Black Pharmacy Leadership

By Imani McPhatter, Victoria Fong, Kwame Asare, Christlere St. Louis, Ja-Tosjah Bolston, Breann Prophete, and Essie Samuel

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In the late 19th and early 20th centuries, healthcare for African Americans in Georgia was a constant battle against systemic racism and exclusion. Segregation meant that Black patients could not simply walk into any drugstore to fill a prescription without fear of discrimination or outright refusal of service. Most pharmacies either denied them care or subjected them to humiliation, forcing Black communities to seek alternatives. The few drugstores that did cater to Black customers were often located far from their homes, requiring long and arduous travel just to obtain essential medications. In rural areas, these resources were virtually nonexistent, leaving entire communities vulnerable to untreated illnesses and preventable deaths.[1]

Yet, out of these hardships emerged a powerful response, Black physicians and pharmacists banded together to create their own parallel healthcare system. Barred from white medical schools and pharmacy programs, young Black men pursued apprenticeships in Black-owned drugstores, learning the trade from established professionals.[2] These pharmacies became more than places to dispense medicine, they were lifelines, community health centers, and training grounds for future pharmacists. Despite the refusal of state pharmacy boards to formally recognize them, these pioneers persevered, ensuring their people had access to care in a world designed to deny them.[3]

This spirit of self-reliance was especially evident on Auburn Avenue, Atlanta's vibrant center of Black business and culture. Following the 1906 Atlanta Race Riot, Black entrepreneurs relocated to this district, fostering a community of economic empowerment. Known as "the richest Negro street in the world," Auburn Avenue was the heart of Black-owned businesses, including banks, insurance companies, and medical establishments that provided crucial support to the community. For Black pharmacists, opening a business in this neighborhood was both practical and symbolic; it allowed them to provide essential healthcare to the African American community in an environment free from discrimination.[4]

In this environment, Moses Amos opened Gate City Drug Store in the heart of Sweet Auburn, marking the beginning of his legacy as Georgia's first registered Black pharmacist. The name "Gate City" reflected Atlanta's status as a transportation hub, symbolizing access, opportunity, and self-sufficiency for the Black community. More than just a pharmacy, it became a cornerstone of Black healthcare, a space for mentoring aspiring pharmacists. Moses recognized the significance of his role, stating in an interview with *The Atlanta Constitution*:

"I am not trying to rival the white drug-store proprietors. I have my own niche to fill, here among my people, and I am filling it." (*The Bulletin of Pharmacy*, 1914).[1]

His efforts along with those of other Black medical professionals laid the foundation for a healthcare system rooted in resilience, self-determination, and community service. Their contributions not only saved lives but also paved the way for future generations of Black pharmacists to earn recognition and legitimacy in a field that had long sought to exclude them.

Moses Amos, son of Miles and Martha Ward-Amos, was born a free man on June 8th, 1866, in Hogansville, Georgia.[2] He married Emma L. Holmes, and they had

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A Dose of Change: Moses Amos. . .

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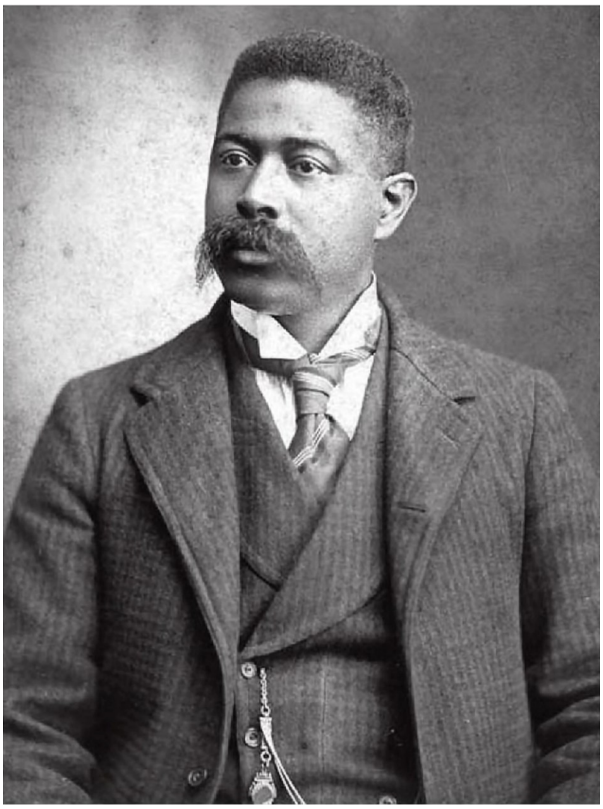
a son, Moses Jr., and a daughter, India.[5] Moses's path to the pharmacy profession began at a young age. In the mid-1870s, at around 10 years old, he left home in search of work in Atlanta. He was hired by Dr. Jacob C. Huss, a white physician, pharmacist, and drugstore owner. In 1876, as Moses wandered Peachtree Street, Dr. Huss spotted him and invited him to live in his home while he worked at his drugstore. Eventually, Moses trained directly under Dr. Huss as a pharmacist apprentice. African Americans in Georgia were not permitted to attend pharmacy school. Working under Dr. Huss was the only way Moses could understand, study, and practice pharmacy. While training under Dr. Huss, Moses took the Georgia Board of Pharmacy licensing exam. After passing the licensing exam in 1914, he became Georgia's first African American registered pharmacist.[2]



In the 19th and 20th centuries, Black physicians Dr. Henry Rutherford Butler and Dr. Thomas Heathe Slater advanced healthcare in Atlanta, including pharmacy, by acquiring a drugstore where Moses Amos served as the pharmacy manager. After more than two decades, the business was sold to Moses. In 1914, he renamed the pharmacy Gate City Drug Store and relocated it to 184 Auburn Avenue.[6] This move allowed him to better serve the Black community by positioning the pharmacy at the heart of Auburn Avenue. The complex also included an auditorium where many Black entertainers performed and a Masonic lodge, of which Moses was a member. His involvement in the lodge offered valuable networking opportunities, connecting him with influential Black leaders and professionals. Additionally, as a member of the National Negro Business League, he further strengthened his ties to Black entrepreneurship.[7]

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The Hadacol Caravan Hits the Road

The Hadacol Caravan was more elaborate than previous medicine show which had been staged.[3] Instead of relying on wagons to go between small towns in a region, LeBlanc chartered a 17-car passenger train along with a fleet of tractor-trailers to travel to 50 cities in 16 states.[1] Rather than hiring up-and-coming entertainers, the Hadacol Caravan featured some of the most famous musicians, sportsmen, and entertainers in the United States. The entertainers hired by LeBlanc covered a wide swath of interests to drum up sales nationwide.

Hollywood stars would come and go over the course of the tour. Comedians were central to LeBlanc's caravan, as attendees had the chance to see Lucille Ball, Bob Hope, Milton Berle, and George Burns and Gracie Allen.[1,7] The Hadacol Caravan also featured stars of many of the popular movies of the era, so the public had the chance to see James Cagney, Mickey Rooney, or Judy Garland in their town.[14] However, many of these comedians and movie stars would only appear at one or two locations. The consistent draw to LeBlanc's predominantly southern clientele was the music.

As was tradition in large shows like this in the south, music offerings were made available to both black and white audiences. For African American audiences, LeBlanc hired bluesmen like Peg Leg Sam and T-Bone Walker.[3] However, the larger part of LeBlanc's audience was the white working class, whose musical genre of choice was country and western music. The Hadacol Caravan gave country music fans the chance to see stars they might have only previously heard on the radio's Grand Ole Opry. This included Roy Acuff, a veteran of the original medicine show circuit, had a powerful voice and a commanding stage presence who had been a huge star on the Opry since 1938, and Minnie Pearl, a comedian famous for her satirical persona of a country woman who would give updates on the colorful characters in her fictional hometown of Grinders Switch, Tennessee.[15-17] The major draw for country music fans was the hottest new star in the genre, Hank Williams. At only 28 years of age, Williams had become the biggest star in country music, and LeBlanc knew his customers would love to see the newest star. More importantly, LeBlanc knew those customers would pay whatever it would take to see Williams, and he used that for sales before the Caravan would even arrive in town.[18] While the original medicine shows relied on sales of the product drummed up by the entertainers, those wanting to see Dudley LeBlanc's spectacular revue could only do so with two box tops from their Hadacol bottles. "Big" Bill Lister, a singer-songwriter who toured with

Fig. 1 – An 8 Ounce Bottle of Hadacol. Source: "Hadacol Dietary Supplement". Digital Collections of OHSU Libraries.

Hank Williams, described the Caravan's sales techniques. "The only way you could get into that show was with a Hadacol box top. And believe me, we played to crowds of ten, twelve thousand people a night." [19] Some reported the show in Atlanta had drawn more than 20,000 people. These tremendous attendance figures meant that the Hadacol Caravan had been hugely successful for Dudley LeBlanc, with Hadacol sales topping $4 million over the 15 months.[7]

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Hadacol Caravan. . .

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However, the end of the Hadacol Caravan would be the beginning of the end for Hadacol itself.

The Fast Fall of Hadacol

People knew that Dudley LeBlanc had spent a lot of money on advertising, but they did not realize just how much. The star-studded lineup LeBlanc used to sell Hadacol had cost him greatly, with talent fees being $75,000 a week alone (over $900,000 a week in 2025 dollars).[3,20] This did not include the new trucks, the elaborate train cars, the cost of travel and doing business. Rumors abounded of checks beginning to bounce despite the tremendous sales. LeBlanc defiantly attempted to continuing selling his product. Additionally, the claims made regarding the healing properties of Hadacol were not approved given its status as a dietary supplement. More rumors spread, this time of LeBlanc trying to sell the company in response to the FDA and the Federal Trade Commission (FTC) coming after Hadacol for the curative claims being made in their marketing materials.[10] Before the government could reach LeBlanc, he sold the company to the Maltz Cancer Foundation of New York for $8.2 million dollars in late 1951. This purchase would unfortunately bankrupt the Maltz Cancer Foundation, when it became known that LeBlanc had been carrying an additional $4 million dollars of debt off the books.[3]

Soon after, Hadacol was removed from shelves, with the FTC stating in a Manhattan courtroom that LeBlanc's company was "false, misleading and deceptive" in marketing Hadacol as "an effective treatment and cure for scores of ailments and diseases."[21] With the court's ruling, the foul-tasting brown liquid which had been one of America's largest brands of the post-war era would be nothing more than a memory to many.

Dudley LeBlanc staged the last large medicine show in US history. Something which was once ubiquitous was now obsolete and never to be seen at the same heights again. In the early days of medicine advertising, medicine shows had done a tremendous amount to make patent medicines more available to the public. While the reputation of patent medicines might have been one of all quack medicine from conmen trying to make a quick buck, Bayer Aspirin, Milk of Magnesia, Ex-Lax, Vicks VapoRub, and Listerine all began life as patent medicines.[3] Additionally, medicine shows would set the stage for a future of direct-to-consumer advertising of medications. The Hadacol Caravan was one last major gasp for what had been an American institution, particularly in rural communities. Drug product advertising in the 1950's had long since shifted to radio, but the Hadacol Caravan showed that what was successful before could be successful again.

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Expired Drugs. . .

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containers that were <12 years old at time of analysis all had >99% morphine content. However, morphine frequently discolors to brown or yellow and forms precipitates as it degrades, and this can occur in less than 3 months if exposed to light or elevated temperature for both morphine sulfate and hydrochloride.

Phenobarbital, one of the more well-known and older **barbiturates**, being introduced in 1911, degrades to pheneturide, another compound that has been used for anticonvulsant activity, but was withdrawn due to toxicity and low efficacy, the specifics of which were not available.[11]

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Expired Drugs. . .

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The 3 samples analyzed were: a 1978 dragée (a candy-coated dosage form used to improve tolerability), was found to have 73.9 mg compared to the declared 50 mg (148%); a suppository from 1985 with 13.5 mg of the declared 25 mg (54%); and an oral liquid with an unknown date of manufacture between 1938-1964 with 0.874 mg/mL of the declared 1 mg/mL (87.4%). The latter two dosage forms have clearly had some degradation, and this can be expected in other samples, so any individual considering taking old samples of phenobarbital may expect lesser, non-zero effects compared to recently manufactured samples, though it must also be noted that these samples were stored in a central European university at room temperature and protected from light.

Another systematic review of long-term stability and degradation of drug products included information from studies regarding other potential drugs that could be abused, though much of the review focused on archaeological value of analysis of drugs, especially prior to the 19th century.[12] The study in question in the review analyzed a sample of **heroin** for injection and **cocaine** for injection, both from the 1940s. The sample of heroin had degraded into pharmacologically active morphine (96.1%) and codeine (3.9%), while the sample of cocaine degraded much more, with only 26.9% cocaine remaining, with the remaining fraction consisting of 31.5% benzoylecgonine, 17.4% ecgonine, and 24.2% ecgonine methyl ester. Benzoylecgonine is the primary metabolite of cocaine, remains at detectable levels in urine up to 4 days after last use of cocaine, and is responsible for most of its toxic effects when used long-term. Exposure to benzoylecgonine causes stronger vasoconstriction, increased latency and frequency of seizure, and increased toxicity in developing fetuses when compared to cocaine.[13] With both samples, pharmacologic activity can be expected, but due to the individual not knowing potential degradation products, adverse events are more likely.

To summarize, there is very little information regarding old drugs with high abuse potential found outside of proper storage conditions, i.e. a sealed, light-protected container at room temperature, but the information found on these drugs from proper storage conditions does shed some light on the potential effects these drugs may have. Morphine, one of the most common old analgesics, is remarkably resilient to degradation, and will likely perform similarly to recently manufactured drug. Typical antipsychotics have the least information with only 2 properly stored samples from the latter quarter of the 20th century, as these drugs are prone to degradation under less-ideal conditions, but the effects of these products are not well studied. Phenobarbital, and likely other barbiturates, tend to not degrade much, but its degradation products have a potential for unpleasant but likely non-fatal effects such as vomiting. The amphetamine product in the picture sent in the request is likely to be much less potent than it was at time of manufacture, but still have some active ingredient left. Heroin tends to degrade completely into active morphine, and cocaine tends to degrade the most out of any of the products examined, converting into a form that produces less of a high and more of the toxic effects in the body.

Figure 2: 1898 Bayer Heroin Bottle – image from https://museum.dea.gov/museum-collection/collection-spotlight/artifact/heroin-bottle

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History of Aspirin

By Shelby Barron, Jaylynn Fortenberry, MK Schwaemmle, and Bernie R. Olin, PharmD, Auburn University Harrison College of Pharmacy

If someone were to ask you what is the most widely used drug in the world, what would your response be? Aspirin![1] Aspirin is a dynamic drug used in many diseases and is famous for its anti-inflammatory, analgesic and antipyretic properties. In 2017, aspirin's 120th birthday was celebrated, but relatives of aspirin have been used around the world for thousands of years.[1]

Salicin, a chemical substance used to synthesize aspirin, has been used for centuries to treat pain and inflammation even before its antipyretic effects were discovered. In fact, the use of salicin from willow trees, specifically in the *Salicaceae* family, was present on a global scale 3,500 years ago with records indicating it being used by the people of Ancient Sumer to Egypt to Greece, as well as other countries around the world.[1] The Sumerians recorded the use of salicin derived from willow tree bark and willow leaves.[1] Willow leaves were noted for their analgesic properties, which were believed to have been used to treat disease states such as rheumatic disease. Around 1534 BCE, willow leaves and myrtle were used by the Egyptians to treat joint pain.[2] This combination was recorded in the Ebers Papyrus, which consists of 877 medicinal regimens.[1] In 400 BCE, Hippocrates used willow leaf tea to help relieve pain associated with childbirth.[2]

Despite its use to treat pain and inflammation, it would take more than 1000 years for the reason behind its usefulness to be studied. In the late 1750s and early 1760s, Edward Stone, a British scientist of the Royal Society, spent five years conducting his own clinical trials with willow bark and was able to determine it had anti-pyretic properties.[3]

The first person to extract salicin from willow bark was a pharmacy professor from Munich University, Joseph Buchner in 1828.[1, 2] In 1830, a Swiss pharmacist, Johann Pagenstecher, and a German researcher, Karl Jacob Ladwig, extracted salicin from meadowsweet flowers.[2] When consumed, salicin is metabolized in the body to glucose and salicyl alcohol which continue to be metabolized separately.[1] Salicyl alcohol is metabolized to salicylic acid once the aromatic section of the alcohol is oxidized.[1] In 1838, Raffaele Pirìa, an Italian chemist, was able to separate the glucose component from the salicyl alcohol to obtain pure salicylic acid.[1] From thereon, research focused on finding a way to synthesize a purer, better-tolerated, and cheaper form of salicylic acid.[1] This was achieved in 1859 by a German chemistry professor, Hermann Kolbe, and was later refined by his assistant Rudolf Wilhelm Schmitt, by using what is known as today as the Kolbe-Schmitt reaction.[1] In this reaction sodium phenoxide and carbon dioxide are heated then acidified with sulfuric acid which subsequently creates chemically

***Figure 1**: Willow bark shavings. https://www.southlakepaininstitute.com/blog/willow-bark-natures-made-aspirin*

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pure salicylic acid.[1] In 1874, Friedrich von Heyden another pupil of Kolbe, received the first patent to produce salicylic acid using this method on an industrial scale and opened the first factory to produce synthetic salicylates in Dresden.[1] Von Heyden was the first to succeed at marketing the extract in mass amounts in a way that was ten times cheaper than the willow extracting methods.[1] Experiments were conducted throughout Europe in the late 1800's in order to determine benefits, application, and side effects associated with salicylates. In 1876, Thomas McLagan, a Scottish scientist, published his findings on the use of salicylates in patients with acute rheumatism.[2] His trials determined that patients who received salicylic acid to treat rheumatism experienced complete remission from joint pain and fever.[1] His trials also noted that salicin could cause gastric irritation.[1] In 1878, Germain See discovered the efficacy of salicylates to treat inflammatory diseases such as chronic rheumatism and gout.[1]

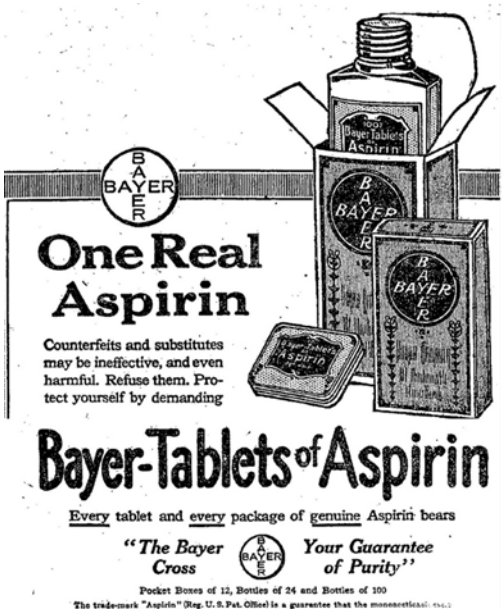

***Figure 2**: Bayer Aspirin advertisement in NYT on February 19, 1917. https://commons.wikimedia.org/wiki/File:Bayer_Aspirin_ad,_NYT,_February_19,_1917.jpg*

The wide variety of uses for salicin stirred interest in the scientific community. In 1897, Felix Hoffmann, an employee of Bayer Pharmaceuticals, discovered a way to decrease irritant side effects associated with salicylates by adding an acetyl group during the synthesis of salicylic acid therefore creating acetylsalicylic acid (aspirin).[4] This discovery led Bayer Pharmaceuticals to begin marketing acetylsalicylic acid at affordable costs for the public and coined the name *Aspirin*. This initiated the meteoric rise of *Aspirin* as a household name. However, there is controversy surrounding Hoffman's discovery. Evidence exists that a Jewish chemist working in Germany, Arthur Eichengrun, contributed to the discovery of a stable formulation of aspirin, and it is believed that the record of his work was expunged during World War II due to antisemitism.[4] On March 6, 1899, Bayer patented the formulation for aspirin.[4] Despite being short, the name aspirin contains roots from the ingredients used to create it. For example, the 'spir' in aspirin comes from the scientific name for meadowsweet, Spiraea ulmaria, from which salicin can be derived.[2] The "a" in aspirin represents acetyl, part of the chemical structure of aspirin (acetylsalicylic acid).[2] Aspirin was first used in hospitals and clinics before transitioning to use at home.

Aspirin became available to the American public in 1915, and it was debuted as an over-the-counter medication.[5] It didn't take long for aspirin to make its way into the households of millions of Americans. Its popularity can be attributed to its effectiveness for treating pain and inflammation while also being affordable. After 45 years on the American market, aspirin won a Guinness World Record for being the most commonly sold painkiller in 1950.[6] By 1930, drug companies were looking for ways to promote and reformulate aspirin in an effort to boost sales. Combination products began to enter the market. Alka-Seltzer, which is a combination of aspirin, citric acid, and sodium bicarbonate, was manufactured by Dr. Miles Medical Company as a new drug targeting indigestion.[7] The same company also introduced a new formulation of aspirin to consumers, "Dr. Mile's Aspir-Mint". The distinguishing feature of this formulation was its minty flavor, which further endeared aspirin to the public.[8] The indications

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A Dose of Change: Moses Amos. . .

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Gate City Drug Store's grand opening took place on Wednesday, June 10, 1914. In addition to medications, the pharmacy sold ice cream and everyday essentials including toiletries. Newspaper advertisements stated, "The Gate City Drug Store is the first negro drug store in Georgia. One thousand blocks of pure ice cream will be served at intervals to visitors."[1] The grand opening was open to the community, with members of the all-white Georgia Board of Pharmacy in attendance.[6]

Despite the excitement of the grand opening, Moses faced challenges in managing his new business. Struggling to collect what was owed, he attempted to recover debts from trusted customers but received only a small fraction of the total. However, this setback became a turning point for Moses, who quickly adapted. He expressed, "After that experience, we came down to a cash basis. We trust no one, and since then we have been doing well."[8] This decision led to a period of success for the pharmacy, with business booming and estimates suggesting that Moses filled over one million prescriptions. Not only did his business thrive, but Moses made significant contributions to his community. He was known for his charitable work, having sent ten boys through pharmacy school, and hired the first Black woman to work in a public place in the city. He employed up to 21 staff members and supported the Federation of Colored Women's Clubs with both donations and organizing efforts. Furthermore, he mentored at least 10 young men who went on to become successful physicians and pharmacists, including his nephew, Miles G. Amos who was later mentored by him.[2]

Moses Amos passed away on June 5, 1928, at the age of 64 at Mercy Hospital. His funeral service was held the following Friday morning at David T. Howard's funeral parlor, with burial at South-View Cemetery.[5] After his death, Miles carried on his uncle's legacy by opening his own pharmacy, Amos Drug Store. At a time when Black-owned pharmacies were rare in the city, Amos Drug Store became a crucial resource for the community. For over 40 years, it remained a trusted institution, embodying the spirit of service and self-sufficiency that Moses had championed. When Miles retired in 1969 at the age of 71 he decided to close the doors instead of selling the business, ending an era of dedicated care and commitment.[9]

Figure 3. Interior of Gate City Drug Store[10]

Many may remember Moses, and his contributions do not go unnoticed. His contributions to society extended further than just pharmacy. He was actively involved in Atlanta's political and civil affairs where he passed his legacy down to members of his family and community.

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Figure 2. Outdoor Signage of Gate City Drug Store[10]

A Dose of Change: Moses Amos. . .

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Moses faced many trials and tribulations in life. Despite his humble beginnings, he rose to a position of leadership becoming the first black pharmacist in Georgia and one of the most recognized and successful black business entrepreneurs in the city of Atlanta. The Apex Museum, located on Auburn Avenue in Atlanta, features an exhibit about the drugstore and the Auburn Avenue Research Library houses collections of the drugstore's owners. Moses' journey of life ended in 1928 however, his legacy lives on here in Atlanta, Georgia forever.

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History of Aspirin. . .

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for this product included inflammation of the upper respiratory tract, headache, neuralgia, and muscle aches or pain.[8] Interestingly, fever was not among its listed indications.

Along with being popular among adult populations, aspirin was commonly used to treat children. The Baby Boom following World War II created a market for more pediatric medications. In response, the Plough Company created a chewable aspirin tablet specifically for children.[9] They successfully created pediatric aspirin in 1947, which was unique for its chewable formulation and bright orange color.[9] The Plough company named their new aspirin formulation "St. Joseph Aspirin for Children" and began marketing it extensively. Newspaper advertisements played a key role in popularizing St. Joseph's aspirin.[9] In 1950, St. Joseph's pediatric aspirin was the most commonly used drug in children.[9] Unfortunately, the taste and bright color of St. Joseph's Aspirin for Children resulted in children mistaking the medication for candy and consuming it which lead to a spike in pediatric aspirin overdoses.[9] Additionally, parents and caregivers were not adequately warned about the risk of overdose in children receiving St. John's Aspirin for Children.[9] The American Academy of Pediatrics grew concerned by the drastic increase in aspirin overdoses in children and issued a warning to the public.[9] At first, the Plough company denied these allegations relating to the risks associated with St. Joseph's.

In 1955, The Conference on Accidental Aspirin Poisoning took place, but it only recommended that pediatric aspirin manufacturers consider adding a warning label to their products.[9] Despite growing concern for the safety of children, drug companies dragged their feet in finding solutions to this issue. Aspirin manufacturers did eventually agree to put a consistent amount of aspirin in each tablet in 1960, but no other action was taken to address the estimated 120 accidental, fatal overdoses in children under the age of 5 occurring each year.[9,10] Prior to this change, there was no standardization for the amount of aspirin put in each tablet. In 1969, the Poison Prevention Packaging Act required child-safety packaging on any product that could be toxic or hazardous, and the first drug affected by this new legislation was aspirin.[9] This spurred aspirin companies, such as the Plough company, to take action in protecting pediatric patients despite their previous attempts to dismiss the issue. Thanks to the Poison Prevention Packaging Act, aspirin products were contained in child-safe packaging, and the rate of accidental aspirin overdoses in children decreased drastically.[8]

***Figure 3**: John Vane (1927 - 2004). https://commons.wikimedia.org/wiki/File:John_Robert_Vane.jpg*

Commonly referred to as a "wonder drug", thanks to Bayer's marketing strategy in the 1950s, aspirin's popularity continued to skyrocket.[1] The same characteristics that made it popular throughout history such as its antipyretic, analgesic and anti-inflammatory properties, propelled it forward in modern society. Despite the frequent use of aspirin, its mechanism of action remained a mystery. It seemed that the public was more interested in the fact that it did work rather than how it worked to alleviate their aches and pains. It wasn't until 1971 that John Vane published his research outlining aspirin's mechanism of action.[11] John Vane was a pharmacology professor at the University of London and the Wellcome Research Laboratories, Beckenham, United Kingdom, and his discovery regarding aspirin's mechanism of action earned

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in 1982 along with fellow scientists Bengt Samuelsson and Sune Bergstrom.[11] Their discovery determined that prostaglandins play a major role throughout the body, and acetylsalicylic acid inhibits prostaglandin synthesis, decreasing pain and inflammation.[11] Understanding how aspirin worked served as a valuable springboard for continued research on the potential uses of this "wonder drug" and many other compounds.

In the late 1960s and early 1970s, researchers began delving into the mechanisms of thrombosis due to it being a common pathway for the majority of cardiovascular issues.[1] Aspirin's anti-thrombotic properties had been discovered and investigated years earlier, with the first trials to test these properties being conducted in 1953 by Dr. Lawrence Craven.[1] Craven noticed the same increased occurrence of bleeding in his tonsillectomy patients who used aspirin for pain relief, previously noted in 1945 by Dr. Rudolf Singer.[1] Craven went on to hypothesize that aspirin could be efficacious in the prevention of coronary thrombosis and could possibly be a safer substitute for warfarin due to its anti-thrombotic propeties.[1] Following this hypothesis, Craven began prescribing aspirin as primary prevention of cardiovascular events to males aged 45 to 65 with risk factors for cardiovascular disease.[1] The invention of the aggregometer by Gustav Born in the 1960s, allowed scientists to confirm that aspirin inhibited platelet aggregation and thus decreased the risk of blood clots. The first randomized control trial for aspirin was conducted in 1974 and showed that aspirin was potentially efficacious in secondary prevention of death from a heart attack. [12] In 1998, the Hypertension Optimal Treatment trial showed that aspirin significantly reduced cardiovascular events in patients with high blood pressure and was shown to help prevent heart attacks.[13] A 2018 study evaluated the efficacy and safety of aspirin for the primary prevention of cardiovascular disease in older adults over the age of 65 years. It was found that aspirin increased the risk of bleeding and did not significantly lower the risk of cardiovascular disease in this population.[14] Though many benefits have been found, the risks of daily aspirin use may outweigh the benefits for some.

By the early 1990's, researchers had also begun exploring the role of aspirin in preventing the incidence of cancer. The Cancer Prevention Study-II, a large prospective cohort study based in the United States, concluded in 1991 that the chronic use of aspirin may reduce the risk of developing fatal colon cancer.[15] Though it was unclear if this was a direct effect of aspirin use, it was thought that aspirin's inhibition of prostaglandins reduced the development of polyps, which are often a precursor for colon cancer.[15]

The potential role of aspirin in preventing incidence of cancer was further expanded in 1993 to other digestive tract-related cancers, such as those involving the esophagus, stomach, and rectum.[16] However, a 2005 study reported no effect of aspirin in reducing the incidence of cancer in healthy women. This could be due to the every-other-day dosing schedule used in this large, long-term, randomized clinical trial compared to the daily dosing used in other studies.[17] Still, researchers were not deterred from discovering further benefits of aspirin use. By 2014, ovarian cancer was added to the robust list of cancers that could potentially be prevented by taking aspirin daily.[18] In the 2016 guidelines for aspirin use, the United States Preventive Services Task Force (USPSTF) recommended the use of daily low-dose aspirin in adults between the ages of 50-59 years with at least a 10% 10-year cardiovascular disease risk to reduce the incidence of cardiovascular disease and colorectal cancer.[19] However, this recommendation changed with the 2022 update to state that the evidence regarding the role of aspirin in reducing the incidence or mortality of colorectal cancer was inadequate and would require more research.[20]

Even the "wonder drug", is not exempt from side effects. Since 1982, multiple agencies, including the Centers for Disease Control and Food and Drug Administration, have recommended against the use of aspirin in children under the age of 18 years, especially if affected by chickenpox or the influenza virus. This is due to the potential for Reye Syndrome, a deadly condition defined by vomiting, lethargy, and confusion.[21,22] Tinnitus is also a potential side effect of aspirin. In fact, it was previously used for dosing intensive aspirin therapy, as indicated by the old adage of "push to tinnitus, then back off slightly." [23] Aspirin is also known to cause an increased risk of bleeding, including gastrointestinal bleeding, and limits its use in certain populations, as mentioned previously.[14]

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Ultimately, the best thing for any individual encountering these products is to avoid taking them, but in the interest of harm-reduction, it should be noted that these drugs may have near-full potency depending on storage conditions, and potential abusers of these drugs should know not to take more than they ordinarily would as overdose is just as likely with old products as it is with freshly manufactured substances. If any individual encounters these substances and is considering selling them or the packaging, it would be best for them to first dispose of the drugs following the methods suggested by the FDA to reduce the risk of harm to others who may purchase them for their collections. For those who wish to keep them as a part of a collection, it is important to keep these drugs in a place away from the reach of children, ideally in a sealed or locking display. The display should be protected from fluctuations in temperature, humidity, and light to prevent further breakdown of the components into unsafe by-products.

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Throughout its nearly 3,500 years of use in various forms, aspirin has established a reputation as a multifaceted drug. Additional benefits were discovered with medical research and drug trials. In addition to its historically established anti-inflammatory, analgesic, and antipyretic properties, aspirin has recently proven beneficial in the prevention of both cardiovascular disease and various types of cancer. Researchers are continuously assessing the role of aspirin in various other disease states. Currently, there are 10 trials studying aspirin's impact on various cancers, community-acquired pneumonia, and prevention of venous thromboembolisms after orthopedic surgery.[24] Aspirin's title of "The Wonder Drug" has held true for centuries, and it has been – and continues to be – the drug that keeps on giving.

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As an open academic forum, the SIG strives to facilitate the exchange of ideas and innovation among pharmacy faculty across disciplines; to serve broadly as an accurate information resource for teaching, learning, and scholarship pertaining to the evolution and history of the pharmacy profession; to develop and maintain historical collections of artifacts and school or college museums; and to ensure the lessons, the message, and the legacy of the pharmacy profession is preserved to educate future generations of pharmacy students.

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