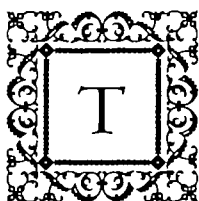


Rewriting Medical History: Charles Best and the Banting and Best Myth

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THE 1923 Nobel Prize in Physiology or Medicine was awarded to Frederick Banting and James J. R. Macleod for the discovery of insulin. Banting divided his share of the prize money equally with Charles Best; Macleod split his share with James B. Collip. As the discovery of insulin passed into medical history, it was seldom described in the most obvious ways, as the product of the researches of Banting and Macleod; or of those of Banting, Macleod, Best, and Collip. Instead the discovery of insulin was almost universally credited to Banting and Best.

In *The Discovery of Insulin*, published in 1982, and its sequel, *Banting: A Biography* in 1984, I documented the ways in which Banting, who had clashed constantly and bitterly with Macleod and Collip during the insulin research, worked assiduously and with considerable success during his lifetime to spread the view that he had discovered insulin with the help of Best. Best had been his student assistant, one of two recent graduates in Honours Physiology and Biochemistry assigned by Macleod to work with Banting for pay. There is convincing evidence that Best won a coin toss with the other student E. C. Noble, to see who would work first, and then, with Noble's approval, stayed on with Banting for the duration. Best's job was to do the tests, mostly of blood sugar, that Banting required. After one confrontation about Best's methods, during which the two almost came to blows, they settled down and worked harmoniously. Their research adventure, directed by Mac-

A shorter version of this paper was read at the Seattle meeting of the American Association for the History of Medicine, 1 May 1992.

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ISSN 0022-5045 VOLUME 48 PAGES 253 TO 274

leod, became increasingly complex, tense, frustrating, and then triumphant. The greatest frustration was probably the failure of the first clinical test of their pancreatic extract, on Leonard Thompson, on 11 January 1922. The triumph came several days later when extract purified by Collip brought dying diabetic children back to life and health.

Banting based his claim for precedence on having had the idea on which the research was originally based and on the soundness of results obtained without practical help from either Macleod or Collip. The credit he gave to Best was sometimes extremely generous, at other times *pro forma*. Banting's loyalty to Best was strongest when he recalled the moral support the younger man gave him during a personal crisis in the spring of 1922. Banting never credited Best with specific ideas or proposals that advanced the research. Sometimes Banting thought of Best as his equal partner, at other times as a kind of officer's batman. Many of Banting's friends and admirers believed that he alone was the discoverer of insulin, and that Best had been just the student helper. The full documentary record of the 1921–22 research tends to support that view of Best's contribution, but it also severely undermines Banting's estimation of his own role, and re-establishes the vital contributions of Macleod and Collip.

This essay traces the continuation and elaboration of the Banting and Best myth after Banting's 1941 death. Best then became the chief spokesman for the view that the two young researchers had discovered insulin on their own in 1921, and had been deprived of their full share of the consequent glory because of the machinations of Macleod, Collip, and their friends. During the next thirty years Best and his friends championed a Banting-and-Best version of the discovery of insulin which featured a substantial enlargement of Best's part in the story. Their version of historical correctness became increasingly convoluted and difficult to maintain as the years went by, however, because of outsiders' interest in the events of 1921–22, the surfacing of new documentary evidence, and the obstinate refusal of the fourth party in the research, J. B. Collip, to play ball. Charles Best himself seems to have had a deep psychological hunger for recognition as a discoverer of insulin. Ironically, by the end of his life, the view of Banting and Best as insulin's discoverers was beginning to backfire, because it had established the pre-conditions for other historians to deny any Toronto researchers a significant role in insulin's discovery.

* * *

Ironically, as well, by the last years of his life Frederick Banting had developed an intense dislike of Best. As Head of the Department of Medical Research at the University of Toronto, as well as the most famous person in Canada, Banting was in a position to frustrate the various ambitions of Best, the Head of the Department of Physiology, who was deeply interested in creating some kind of physiological or research institute to commemorate his name, somewhat along the lines of the University's Banting Institute, opened in 1930. "Best is naive in his abject selfishness," Banting wrote in 1940 apropos of the quarrelling.¹ In the winter of 1940-41 he became further exasperated when Best, who had been lobbying strenuously to be the next Canadian medical expert in line for a liaison mission to wartime Britain, suddenly announced that he could not make the trip. Banting decided to go himself, knew that it would be a hazardous crossing, and savaged Best for his role in the confusions. A medical officer of the National Research Council, who was with Banting when he took the telephone call confirming his flight, remembered that Banting remarked on the hazards of the trip and said: "If they ever give that chair of mine to that son of a bitch, Best, I'll roll over in my grave."²

Banting's plane crashed in Newfoundland. He died there, and, to the intense annoyance of his friends,³ both his chair and control of his Department were given to Best. One of the initiatives Banting had been working on, a proposal to have the University of Toronto recognize his former rival but now close friend, J. B. Collip, with an honorary degree, also died.⁴ Best and Collip were now the surviving members of the insulin team, J.J.R. Macleod having died in Scotland in 1935. Collip moved

1. Banting War Diary, [autumn], 1940, Sir Frederick Banting Papers, Fisher Rare Books Library, University of Toronto; also Michael Bliss, *Banting: A Biography* (Toronto: McClelland & Stewart, 1984), pp. 288-90.

2. Interview with Dr. L. W. Billingsley, Nov. 30, 1983 (transcript in Bliss Insulin Papers, Fisher Rare Books Library).

3. J. B. Collip Papers, Fisher Rare Books Library (formerly privately held), Sadie Gairns to Collip, 14 June 1941: "I went so far as to tell the President that I felt it was the last person Dr. Banting would want to succeed him in the department." Miss Gairns, who had worked with Banting as his research associate, administrator, and general factotum for years, immediately resigned her appointment in the University.

4. *Ibid.*, H. J. Cody to Collip, 2 March 1941; Collip did get a D.Sc. from the University of Toronto in 1952.

from McGill University to become the Dean of Medicine at the University of Western Ontario in 1946.

Best's wartime tributes to Banting and reminiscences about their work were laudatory and reasonably modest (although some of Banting's friends would have smiled at Best's claim that the war had interrupted their plans to return to metabolic research together).⁵ But the possibility that his role in medical history might be unduly neglected was on Best's mind,⁶ and in 1946 he used twenty-fifth anniversary celebrations of the discovery to say a lot about his contribution.

"I have paid my tribute to Banting's initiation of our researches, to his surgical ability, his perseverance and to his 'older brother' relation to me, on many previous occasions," Best stated in a major address to the American Diabetes Association. And then he continued: "As Banting has stated very clearly we began work in partnership. Indeed that was the only possible relationship when both of us were without a stipend and each was responsible for a definite aspect of the research. . . . it is difficult to imagine a closer working arrangement than that which developed between us." In describing their partnership Best talked of how Banting had been motivated to go into the work after seeing a schoolmate die of diabetes (a story which appears to be a complete fabrication) and how he, Best, "had joined Professor Macleod's department to work on sugars," in large part because of an aunt who had died of diabetes. Best claimed to have known the techniques of "alcoholic fractionation" and to have been using ethyl alcohol in their preparation of pancreatic extracts for "some weeks" before Banting mentioned to him that Macleod had recommended its use. He and Banting produced "adequate evidence that insulin could consistently be extracted from pancreas and that all the signs and symptoms of diabetes in dogs could be controlled," he claimed, and then they went on to test their extract on a human diabetic, Leonard Thompson. "The actual clinical result was not striking," Best admitted, "but has, of course, considerable historical significance. It was my privilege to make this extract. In fact, I depancreatized

5. C. H. Best, "Reminiscences of the researches which led to the discovery of insulin," *Can. Med. Assoc. J.*, 1942, 47, 398-400.

6. See "Copy of Letter Dr. Best might send to Dr. Ettinger some time," 1922 File, W. R. Feasby Papers, Fisher Library, University of Toronto. Ettinger had made a published reference to the discovery of insulin by Banting and an unnamed "college youth not yet graduated." In about 1945 Best wrote Ettinger a long letter outlining his role and commenting, "I must have had a subconscious urge to make a record of these matters. Only a very small stimulus was needed to call forth an outpouring. . . ."

the likely looking steer and carried through the fractionation and testing up to the stage when the material was given to the human subjects." Best referred to his and Banting's "first paper," given, he said, on 14 November 1921. He paid tribute in passing to Macleod and Collip "for their contributions to the development of insulin."⁷

Best's principal claims in this address—about the origins of the "partnership," his contributions to the preparation of their pancreatic extracts, the certainty of their results in their dog research, his role in the first clinical test, and the timing of the presentation of their work—would be repeated and explained obsessively for the rest of his life. All of these claims were unprovable, misleading, or inaccurate.

Best's closest friend in the medical world was Sir Henry Dale, the very distinguished British physiologist who had come out to Toronto in 1922 to investigate insulin. Dale had advised young Best to get out of Toronto for his graduate work. Best went to England to do his doctorate under Dale. Dale became his mentor and lifelong booster. In 1950 Dale nominated Best for a Nobel Prize for both his later research on choline and for his general achievements, including the insulin work. "Everything which I learned [in 1922] convinced me that Best had had at least an equal share with Banting in the essential discovery," Dale wrote in his nomination, "and everything which has happened since has strengthened that conviction." Despite repeated nominations by Dale, and probably others (including a bizarre nomination by his friends in the International Diabetes Federation for a Peace Prize), Best was not awarded a Nobel Prize.⁸

It was a glittering medical occasion, however, when the Best Institute was finally opened at the University of Toronto in 1953, with Dale as principal speaker. Naturally his address contained a handsome summary of Best's role in the insulin work:

The collaboration was to be one of intimate understanding, with no question between the two participants of any but an equal sharing of its success. . . . Macleod, still quite naturally sceptical of any successful outcome to the enterprise, left Toronto to spend the summer in Europe; so that it was in an otherwise deserted Department that the two young and inexperienced but determined enthusiasts . . . solved the main problem without further aid from, or communication with, anybody. As a result they had the clear evidence of the existence

7. C. H. Best, "The discovery of insulin," *American Diabetes Association Proceedings*, 1946, 6, 87–93; also C. H. Best, "The discovery of insulin," *Physician's Bulletin*, 1947, 12, 16–18.

8. Dale to Members of the Nobel Prize Committee of the Caroline Institute, 9 January 1950, Sir Henry Dale Papers, Royal Society of London; see Dr. F. Genitzen to Dale, 24 July 1953 *et seq.*, Nobel Prize Files, Dale Papers, for the Peace Prize nomination.

of insulin, and of the possibility of obtaining it in a separate solution, and of eliciting its effects by artificial injection, by the time Macleod returned from Europe.⁹

Some weeks later Dale learned through an acquaintance of the extreme discomfort that one of the guests at the opening, the Dean of Medicine of the University of Western Ontario, J. B. Collip, had felt about not hearing his name mentioned at all in connection with the events of 1921–22. “I appeared to have put my head, unwittingly, into a wasp’s nest,” Dale wrote to Best, asking him to insert for the published version of his address a two-sentence reference to Collip’s contributions. “This is not the first hallucination which Collip has had in recent years,” Best noted sourly in his reply. He tinkered slightly with Dale’s wording because, as he put it, “the first clinical trial of insulin was with a material which I made and to which Collip made no contribution whatever.”¹⁰

Dale’s curiosity was piqued. He recalled a statement he had received twenty years earlier from a Canadian physiologist arguing for the importance of Collip’s role, looked it up, and in February 1954 wrote Best asking for “the straight appraisal of the whole situation. . . . I want to know that I really do know exactly what happened, on first-hand authority.” If he had in fact underestimated Collip’s contribution, he told Best, he wanted to put it right.¹¹

Best answered Dale’s queries with a seven-page statement of his case, focussing on Collip’s minor role. Best claimed to Dale, for example, that he and Banting had been the first to record a hypoglycaemic condition after the administration of pancreatic extract—a statement which the record does not support. In denying a canard that Collip had joined the group because the work was at a standstill, Best claimed to have developed extraction procedures, using acidified alcohol, which “gave us many lots of excellent insulin and . . . kept one of our completely depancreatized dogs in fine condition for 70 days”—another half-truth, for an autopsy in fact revealed that the dog had not been completely depancreatized. Best described making the extract for the first clinical test and quoted Banting’s comment in his Nobel Prize lecture that “There was a marked reduction in blood sugar and the urine was rendered sugar free.” Best did not quote Banting’s next sentence, which reads, “However the high protein content rendered the continuous use undesirable,

9. Dale, “Opening address,” *Diabetes*, 1954, 3, 30–35.

10. Dale to Best, 5 November 1953, Dale Papers, Royal Society; reply, 9 November.

11. Dale to Best, 16 February 1954, Dale Papers.

due to formation of sterile abscesses.”¹² Best told Dale about a physical confrontation that had taken place in the laboratory between the two of them and Collip, described Collip’s inability to make insulin in large-scale batches, described the hard work he, Best, had done trying to rediscover insulin, and claimed that by substituting acetone for alcohol in the extraction process he had made that breakthrough. He also claimed that he was appointed “Director of the Insulin Division of the Connaught Laboratories, January 1, 1922,” a grossly misleading statement about an appointment actually made months later, possibly with retroactivity.

Best suggested that Dale place his letter on file with the Royal Society and concluded with a statement of his bitterness:

I have to confess that even after all these years the revival of the memory that Prof. Macleod and later Collip instead of being grateful for the privilege of helping to develop a great advance, used their superior experience and skill, with considerable success, in the attempt to appropriate some of the credit for a discovery which was not truly theirs, still makes me warm with resentment.¹³

Not only Dale, but the whole world wanted to know more about the discovery of insulin. In 1954–55 the Metropolitan Life Insurance Company proposed to sponsor a filmstrip about the event, and the National Film Board of Canada hoped to make a feature film about this great Canadian achievement. Both firms sought Best’s advice; both firms hired as consultant a colleague and admirer of Best’s, Dr. W. R. Feasby, who had written a considerable amount of medical history. Various drafts of the treatments and proposed scripts of these projects were passed to Feasby and Best for comment.

Both Best and Feasby told the would-be popularizers that the discovery of insulin was made by Banting and Best while working on their own in 1921. Best urged the National Film Board’s writer, Leslie Macfarlane (whose greatest claim to fame today is to have written many of the original Hardy Boys books) to disregard Macleod’s claim that he assigned Best to work with Banting (“He did not assign me. I volunteered to work for nothing because I had a family interest in Diabetes, because I was going to work on Diabetes for another year anyway and because I was greatly stimulated by Fred Banting. There was no tossing of coins.”) and suggested that the movie begin with a meeting between Best and Banting

12. F. G. Banting, “Diabetes and Insulin,” Nobel lecture, delivered at Stockholm, 15 September 1925 (Stockholm, 1925).

13. Best to Dale, 22 February 1954, Dale Papers; copy in 1921 File, Feasby Papers.

in the autumn of 1920, six months before they actually met. The end of the movie, Best thought, should come just after "our joy at hearing the encouraging result" of the first test on Leonard Thompson. Presentation of the first paper, which Best now claimed he wrote, might also be dramatized. When Macfarlane showed him a draft treatment of the screenplay, Best suggested extensive rewriting to eliminate the other student, Clark Noble,¹⁴ and to have Best explain to Banting on their first meeting how faulty chemical procedures had probably been responsible for previous failures to isolate the antidiabetic principle.¹⁵

Macfarlane's draft scripts caused Best certain difficulties because the writer had been able to get access through Banting's widow to unpublished accounts of the discovery of insulin that Banting had written in 1922 and 1940; he had also studied their joint insulin notebooks in some detail. This research raised factual questions Best had not considered. Banting stated, for example, that Macleod was skeptical of their research results when he returned from Scotland in September 1921. Best told Macfarlane it was not that way at all. "Macleod was impressed," Best claimed. "But he was also chagrined. He found it difficult to believe that these two young men had solved a riddle that had baffled trained investigators for years. . . . He did not question their figures or findings. . . . I would not say that we were on the threshold of a great discovery; I think the discovery was complete in so far as the experimental diabetes goes." In another version Best claimed, "There was no doubt in Macleod's mind when he looked over our data that we had the internal secretion of the pancreas."¹⁶

Best suggested more changes in Macfarlane's script to counter Banting's statements that Best had sided with Macleod in some of the quarrels and/or that he had taken orders from either Banting or Macleod. "We worked together as partners," Best wrote—as usual—but suggested to Macfarlane that at a crucial stage in extraction Banting should say, "This is Charley's idea." He told Macfarlane that certain innovations in the research, such as the use of foetal calf pancreas—their first advance from

14. Clark Noble, who rejoined the insulin team in February 1922 and has his name on several of the key papers, became a general practitioner in Toronto and lived until 1977. He was deeply embittered by Banting's and then Best's neglect of his contributions to the insulin work. He intensely disliked Best. A small collection of his papers is held by the Fisher Library.

15. Best to Mr. MacFarlane, undated, National Film Board file, Feasby Papers; Best to MacFarlane, 17 August 1954.

16. Best to MacFarlane, 17 August 1954, Feasby Papers, NFB file; dictation from Best's office, 1 March 1956, Feasby Papers.

atrophied dog pancreas—took place in the summer of 1921 before Macleod returned, but had to back off from that claim when Macfarlane found the correct November dating in the notebooks. Best also warned that Macfarlane's proposal to dramatize the fights and confrontations, as described by Banting, would lower the dignity of the story. "In more mature countries they might make fun of it if it is too literal and earthy, and 'crude' would be the word that some Englishmen might use."¹⁷

The film strip and the feature film projects both ran into trouble because Collip, supported by the president of his university, Ed Hall, a former colleague of Banting's, insisted that it would be wrong and pointless to resurrect these issues while the principals were still alive. The sponsors of the filmstrip backed off because of the controversy. One of the Commissioners of the National Film Board, Dr. A. W. Trueman, came to Toronto and interviewed Best and Feasby. Who made and who gave the first insulin, he asked? "I answered them with the truth as I know it," Best told Feasby, "that Banting and I had worked alone from May 'till December, and Collip had . . . nothing to do with making the first extract given to a human being, and that he had made a contribution which was later used in some of the processes for making insulin . . . and it was not an essential step." Feasby again suggested to Trueman that "you could stop the story on January 11, 1922. Right there and then, and then you don't have to bring anybody else into it except Macleod, Banting and Best. You don't have to mention Collip." Would that leave an opening to "the enemy," Feasby wondered in reporting this conversation to Best. "Whether to bring up the business about Thompson getting an abscess at the site of the injection. . . . I went into that with him, and told him that that was an unlucky accident that it didn't prove that the extract was impure at all, merely proved that he was highly susceptible to infection, and maybe the syringe and the needle were dirty . . ." "Dr. Best is terribly fussy and won't allow the slightest exaggeration," Feasby told Trueman. "Everything has to be qualified."¹⁸

After investing \$15,000 in Macfarlane's work, the National Film Board decided drastically to scale down its insulin project. It eventually released a short film, "The Quest," which slid over some key issues while

17. Best to Feasby, "Comments on Mr. MacFarland's Script of *The Seekers*," NFB file, Feasby Papers; Dictation from Best's office, 1 March 1956; MacFarlane Comments on Dr. Best's notes on February 27th outline; Best dictation, transcribed 20 March 1956.

18. See correspondence in both the Filmstrip and NFB files in the Feasby Papers, esp. Collip to Feasby, 17 July 1956; Collip to Wallace Troup, 30 May 1956; Best dictation for Feasby 27 April 1956; Feasby dictation for Best, 27 April.

substantially glorifying Banting and Best. In the Canadian medical and scientific community this and other attempts to dramatize the discovery of insulin were seen as embarrassing "hot potatoes." The head of Canada's National Research Council, Dr. E. W. Steacie, told the Film Board people that "it was a pity that Dr. Best, a man of undeniably great gifts, had devoted so much time to building up his own part in the insulin discovery far beyond its actual importance."¹⁹

Best's control of history was significantly challenged with the 1954 publication in the *Journal of the History of Medicine and Allied Sciences* of a major article, "A Reappraisal of Researches Leading to the Discovery of Insulin," by Dr. Joseph H. Pratt, an American physician with a lifelong interest in diabetes. Pratt concluded that Collip's contribution was essential in furnishing the clinicians "with the first insulin ever to be used successfully in the treatment of diabetes," and argued powerfully that all four members of the team deserved recognition. Best helped Feasby draft a reply to Pratt aimed at correcting the "errors of fact and several omissions and misinterpretations" in Pratt's article.²⁰

"Those who know Charles Best will never doubt his ruthless honesty," Feasby wrote in footnote number 1 to his article, "The Discovery of Insulin," published in the *Journal of the History of Medicine and Allied Sciences* in 1958. "Perhaps it stems from years of brilliant and painstaking research, perhaps it is inherent in his English Maritime stock, but his meticulous and precise rendering of any fact, with all its relevant modifying factors, is well known." Feasby's rebuttal to Pratt attempted to argue the case that "convincing proof of the presence of insulin was available in the summer of 1921, when they were working alone and only on depancreatized dogs. The discovery of insulin was complete before any attempt was made to apply it to the human species." To make this case, Feasby and Best offered a claim, which had its foundation in a mistatement in Banting and Best's first paper,²¹ that Banting and Best's notebooks reveal seventy-five instances, without exception, in which their extracts caused a definite lowering in the blood sugar of diabetic dogs — "no one could have doubted that a therapeutic principle for depancreatized dogs had been discovered." The paper noted that Banting and Best's ex-

19. Leslie McFarlane memo to Nick Balla, 2 August 1956, "The Quest" file, National Film Board Archives, Montreal.

20. Joseph H. Pratt, *J. Hist. Med. Allied Sci.*, 1954, 9, 281–89; Best draft of "The article to be written by W. R. Feasby, 18 November 1955, 1955 File, Feasby Papers; W. R. Feasby, *J. Hist. Med. Allied Sci.*, 1958, 13, 68–84.

21. Michael Bliss, *The Discovery of Insulin* (Toronto: McClelland & Stewart, 1982), pp. 94–95.

tracts of foetal calf pancreas were very potent. It repeated a new argument Best had recently made under his own name²² that in preparing for the first clinical trial Banting had vetoed Best's suggestion that they use foetal pancreas, a veto which proved to be an "unwise move."

This Feasby/Best account also stressed Best's achievements after Collip ran into production problems. "In February 1922 when Collip left the group, Best had to resume responsibility for the production of insulin . . . Best's modifications consisted essentially in the use of acid acetone as an extractive and of a fine wind tunnel for rapid concentration of extracts. This . . . provided all the insulin used in Toronto for experimental and clinical work in the later winter, spring, and summer of 1922." Both the first and last parts of this statement were palpably untrue (Collip did not leave until the end of May; by July the most important supplier of insulin for use in Toronto was Eli Lilly and Company).

Best's claim to have rediscovered insulin, along with other aspects of the article, would have been thrown into jeopardy if the *Journal* had been able to proceed with a proposal by Lloyd Stevenson, Banting's first scholarly biographer, to accompany Feasby's article with an account of events written by J.J.R. Macleod in 1922. This document had been written at the request of the Chairman of the University of Toronto's Insulin Committee, who was trying to find out what had really happened. Banting and Best also wrote accounts at that time. Macleod's account, which detailed his extensive involvement directing the research and making explicit suggestions to Banting and Best, had been sent from Scotland to Ed Hall at Western in 1949, and he had sent a copy to Stevenson. Stevenson now wrote Sidney Smith, the president of the University of Toronto, enclosing a copy of the document and asking approval for its publication. Smith asked Best's advice.

Best drafted a letter for Smith to send to Stevenson, challenging the accuracy of Macleod's account, and informing him that it would only be fair to release all the unpublished accounts simultaneously. Asked to produce them, Best was able to locate Banting's but not his own. Best again insisted that, if Macleod's 1922 account was going to be published, then Banting's document, which contained a one-sided version of his confrontation with Collip, should be published along with it. Best advised Smith to forbid the publication of any of the documents on the ground that they were the property of the University of Toronto. Smith

22. C. H. Best, "The first clinical use of insulin," *Diabetes*, 1956, 5, 65-67.

forbade Stevenson, and Stevenson gave up. Stevenson's views of Feasby's special pleading were acidic, as he ended a long dissection of Feasby's article with the unintentionally ironic comment: "Fortunately Professor Best's unrivalled reputation in science is proof against accidental injury by the clumsy zeal of injudicious admirers."²³

By 1956 Best was involved in several projects designed to secure his role in the insulin adventure. On one occasion he literally asked the director of the Connaught Laboratories to rewrite the history of the discovery of insulin published in one of its handbooks.²⁴ He urged the American Diabetes Association not to grant Collip its Banting Medal and Banting Lectureship until Feasby's answer to Pratt's article was published—then suggested that Collip get a Medal without being asked to give a lecture, and sent a packet of documents, including Banting's intemperate views on Collip, for the ADA Archives.²⁵

More significantly, Best was haunted by the might-have-been if foetal pancreas had been used in the first clinical test—and possibly by knowledge that Pratt had made extracts of pancreas following Banting and Best's published methods, and found them ineffective.²⁶ Best asked several of his junior colleagues to make extracts of foetal pancreas and try them on diabetic patients. Their conclusion, published some years later, was that "Fetal calf insulin, prepared by the original technic of extraction and purification used by Banting and Best in 1921, exerts the same effect in diabetic patients as does modern Crystalline Zinc Insulin. The fetal calf insulin produced no local reactions and presumably would have provided a useful source of hypoglycemic material for the initial treatment of cases of diabetes mellitus in Toronto in 1922. . . ."²⁷ Best regularly cited these experiments when he described his mistake in letting Banting talk him out of using foetal pancreas for the first test on Thompson. "One cannot go back and make changes in history," he told a friend about what had been an attempt to do exactly that.²⁸ The

23. Lloyd Stevenson to Sidney Smith, 18 May 1956, "Hot" File, Feasby Papers; Best to Sidney Smith, 17 August 1956; Smith to Stevenson, 24 August; Best to Feasby, 1 September; Stevenson to John F. Fulton, 23 January 1957, copy in Collip Papers, J. B. Collip Personal File, Faculty of Medicine, University of Western Ontario Library.

24. Best to Kenneth Ferguson, 6 November 1956, "Insulin-A Handbook" File, Best Papers, Fisher Library.

25. Best dictation, 17 January 1957, 1957 file, Feasby Papers.

26. Pratt to Ed. Hall, 14 July 1949, Collip Papers, University of Toronto.

27. J. M. Salter, O. V. Sirek, M. M. Abbott and B. S. Leibel. "A clinical assessment of fetal calf insulin," *Diabetes*, 1961, 10, 119–21.

28. Best to Carlos Reed, 28 April 1956, Feasby Papers.

methods Best advised his associates to use in those 1956 experiments did not in fact correlate with those described in Banting and Best's notebooks or publications.²⁹ It seems to have been a procedure developed after Collip's innovations.

As he studied Macleod's and Banting's 1922 accounts, Best rued his own relative silence in that period. "I think I was blind in those days. I shouldn't have been working. I should have been fighting. . . . Maybe what I should have done, really the smartest move, would have been to have gone to Harvard or some other great American institution, and taken a Ph.D. there and got a group around me and hit the insulin story hard in competition with Macleod. That really would have been a move, but I was just too Canadian to do it. . . ."³⁰ Now thirty-five years later, Best drafted a formal letter to Feasby denying the accuracy of Macleod's 1922 claim to have made specific suggestions to Banting and Best.

Professor Macleod selected the successful procedures which Fred Banting and I used, and claimed them, as it were, for his own. . . . I am wondering . . . whether he did suggest a specific procedure—any specific procedure—which we used. . . . When Fred Banting and I discussed the use of ice and salt to cool the mortar containing the Ringer into which we were going to put our pancreas, there was certainly no mention of Professor Macleod ever having made this suggestion; it just seemed the right one. . . . after I had used alcohol to get rid of proteins . . . Fred did say, rather apologetically: "I think Professor Macleod said something about the use of alcohol." Certainly Fred had never mentioned it to me, and certainly Macleod never mentioned it to me. We discussed the use of acid together, that is Banting and myself, and he left the concentration entirely up to me. . . .

I really think that what happened is that Professor Macleod confused what he taught me as a student with the advice that he thinks he gave to Banting and me.

In a similar vein Best tried to deny that Macleod had directed and influenced his work in trying to rediscover the process. He skated around Macleod's statements of fact about that research with unprovable phrasing such as "His findings only confirmed the conclusions to which I had already come," and he essayed new statements of fact, "I had been using the hot air evaporation of the extracts . . . long before Professor Macleod ever returned from Scotland," which were not true. "It makes me feel a

29. Although the paper states that "Banting's and Best's original notes were consulted," Dr. O. V. Sirek confirmed to the author that the consultation was by Best, who told them how to make the insulin. The procedure was considerably more elaborate than any method used by Banting and Best before 23 January 1922.

30. Best dictation, 27 June 1956, Feasby Papers.

little bit small to debate these matters," Best wrote to Feasby, "because I did learn a very great deal from J.J.R. Macleod. . . . His statements about his contributions or his suggestions . . . were made after successful isolation of insulin—and it is perhaps only human nature to claim some share and credit for procedures that have given important results."³¹

Best's memory was rudely jogged in the spring of 1957 when he finally discovered his own four-page 1922 account of events. Suddenly it would be more difficult for the man who wrote in 1922 that "Dr. MacLeod asked me to assist Banting in this work . . ." to continue to maintain that he had actually volunteered to enter into a partnership.³² There were other difficult statements Best had written in 1922—"He [Macleod] advised making extract of degenerated gland with alcohol. . . . we had the benefit of Dr. MacLeod's advice. . . . Extract from the pancreas of foetal calves . . . originated from an idea of Banting's. . . ."—which undermined his own recent claims.³³

With the 1922 documents now before him, Best wrote another long letter to Feasby about the events of 1921–22. "I made no serious attempt in that [1922] letter to claim all possible credit for myself," he wrote. ". . . The idea of writing for posterity never occurred to me then. . . ." Now he was writing for posterity, and in thirteen pages, in which he virtually rewrote his own document of thirty-five years before, he claimed all possible credit. Best took the tack that Macleod's advice and suggestions came only after he had already made critical innovations, and he explicitly accused Macleod of leaguering up with Collip to steal the glory. Macleod should have had Best nominated for a Nobel Prize, Best thought. Or the glory would have followed if he had had some other "influential patron or supporting group." "With a bit of support at the right time my, shall we say, indispensable contributions might well have made me a Nobel Laureate. . . ." Best now felt that Banting should have refused the Nobel Prize altogether because of the exclusion of his partner.³⁴

31. Best, Proposed letter to Dr. William Feasby, 17 May 1956, 1956 file, Feasby Papers.

32. The germ of truth in Best's recollections lay in the fact that he had volunteered to stay on with Banting rather than give way to Noble. He would have no assurance of being paid for this part of his stint—though in fact Macleod arranged retroactive compensation for both Banting and Best.

33. See Michael Bliss, ed., "Banting's, Best's, and Collip's accounts of the discovery of insulin," *Bull. Hist. Med.*, 1982, 56, 554–68.

34. Best to Feasby, 6 May 1957, "Hot" file, Feasby Papers. At several other times Best reflected on his lack of powerful friends in 1921–22, sometimes suggesting that he was shut out by the parochial Canadians because he had been born in the United States (albeit of Canadian parents). As this paper indicates, Best had developed an intense sense of medical politics and patronage, almost certainly from the tutelage of Dale.

In London, England, in July 1957 Best delivered a prestigious Oslerian Oration on "The Discovery of Insulin." It was yet another rehashing of events from the time Macleod had asked him to "join forces" with Banting through the long summer together in which they had discovered insulin, his having gone to the Connaught Laboratories to get an appointment from 1 January 1922, the first clinical test when Banting had talked him out of using the foetal extract which experiments in the 1950s showed to be so potent, Collip's loss of ability to make extract, Best's rediscovery of insulin, and subsequent controversies. Best quoted highly selectively from the three 1922 accounts and further blackened Collip's and Macleod's reputations. "The seven months of harmonious, intensive work which Fred Banting and I carried on together in 1921, was the period which we both considered to be that of the Discovery of Insulin," Best concluded. "The picture of those days which I have tried to paint for you, is the one that I hope you will carry away in your minds." Some of the scientists who heard this address carried away a picture of a man whose obsession had become an embarrassment.³⁵

Best had chosen Feasby to write his biography. Best worked closely with Feasby, whose eyesight was not very good, often dictating reminiscences and memoranda. There were further discoveries and new suggestions and problems to be considered. Best finally saw the letters, for example, which had been written in 1923 by a friend of Banting's to prominent diabetologists soliciting their views on Banting's role in the insulin discovery; the testimonials were then used in the campaign to have Banting honored. No one had asked the experts' opinion of Best's contribution. "What a joke it would be," Best told Feasby in January 1958, "to write a letter, if it were true and appropriate, to the same people who are still alive, and say that a move is underfoot . . . and give Dr. Joslin, Dr. Frederick M. Allen and Dr. Russell Wilder, all of whom are still alive, give them an opportunity to say what they thought of the work of the

35. Best, "The Discovery of Insulin," Oslerian Oration, 12 July 1957, 1922 file, Feasby Papers; the late Sir Frank Young commented to me several times on the embarrassment he felt for Best on this occasion. Best, however, was pleased to write to Feasby that several of his audience asked him afterwards why he had not won the Nobel Prize. Best to Feasby, 15 July 1957, Feasby Papers. Best added a copy of his Oration, along with other documents, to the packet originally given to the Royal Society in 1954. It is now in the Wellcome Institute. Sir Henry Dale added several of his own accounts of events from his point of view, notably his relations with Macleod in the early standardization of insulin. Dale appears to have disliked and/or been highly jealous of Macleod, which colored his version of the insulin story. As well, Dale's own instincts for self-promotion, which also took him to the point of distorting the historical record, seem evident in the self-serving, self-obsessed documents he generated. A critical biography of H. H. Dale is badly needed.

junior partner. . . . I think some move by you would be interesting historically, just like the work we're doing on the use of foetal calf pancreas extract on human beings."³⁶

Another embarrassing document surfaced during the biographical research. It was a letter Best wrote Macleod on 9 August 1921, ten days after their first promising result with an injection of extract. Best had come to realize, probably because of Pratt's work, that chilling the extract had been the key to inhibiting the proteolytic action that would have rendered it inactive, and he had claimed credit for this procedure. Now he found that in the second paragraph of the August 1921 letter he had written to Macleod: "We followed your instructions in the preparation of the extract—chilled mortar, cold Ringer's sol'n, etc." Best apparently suggested to Feasby that they might omit this paragraph when quoting the letter in the biography.³⁷ Best justified such modifications of the written record on the ground that memory took precedence. "Unfortunately, the notes weren't complete," he told Feasby on another occasion. "You never do make them complete; you remember a lot of things which happened that you didn't put in the notes . . . I don't think my memory is faulty there, because anything we did over those four or five months is just as indelible as it can be on the memory of anyone . . ."³⁸ In the case of the confounding letter, however, Feasby warned Best that it would be "fatal" to omit the second paragraph. "Sooner or later someone would come upon that letter and would then say that we had been pleading a special case, whereas you and I know that we are only trying to represent the truth as it really was." Feasby decided not to use the letter at all; Best still hoped that "excerpts" might be quoted.³⁹

By 1960 Feasby had finished a draft biography of Best's life to 1925. He gave the 200-page manuscript to Best for comment. Unrevised, it was a sycophantic, hagiographic, badly-written piece of special pleading by an old admirer who had for years been little more than a mouthpiece

36. Best to Feasby, 8 January 1958, Feasby Papers; also Best to Feasby, 19 July 1957 "Hot" file. "It would seem to me fair and not unsporting at this late date if one of my friends [i.e., you] gathered together just what comments Fred Banting made about my work with him and the comments he made about Collip's contributions. . . . This material could be sent in confidence to the Minister of Health in Ottawa and could be placed in 'The Archives.'" Draft letters in his papers suggest that Feasby followed both suggestions.

37. Best to Macleod, 9 July 1921, vol. 1, F. G. Banting Papers, Fisher Library, University of Toronto; Feasby to Best, 6 August 1960, "Orig." file, Feasby Papers.

38. Best dictation, 8 January 1958, Feasby Papers.

39. Feasby to Best, 6 August 1960, "Orig." file, Feasby Papers; Best annotation on Feasby draft biography, Feasby Papers.

for Best's version of history. Best proposed extensive revisions, writing them into the manuscript in his distinctive hand. A few were minor and irrelevant, though aimed in a certain direction: "The Best house was a modest one" became "a fine but modest one"; young Charles as "a keen baseball player" was altered to be "a keen and very good baseball player."⁴⁰ The vast majority of the alterations were meant to magnify and amplify Best's role in the insulin story.

If Feasby referred to Banting talking about the work "he" had done, for example, Best would change it to the work "he and Best" had done. More substantively, Feasby described a scene, told to him earlier by Best, in which Best in May 1921 told Macleod of the "definite idea and a definite method of procedure firmly in his mind." "He realized that cold and clean conditions might be of great importance in the production of useful extracts," Feasby wrote. Best changed this to read "he realized fully that cold would inhibit the action of enzymes and that this might be of great importance in the production of a potent antidiabetic extract from pancreas."⁴¹ Summarizing the summer's research, Feasby wrote, "They had demonstrated conclusively on numerous dogs, that this substance would produce a lowering of blood sugar." Best wrote instead, "They had demonstrated conclusively on numerous dogs, that this substance would produce a prompt and extensive lowering of blood sugar and a dramatic improvement in clinical condition. They had initiated and made apparent scores of research problems which were to keep hundreds of workers busy for many decades. They had pledged their loyalty and support to each other as partners in the most momentous adventure of their lives."⁴²

These are examples of other major alterations Best suggested:

Feasby: throughout this long period of four months they had worked virtually alone and they achieved their objective . . . and had reached a point in their studies which must have given them the greatest possible satisfaction.

Best: throughout this long period of four months they had worked virtually alone, and that they had advanced far beyond their primary objective must have given them the greatest possible satisfaction. They realized fully the clinical application of their findings and rightly assumed that diabetic patients would recover as dramatically as their diabetic dogs after insulin was given.⁴³

40. Draft biography, Feasby Papers, Ch. I, pp. 11, 13.

41. *Ibid.*, III, p. 32.

42. *Ibid.*, VI, p. 89.

43. *Ibid.*

Feasby: [With foetal pancreas] they were able to secure reasonable supplies of active pancreatic extract that would consistently lower the blood sugar level of their depancreatized dogs.

Best: . . . they were able to secure reasonable supplies of very active pancreatic material that would consistently lower the blood sugar level of their depancreatized dogs. Later experiments were to show how very active and pure this fetal pancreas extract was. It passed readily through a birkefeld [sic] filter and this gave Banting and Best a sterile potent antidiabetic material. They both contributed to the development of the ideas which made this very real advance possible.⁴⁴

Feasby: in due course, [Collip] asked if he might join the group because his own research work was not progressing as satisfactorily as he would like. No action was taken on this suggestion immediately, but in due course Professor Macleod, Banting and Best agreed to have Collip carry out some experiments.

Best: in due course [Collip] asked if he might join the group. It was natural that he should be attracted by the tremendous promise of the discovery of Banting and Best. No action was taken on Collip's suggestion immediately, but later Professor Macleod, Banting and Best agreed to have Collip carry out some experiments on the further purification of insulin and on certain other problems.⁴⁵

Feasby: [Jeffrey] administered it to . . . the first diabetic ever to receive insulin . . . Leonard Thompson. Unfortunately, this produced a sterile abscess at the site of the injection, and although it had reduced the blood sugar, and reduced the amount of sugar in this diabetic's urine, its administration was discontinued. In retrospect it seems most unfortunate that this happened, because diabetics are highly susceptible to inflammatory reactions, and what had only produced a reddening in the arm of Banting and Best produced somewhat more alarming signs in Leonard, and this forced the discontinuance of this potent material. It was also unfortunate that Best's suggestion was not followed, because the foetal extract would have produced such a dramatic result that it would have overridden almost any other consideration.

One can imagine the reaction to these events, and the disappointment to Banting and to Best must have been severe.

Best: [Jeffrey] administered it to . . . the first diabetic ever to receive insulin . . . Leonard Thompson. It lowered the blood sugar, and reduced the amount of sugar in this diabetic's urine, but it was not sufficiently concentrated to have a dramatic effect in the dose given and the large amount of inert protein made further subcutaneous injections inadvisable. Presumably a larger dose of this material, given intravenously, would have had the same beneficial effect as in the diabetic dog. It was unfortunate that Best's suggestion was not followed, because the extract of foetal pancreas would have produced such a dramatic

44. *Ibid.*, VI, p. 95.

45. *Ibid.*, VII, p. 100.

result that it would have over-ridden almost any other consideration. The extract of foetal pancreas was later shown to be twelve times as potent as that made from the same amount of beef pancreas. (Extract of foetal calf pancreas made exactly as Best prepared it in 1921 has since been shown by Salter, Sirek and Leibel to be a very effective, non-irritating and satisfactory anti-diabetic preparation for both children and adult diabetics).⁴⁶

Feasby: Macleod wanted to represent the facts in a way which would benefit some who had no share in the discovery of insulin.

Best: Macleod wanted to represent the facts in a way which would benefit some who had no share in the discovery of insulin. His plan was to distribute the credit for insulin in such a way that it would not be focused, as it should have been and now is, on the two who had done all that was needed to establish the discovery and to indicate clearly the obvious pathways of development.⁴⁷

Feasby began receiving advice to the effect that it would be unwise to reopen the insulin controversy through this biography. When he re-worked some of his material as a chapter for a collaborative book on insulin, the draft was criticized by everyone who read it, from Sir Henry Dale to members of Best's own staff.⁴⁸ That book was eventually published in 1962 as *The Story of Insulin*, with Feasby's chapter heavily rewritten and toned down, though still very distorted.⁴⁹ The Best biography was never finished.

Best's determination to re-hash the past had become an embarrassment and an exasperation to even such fast friends as Sir Henry Dale. In September 1961 Dale urged Best not to republish those of his articles in which he attacked Macleod. "According to my own experience nobody now thinks of Macleod as having played any serious part in the discovery of Insulin," Dale wrote in a testimony to the effectiveness of Best's past efforts. "All the world now thinks only of Banting and Best as the essential discoverers, and, since Fred Banting's tragic death, the interest of everybody concerned to expound or commemorate the discovery of Insulin has naturally, and properly, become centred on yourself."⁵⁰

They were all old men now and Best's health was erratic. But diabetics everywhere continued to be grateful for the discovery of insulin, eager

46. *Ibid.*, VII, pp. 110–11.

47. *Ibid.*, p. 151.

48. Feasby to Best, 6 August 1960, "Orig." file, Feasby Papers; Dale to Best, 21 August 1960, Dale Papers, Royal Society.

49. G. A. Wrenshall, G. Hetenyi, and W. R. Feasby, *The Story of Insulin* (Toronto: Max Reinhart, 1962).

50. Dale to Best, 13 September 1961, Dale Papers, Royal Society.

to celebrate the anniversaries of its discovery, and thrilled to have the opportunity to hear and honor a living discoverer. Best had done a lot of work with diabetes organizations since the early 1950s. He had received an extraordinary number of honors, and, as health permitted, he continued to give talks and grant interviews about the great work that he and his partner, Fred Banting, did in 1921. The fiftieth anniversary of the discovery, celebrated in 1971,⁵¹ was a particularly busy year. Best told the old story many more times—of the voluntary partnership (he often moved the first meeting back to 1920), his introduction of the vital techniques and procedures, the certainty after seventy-five consecutive successes that they had made the discovery on their own, the world's recognition of their success when they gave their first paper at the Journal Club on 14 November (well before Collip joined the work),⁵² the unfortunate decision not to use foetal pancreas extract on Leonard Thompson, and his own rediscovery of insulin after Collip failed so badly causing the loss of lives. Best let it be known that all of the 1922 documents had been deposited in archives (they had gone to the Wellcome Institute along with commentaries by Best and Dale); none of them was published while he was alive. Feasby died in 1970. Long excerpts from his aborted biography of Best, as revised by Best, were published in a Canadian medical newspaper, *The Medical Post*, in 1971.⁵³

J. B. Collip died in 1965. Throughout all of these controversies Collip had refused repeatedly to be drawn in or offer written comment. He had always maintained that the truth about the discovery of insulin was to be found in the scientific publications of those years and that perhaps someone would be able to piece it together after they had all died.⁵⁴ Collip's friends were deeply upset at the way in which Best was able to continue his campaign of self-aggrandizement. "Charley's statements are viciously inaccurate," Ed Hall wrote to Robert Noble, in 1971, "and I think that Medical History should record the actual and true story of

51. Most anniversary celebrations begged all the fundamental questions about exactly when insulin had been discovered. The predominance of the Banting and Best version of events led to most anniversary celebrations being based on a 1921 rather than a 1922 discovery. In 1971 the president of the New South Wales Diabetic Association asked Best to fix a discovery date. He replied suggesting 15 August 1921 "as the date when we were sure that we could prepare very potent solutions containing insulin consistently." Best to Dr. Milton J. Champion, 24 July 1971, Best Papers, Fisher Library, University of Toronto.

52. In some ways it was the most outrageous of Best's distortions to present what had been a typical university "work-in-progress" session as the public announcement of a great discovery.

53. 7, 21 September, 5 October.

54. Collip to R. A. Farquharson 5 August 1952, Collip Papers, Toronto; Collip to Professor John F. Fulton, 4 March 1957, Collip to Norman A. Keys, 3 February 1959, Collip Papers, Collip Library, University of Western Ontario.

the whole insulin business.”⁵⁵ An attempt by Collip’s old associates to organize a biographical project went nowhere. It was eight years before his obituary was written for publication by the Royal Society.

Charles Best died in 1978. Lloyd Stevenson immediately published Macleod’s 1922 account of the discovery of insulin in the *Bulletin of the History of Medicine*.⁵⁶ In 1967 one of Collip’s would-be obituarists had told my brother, then a physiologist at McGill, of all the unpublished documents that would become available on the death of Best. He influenced me to begin work, after Best’s death, on the manuscript that was published as *The Discovery of Insulin*. In 1982 I was able to secure publication of Banting’s and Best’s 1922 documents, as well as several short accounts by Collip, in the *Bulletin of the History of Medicine*.⁵⁷

From time to time in the 1960s Charles Best would receive letters from Roumania, inquiring into Banting and Best’s research and its relationship to that of a distinguished Roumanian physiologist, N. C. Paulesco, who had published his results just before Banting and Best began their work. Best politely replied to the queries but by now was unable or unwilling to enter into renewed controversy. Perhaps it was just as well, for Paulesco’s chief admirer, I. Pavel, had substantial evidence to show that rigorous application of the standards of evidence being used by Best to justify the claim that he and Banting had discovered insulin in the summer of 1921, would very likely lead to the realization that priority in the discovery of insulin belonged to Paulesco.⁵⁸ Through the 1970s the argument for Paulesco’s priority gained strength and recognition, until by the early 1980s it was on its way to becoming a new orthodoxy in medical history and endocrinological circles.⁵⁹ The Paulesco case was based on the realization that, in fact, Banting and Best had not produced results more impressive than Paulesco’s. Indeed, as Banting had had the honesty to write of the first clinical test of their extract, the results had not been as impressive as those produced by another predecessor, Zuelzer, in 1908.⁶⁰ The final irony of the Banting and Best myth was that it could not meet its own incomplete criteria; Banting’s and Best’s research was so badly done that, without the help of Macleod and Collip,

55. Hall to Noble, 23 July, 6 August 1971, personal collection of the author, supplied by Robert Noble; also Slater Lewis to Mrs. Collip, 13 January 1973, Collip Papers, University of Toronto.

56. J.J.R. Macleod, “History of the Researches Leading to the Discovery of Insulin,” with introduction by Lloyd G. Stevenson, *Bull. Hist. Med.*, 1978, 52, 295–312.

57. Bliss, (n. 33).

58. I. Pavel, *The Priority of N. C. Paulesco in the Discovery of Insulin* (Bucharest, 1976).

59. See, e.g., the account of the discovery of insulin in V. C. Medvei, *A History of Endocrinology* (Lancaster, England: MTP Press, 1982).

60. Frederick Banting, “The history of insulin,” *Edinburgh Med. J.*, 1929, 9, 1–18.

and a much more subtle view of the constituents of the discovery of insulin, the two young Canadians would be fated to disappear from medical history.

Asked about the Paulesco affair in 1971, Best dismissed all of his and Banting's predecessors with the comment that "none of them convinced the world of what they had. This is the most important thing in any discovery. You've got to convince the scientific world. And we did."⁶¹ The decision of the Nobel Committee in 1923 showed that the world was convinced that insulin had been discovered in Toronto, as the result of a collaboration building on the original work of Banting and Best. Throughout his later life Charles Best worked very hard and with considerable temporary success, to convince everyone of his and Banting's claims to be the sole discoverers of insulin. In the long run he failed.

* * *

I never met Charles Best. From studying the written documents, I have not been able to make up my mind about the rationality of his sustained attempts to rewrite the history of the discovery of insulin. At times Best's distortions of the historic record seem to amount to a deliberate, unethical exercise in falsification which verges on scientific fraud. The obsessive pattern and often transparent sloppiness of Best's distortions, however, reinforced by many comments garnered in interviews with former associates, suggests that there was perhaps less controlled calculation to his historical reflections than a structured retrospective study of them implies. In the later years of his life Charles Best appears to have been deeply insecure about and obsessed with his role in history. He appears to have had a profound psychological hunger for recognition, a serious ego-problem, many thought, which overwhelmed his good sense even in the eyes of such steadfast friends as Sir Henry Dale. The fumbling attempts by Feasby and Best, the one with impaired vision, the other with impaired judgment, to manipulate the historical record would have been pathetic and hardly worthy of comment had they not been so grossly unjust to Best's former associates and, for a time, so influential. At the same time as he craved the glory and immortality the world had given to Frederick Banting and the Nobel Committee had given to J.J.R. Macleod, Charles Best must have sensed the fragility of his claim to have played a decisive role in those great events of the early 1920s. Unlike Collip, Best could not rest content to let history take its course.

61. Richard M. Stalvey, "A chat with Dr. Charles Best," *Nutrition Today*, 1971, 4, 5-7, 21-22.