Penicillin: Sources and How They Were Read

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This companion lists every source cited in the book, with a link and an honest account of how much of it was read and what the book takes from it. A final short section records works that were consulted during the writing but are not cited in the text, so that the list of consulted works is complete without implying citations the book does not contain. Read levels: **Full text** (read end to end), **Key sections** (substantial relevant portions read, not the whole), **Abstract or partial** (limited portions only), **Bibliographic record** (citation details verified; the text itself was not read - such sources are used only for facts the record itself establishes, such as a paper's date and authorship). Where sources disagree, the disagreement is noted here rather than silently resolved in the text.

A note on method

Direct quotations in the chapters are verbatim from the source listed. Figures are quoted with their original units and years; where two price or production series exist (for example wartime government purchase prices versus postwar commercial bulk prices), the book keeps them as separate series rather than splicing them. Claims that could not be traced to a source actually read were either omitted or are explicitly attributed in the text to the work that relays them.

Core narrative sources

S-H1 - Clutterbuck PW, Lovell R, Raistrick H, “Studies in the Biochemistry of Micro-organisms. XXVI. The Formation from Glucose by Members of the *Penicillium chrysogenum* Series of a Pigment, an Alkali-Soluble Protein and ‘Penicillin’ - the Antibacterial Substance of Fleming,” *Biochemical Journal* 1932;26(6):1907-1918. https://doi.org/10.1042/bj0261907 - Read level: abstract or partial (snippet-level; the full scan could not be obtained). Used only for: the quoted verdict “an extremely labile substance” and the paper’s place in the timeline.

C1 - Gaynes R, “The Discovery of Penicillin - New Insights After More Than 75 Years of Clinical Use,” *Emerging Infectious Diseases* 2017;23(5):849-853. https://pmc.ncbi.nlm.nih.gov/articles/PMC5403050/ - Read level: full text. Used for: the pre- antibiotic context; Fleming’s career and WWI wound work; the discovery narrative; the cantaloupe strain and strain search; Thom’s strain survey; Ehrlich and Salvarsan; penicillin’s molecular fragility. Note: this paper prints the mouse experiment date as 25 May 1939; see the conflict note below.

C2 - Fleming A, Nobel Lecture, “Penicillin,” 11 December 1945. https://www.nobelprize.org/uploads/2018/06/fleming-lecture.pdf - Read level: full text. Used for: the discovery and first assays in Fleming’s own words; the resistance warning, the “Mr. X” parable, and “If you use penicillin, use enough.”

C3 - Florey HW, Nobel Lecture, “Penicillin,” 11 December 1945. https://www.nobelprize.org/uploads/2018/06/florey-lecture.pdf - Read level: full text. Used for: the pre-penicillin antagonism literature; the Oxford programme’s rationale; the assay and survey work; streptomycin’s rapid resistance, noted already in 1945.

C4 - Chain EB, Nobel Lecture, “The Chemical Structure of the Penicillins,” 20 March 1946. https://www.nobelprize.org/uploads/2018/06/chain-lecture.pdf - Read level: full text. Used for: the purification chemistry; the instability problem; the wartime synthesis programme (scale, secrecy, report exchange); penicillinase noted as already known.

C5 - Fleming A, “On the Antibacterial Action of Cultures of a *Penicillium*, with Special Reference to Their Use in the Isolation of *B. influenzae*,” *British Journal of Experimental Pathology* 1929;10(3):226-236. https://pmc.ncbi.nlm.nih.gov/articles/PMC2048009/ - Read level: full text (scanned original). Used for: the naming of penicillin; the 1929 spectrum tables; the rabbit toxicity test; the verbatim therapeutic suggestion (“may be an efficient antiseptic for application to, or injection into, areas infected with penicillin-sensitive microbes”); the acknowledgment of mycologist C. J. la Touche.

C6 - Aminov RI, “Beta-lactam Antibiotics: From Antibiosis to Resistance and Bacteriology,” *Clinical Microbiology Reviews* 2010;23(4):750-771. https://pmc.ncbi.nlm.nih.gov/articles/PMC2894812/ - Read level: full text. Used for: the pre-Fleming history of antibiosis (Burdon-Sanderson, Tyndall, Lister, Pasteur and Joubert, Duchesne, Gratia); the semisynthetic concept and methicillin/carbenicillin dates; cephalosporin C and 7-ACA; carbapenems and monobactams; penicillinase in 1940 (Abraham and Chain); the resistance timeline (resistant strains within about a year; majority of hospital staphylococci resistant by 1947; the 80/81 complex; Barber’s alarm; the 1960s Gram-negative shift; Finland’s surveys); beta-lactamase families on plasmids and transposons.

C7 - Houbraken J, Frisvad JC, Samson RA, “Fleming’s Penicillin Producing Strain Is Not *Penicillium chrysogenum* but *P. rubens*,” *IMA Fungus* 2011;2(1):87-95. https://pmc.ncbi.nlm.nih.gov/articles/PMC3317369/ - Read level: full text. Used for: the reclassification of Fleming’s mould; the La Touche spore hypothesis for the contamination.

C8 - Wellcome Trust and Boston Consulting Group, “Understanding the Antibiotic Manufacturing Ecosystem” (2022). https://cms.wellcome.org/sites/default/files/2022-04/understanding-the-antibiotic-manufacturing-ecosystem-2022.pdf - Read level: full text. Used for: the modern supply-chain map (seven 6-APA sites, five in China; 100% of 7-ACA sites in China; roughly 70% of API sites in China and India; the seventeen amoxicillin API sites); the margin-and-fragility analysis; the very limited innovative pipeline; delinked reimbursement proposals; the One Health framing.

C9 - Ballentine C, “Taste of Raspberries, Taste of Death: The 1937 Elixir Sulfanilamide Incident,” *FDA Consumer*, June 1981 (FDA history page). https://www.fda.gov/about-fda/histories-product-regulation/sulfanilamide-disaster - Read level: full text. Used for: the elixir sulfanilamide disaster and the 1938 US food-and-drug law.

C10 - Domagk G, Nobel Lecture, “Further Progress in Chemotherapy of Bacterial Infections,” 12 December 1947. https://www.nobelprize.org/uploads/2018/06/domagk-lecture.pdf - Read level: key sections (discovery narrative and the puerperal-fever mortality chart; the later compound survey skimmed). Used for: Prontosil, the sulfanilamide dissection, and the childbed-fever mortality curve.

C11 - Calver T, “75 Years of Penicillin in People,” University of Oxford, 12 February 2016. https://www.ox.ac.uk/news/science-blog/75-years-penicillin-people - Read level: full text. Used for: the Albert Alexander case dates and the first-treatment anniversary.

C13 - NobelPrize.org, “Alexander Fleming - Biographical.” https://www.nobelprize.org/prizes/medicine/1945/fleming/biographical/ - Read level: full text. Used for: Fleming’s biography details.

C14 - University of Oxford, “Penicillin” (medical sciences history page, archived copy). https://web.archive.org/web/20140311182554/http://www.ox.ac.uk/research/medical_sciences/projects/penicillin.html - Read level: full text. Used for: the mouse-experiment date of 25 May 1940 (see conflict note).

C15 - University of Pennsylvania, NRRL penicillin history pages (drawing on Neushul, Raper, Hobby, and A. N. Richards's wartime account). http://ccat.sas.upenn.edu/goldenage/state/govt/sl_govt_nrrl.htm - Read level: full text. Used for: the Peoria cast (May, Coghill, Moyer); corn steep liquor (1937, the thirty-fold yield claim, the lactose switch); the submerged-fermentation lineage to 1935; the Army Transport Command soil search; the OSRD price series relayed from Richards ($200 to $6 per million units); the wartime production figures (425 million units in June 1943; 646 billion in June 1945); the fermentation-versus- synthesis spending (~$22 million versus $3 million); the synthesis-contract cancellations.

C16 - US Department of Agriculture, Agricultural Research Service, "Penicillin: Opening the Era of Antibiotics." https://www.ars.usda.gov/midwest-area/peoria-il/national-center-for-agricultural-utilization-research/docs/penicillin-opening-the- era-of-antibiotics/ - Read level: full text. Used for: the cantaloupe and corn-steep-liquor stories in the USDA's own account; the per-dose price series ($20 in July 1943 to $0.55 in 1946).

C17 - US Department of Agriculture, Agricultural Research Service, "The Enduring Mystery of 'Moldy Mary'." https://www.ars.usda.gov/ - Read level: abstract or partial. Used only for: the USDA itself treats the "Moldy Mary" identity as unresolved.

C18 - Quinn R, "Rethinking Antibiotic Research and Development: World War II and the Penicillin Collaborative," *American Journal of Public Health* 2013;103(3):426-434. https://pmc.ncbi.nlm.nih.gov/articles/PMC3673487/ - Read level: full text. Used for: the wartime programme's structure (57 pre-1943 OSRD contracts; twenty-one companies and five academic groups; the 250- fold May-June 1944 production increase quote; the USDA's royalty-free process patents; the information-pooling groups; the strain genealogy NRRL 1951 to B25 to Cold Spring Harbor X-ray to Wisconsin UV; the WPB antitrust exemptions); and the closing platform argument (the postwar antibiotic parade; cortisone and B12; biotechnology's debt).

C19 - Elander RP, "Industrial Production of Beta-lactam Antibiotics," *Applied Microbiology and Biotechnology* 2003;61:385-392. https://pubmed.ncbi.nlm.nih.gov/12698315/ - Read level: abstract or partial. Used for: modern harvest titres of 40-50 grams per litre and high recovery rates (2003 vintage).

C23 - Batchelor FR, Doyle FP, Nayler JHC, Rolinson GN, "Synthesis of Penicillin: 6-Aminopenicillanic Acid in Penicillin Fermentations," *Nature* 183:257-258, 24 January 1959. https://doi.org/10.1038/183257b0 - Read level: bibliographic record. Used only for: the paper's date, authorship and title claim (6-APA in fermentations).

C24 - Harkins CP et al., "Methicillin-Resistant *Staphylococcus aureus* Emerged Long Before the Introduction of Methicillin into Clinical Practice," *Genome Biology* 2017;18:130. https://pmc.ncbi.nlm.nih.gov/articles/PMC5517843/ - Read level: full text. Used for: the mid-1940s origins of the mecA lineage; MRSA observed by October 1960.

C25 - Sheehan JC, Henery-Logan KR, "The Total Synthesis of Penicillin V," *Journal of the American Chemical Society* 1957;79(5):1262-1263. https://pubs.acs.org/doi/10.1021/ja01562a063 - Read level: abstract only. Used for: the 1957 total- synthesis landmark.

C26 - US Patents 2,442,141; 2,443,989; 2,476,107 (Andrew J. Moyer, "Method for Production of Penicillin"), via Google Patents. https://patents.google.com/patent/US2442141A/en - Read level: patent records. Used for: the assignment of Moyer's process patents to the US government.

C27 - NobelPrize.org, "Ernst B. Chain - Biographical." https://www.nobelprize.org/prizes/medicine/1945/chain/biographical/ - Read level: full text. Used for: Chain's biography.

C28 - NobelPrize.org, "Howard W. Florey - Biographical." https://www.nobelprize.org/prizes/medicine/1945/florey/biographical/ - Read level: full text. Used for: Florey's biography.

C29 - Garrison C, "Ensuring That Intellectual Property Rights Aren't a Barrier to Scaling-Up: The Remarkable Example of Penicillin Production in the United States During World War II," Medicines Law & Policy, April 2021. https://medicineslawandpolicy.org/wp-content/uploads/2021/04/Ensuring-IP-rights-arent-a-barrier-to-scaling-up-the-example-of- penicillin.pdf - Read level: full text. Note: this is a briefing that itself quotes scholarly works (Bud 2008, Neushul 1993, Tyabji 2004) the book has not read; where the chapters use those quoted points, the text attributes them accordingly. Used for: the production ramp figures (100 billion units/month by D-Day; about 650 billion by June 1945); Oxford's no-patent decision and its background; the tiered synthetic-patent agreement; the Oxford Vice-Chancellor's 2020 "mistake" remark; India's first penicillin plant in 1955 with WHO and UNICEF support.

C30 - "Comparative Genomics of Alexander Fleming's Original *Penicillium* Isolate (IMI 15378)," *Microbial Genomics* 2020;6. https://pmc.ncbi.nlm.nih.gov/articles/PMC7515868/ - Read level: key sections. Used for: the industrial lineage (Wisconsin 54- 1255, Panlabs P2niaD18) and the shared Q-176 ancestor; the tandem duplication of the pcbAB-pcbC-penDE cluster; effector divergence with regulatory conservation; the P. rubens reclassification.

C31 - Rolinson GN, Stevens S, "Microbiological Studies on a New Broad-Spectrum Penicillin, 'Penbritin'," and Brown DM, Acred P, "'Penbritin' - A New Broad-Spectrum Antibiotic," *British Medical Journal*, 22 July 1961;2:191 and 2:197. https://doi.org/10.1136/bmj.2.5246.191 - Read level: key sections (journal pages). Used for: the ampicillin launch and date.

C32 - Sutherland R et al., "Amoxycillin: A New Semi-synthetic Penicillin," *British Medical Journal*, 1 July 1972;3:13. https://doi.org/10.1136/bmj.3.5817.13 - Read level: abstract only. Used for: the amoxicillin announcement date and its roughly doubled oral absorption versus ampicillin.

C33 - American Chemical Society, “Development of Deep-Tank Fermentation: Penicillin” (National Historic Chemical Landmark booklet, designated 12 June 2008). https://www.acs.org/content/dam/acsorg/education/whatischemistry/landmarks/penicillin/development-of-deep-tank-fermentation-commemorative-booklet.pdf - Read level: full text. Used for: the Pfizer Rubel Ice Plant (bought September 1943; opened 1 March 1944 with fourteen 7,500-gallon tanks; the autumn-1944 “one day’s production often exceeded the entire production of 1943”; most D-Day penicillin from that plant; about four parts drug per ten thousand of broth; the 1946 crystallization); Pfizer’s citric- acid deep-tank heritage.

C34 - “Alexander Fleming” (profile), *Singapore Medical Journal* 2015;56(7):366-367. https://pmc.ncbi.nlm.nih.gov/articles/PMC4520913/ - Read level: full text. Used for: Fleming’s “I did not invent penicillin. Nature did that. I only discovered it by accident.”

C36 - Podolsky SH, “The Changing Fate of Pneumonia as a Public Health Concern in 20th-Century America and Beyond,” *American Journal of Public Health* 2005;95(12):2146-2156. https://pmc.ncbi.nlm.nih.gov/articles/PMC1449499/ - Read level: full text. Used for: Osler’s 1892 “self-limited disease… uninfluenced in any way by medicine” and “Captain of the Men of Death”; the serum-era mortality figures (more than 25% to 7.5% at the Rockefeller Institute Hospital; ~25% to 11.1% in the Massachusetts programme); the 1930s pneumonia public-health campaign and its post-penicillin dissolution.

C37 - Gross DP, Sampat BN, “Organizing Crisis Innovation: Lessons from World War II,” NBER Working Paper 27909, October 2020. https://www.nber.org/papers/w27909 - Read level: key sections (the penicillin case study read in full). Used for: the financing shape (about three-quarters of the $30 million plant spend from private firms; Defense Plant Corporation support; rapid tax amortization); the late-1941 meetings and reluctant firms; the token contracts and mandatory non-exclusive licensing “as a substitute for presumptive government ownership”; production of 10 million units/month in 1941 rising to 40 million by 1942; the $20-to-under-$1 cost fall per 100,000 units; the synthesis programme’s legacy for the 1950s semisynthetics.

C38 - Lee V, “Microbial Transformations: The Japanese Domestication of Penicillin Production, 1946-1951,” *Historical Studies in the Natural Sciences* 2018;48(4):441-474. https://doi.org/10.1525/hsns.2018.48.4.441 - Read level: key sections (introduction and framing read in full). Used for: the Japan Penicillin Manufacturing Association’s founding on 15 August 1946; the thirty-nine companies; the occupation government’s cost motive; the JPRA research association; Iwadare Toru’s recollection (“both the government and firms were not very enthusiastic”); the domestication (kokusanka) framing and the agricultural-chemistry heritage.

C39 - United States Federal Trade Commission, *Economic Report on Antibiotics Manufacture*, Washington: GPO, June 1958 (public-domain scan, Wellcome Collection). https://wellcomecollection.org/works/yfg3efna - Read level: key sections (Appendix 2, “Discovery and Development of Penicillin,” pp. 302-354; the price-history section pp. 162-170; the patent chapter’s penicillin and tetracycline passages pp. 227-229 and 252-254; the Chapter I findings; read from a scan by OCR). Used for: the postwar bulk price series (commercial introduction 1945 at $6,000 per billion units; $800-900 by 1948; about $85 by 1952; $34.50 in December 1955; salts timeline); the patent findings (no product patent on penicillin; USDA process patents licensed royalty-free; 671 antibiotics patents 1942-56, about 86% corporate); the formulation patents (procaine/Lilly, benzathine/Wyeth, penicillin V/Lilly); the March 1942 Maxwell-Merck cable; the Moyer-and-Heatley distribution note in Moyer’s patent file; the tetracycline patent saga (claims rejected November 1954; US 2,699,054 issued to Pfizer 11 January 1955; the same-day lawsuits).

C40 - Review on Antimicrobial Resistance (chair: Jim O’Neill), “Tackling Drug-Resistant Infections Globally: Final Report and Recommendations,” May 2016. https://amr-review.org/sites/default/files/160525_Final%20paper_with%20cover.pdf - Read level: key sections (summary, burden and interventions chapters). Used for: the report-era estimate of about 700,000 deaths a year (including HIV, TB and malaria, and described by the Review as likely an underestimate); the projections of 10 million deaths a year and a cumulative $100 trillion of lost output by 2050; the list of antibiotic-dependent procedures (gut surgery, caesarean sections, joint replacements); the demand-side and supply-side intervention packages, including delinked incentives; the catalogue of alternatives (phages, lysins, antibodies, probiotics, immune stimulation, peptides). All figures from this source are presented in the book as the Review’s 2014-2016 estimates and projections, not as current measurements.

C41 - Silver LL, “Challenges of Antibacterial Discovery,” *Clinical Microbiology Reviews* 2011;24(1):71-109. https://pmc.ncbi.nlm.nih.gov/articles/PMC3021209/ - Read level: key sections. Used for: the discovery-void analysis (Walsh’s “no major classes introduced 1962-2000”; the 1978/1987/1952 origins of the 2000s classes; “no successful discoveries of novel agents since 1987… a discovery void of unknown extent”). The book presents this as the verdict of a 2011 review, still widely quoted in the field’s literature.

C42 - Joint Committee on the Use of Antibiotics in Animal Husbandry and Veterinary Medicine (chair: M. M. Swann), report presented to Parliament - as recorded in the Minister of Agriculture’s statement, Hansard, House of Commons, 20 November 1969. https://api.parliament.uk/historic-hansard/commons/1969/nov/20/use-of-antibiotics-in-animal-husbandry - Read level: the ministerial statement in full. Used for: the committee’s finding on resistant strains from livestock use; the feed/therapeutic classification; the prohibition of penicillin and tetracyclines in feedingstuffs.

C43 - American Academy of Allergy, Asthma & Immunology, “Penicillin Allergy Evaluation Should Be Performed Proactively in Patients with a Penicillin Allergy Label” (position statement, approved 31 August 2023). https://www.aaaai.org/ - Read level: key sections. Used for: penicillins as the most commonly implicated allergy drugs; the ~10% population / up to 15% hospitalised label

rates; the overwhelming majority tolerating penicillin on evaluation; the harms of the label (longer stays, more perioperative infections, higher mortality; costlier broader-spectrum substitutes; resistance and C. difficile); the 4-10% reaction rate on direct challenge of low-risk patients; delabeling as a stewardship component.

C44 - World Health Organization, *WHO Model List of Essential Medicines*, 24th list (2025). https://iris.who.int/ - Read level: the antibacterials section. Used for: benzylpenicillin, benzathine benzylpenicillin, procaine benzylpenicillin and phenoxymethylpenicillin on the current list.

C45 - GBD 2021 Antimicrobial Resistance Collaborators, "Global burden of bacterial antimicrobial resistance 1990-2021: a systematic analysis with forecasts to 2050," *The Lancet* 2024;404(10459):1199-1226. https://pmc.ncbi.nlm.nih.gov/articles/PMC11718157/ - Read level: key sections (abstract, findings and introduction read in full; methods and appendix skimmed). Used for: the 2021 burden estimates (1.14 million deaths attributable to bacterial AMR, 4.71 million associated); the 1990-2021 age divergence (under-five deaths down more than half; deaths among adults 70 and older up more than 80 per cent); the 2050 reference forecast (about 1.9 million attributable, 8.2 million associated); the better-care scenario (about 92 million deaths avertable between 2025 and 2050).

The 1940-1941 primary papers

S-H2 - Chain E, Florey HW, Gardner AD, Heatley NG, Jennings MA, Orr-Ewing J, Sanders AG, "Penicillin as a Chemotherapeutic Agent," *The Lancet* 236(6104):226-228, 24 August 1940. Read level: full text (scanned original). Used for: the mouse-protection experiments (including the final series: 25 of 25 untreated controls dead against 24 of 25 treated surviving); the toxicity battery; urinary excretion; the funding acknowledgments (Rockefeller Foundation, Medical Research Council, Nuffield Trust).

S-H3 - Abraham EP, Chain E, Fletcher CM, Gardner AD, Heatley NG, Jennings MA, Florey HW, "Further Observations on Penicillin," *The Lancet* 238(6155):177-189, 16 August 1941. Read level: full text (scanned original). Used for: the Oxford unit definition; the ceramic culture vessel and repeated harvesting; the yields (about 100 litres of broth to roughly one gram of therapeutic material, a third of it recovered); the extraction chemistry (amyl acetate and ether, charcoal, alumina chromatography, freeze-drying); the pyrogen fractions; the case series, including Case 1 (the policeman, admitted 12 October 1940, infection from a sore at the corner of the mouth, sulphapyridine failure, penicillin from 12 February 1941, died 15 March) and the doses recovered from his urine for a later child patient.

Points of disagreement the book leaves open

The mouse experiment date. C1 prints 25 May 1939; Oxford's history page (C14) and the August 1940 Lancet paper (S-H2) place it on 25 May 1940, and the 1939 chronology of the programme's funding supports 1940. The book uses 1940 and treats the 1939 in C1 as a misprint.

The number of wartime producers. Sources give twenty (Neushul, as relayed by C29) or twenty-one companies (Richards via C15; Quinn, C18). The book says "some twenty companies."

The two price series. The wartime series (government purchase prices, $200 to $6 per million units, from Richards via C15) and the postwar commercial bulk series (FTC, C39, from $6,000 per billion units in 1945 to $34.50 in December 1955) meet at the same point - $6 per million units equals $6,000 per billion - but they are different measurements, and the book keeps them distinct.

Moyer's foreign patents. A widely repeated claim that Andrew Moyer took out foreign penicillin patents later bought by Commercial Solvents, Merck and Squibb could not be confirmed in the FTC report or any other source read for this book, and the book therefore omits it.

"Moldy Mary." The cantaloupe is documented; the identity of its legendary human discoverer is not - the USDA's own account treats it as unresolved (C17). The book tells the story as a legend attached to a real melon.

The 2050 burden projection. The O'Neill Review (C40) projected about ten million deaths a year by 2050 if nothing changed; the global-burden forecasting study (C45), the most comprehensive academic estimate to date, forecasts about 1.9 million deaths attributable to bacterial resistance (8.2 million associated) in 2050 under its reference scenario - a bacterial-only figure built from three decades of mortality data; the two projections differ in scope, method and publication year (2016 versus 2024) and are not directly comparable. The book presents both as projections, not counts, and treats the direction of the burden, not its magnitude, as settled.

Works consulted but not cited in the text

C20 - The Economic Times (India), report on Aurobindo's Kakinada penicillin G plant, October 2024. https://economictimes.indiatimes.com/ - Read level: full text. Consulted for the contemporary Indian penicillin G industry; the book's account of the modern industry rests on other sources and this report is not cited in the text.

C21 - Sandoz press release on the Kundl (Austria) antibiotics facility, 21 March 2024. https://www.sandoz.com/ - Read level: full text. Consulted for the remaining Western API manufacturing footprint; not cited in the text.

C22 - Rolinson GN, "Development of the Semi-synthetic Penicillins and Cephalosporins," *International Journal of Antimicrobial Agents* 2007. https://pubmed.ncbi.nlm.nih.gov/18248798/ - Read level: abstract only. Consulted for the Beecham semisynthetic programme's retrospective outline; the book's Beecham account cites C23, C31 and C32 instead, and this paper is not cited in the text.

C35 - Birkinshaw JH, Oxford AE, Raistrick H, "Studies in the Biochemistry of Micro-organisms. XLVIII. Penicillic Acid, a Metabolic Product of *Penicillium puberulum* Bainier and *P. cyclopium* Westling," *Biochemical Journal* 1936;30(3). https://pmc.ncbi.nlm.nih.gov/articles/PMC1263039/ - Read level: full text. Consulted as context for the Raistrick laboratory's mould-metabolite programme in the 1930s. The paper concerns penicillic acid, a different substance, not penicillin; it is not cited in the text.