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Discovery of the Witwatersrand goldfields—contrasting opinions after 100 years

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ABSTRACT

George Harrison has long been recognised for his discovery of the Witwatersrand goldfields in early 1886. He received the Discoverer's Claim from the government and has a park at the Langlaagte discovery site named by the City of Johannesburg in his honour. Harrison left the Witwatersrand district by the end of 1886, and others then attempted to retrospectively claim credit for the discovery, but there was little community uptake of their claims. From 1986, the details of the discovery have been rewritten, culminating in a statement in 2020 that people today are mistaken and that the real discoverer was Fred Struben—one of many gold prospectors who had been around the Witwatersrand district in the 1880s. This revisionist claim cites material purportedly from the Struben family but includes no verified evidence supporting the Struben claim. A detailed history of the Langlaagte discovery written by Ethel and James Gray in the 1930s concluded that Harrison was the discoverer. Importantly, the Grays highlighted false claims and records from the Struben family and questioned the authenticity and date of a map by Fred Struben near the discovery district. Struben's lack of follow-up actions weakens his claims of having recognised an enormous goldfield, especially as he left the Witwatersrand in 1887. The picture that emerges from this examination is one of the Struben family network having built a case for one of their own using problematic documents and maps. Then follows more recent revision of the story of the Witwatersrand discovery based on the family's unverified documents. A classic example follows of *creeping certainty* as the revisionist story is retold and shifts from a vivid idea in 1986 to fact by 2020. The whole episode also provides a modern example of the *Evans Effect*, in which a revisionist story enters mainstream reviews and gains unjustified authority, and of *groupthink* that perpetuated an environment unwelcoming of challenge.

KEY POINTS

1. George Harrison has long been recognised as the discoverer of the Witwatersrand goldfields in 1886.
2. Years after Harrison's departure from the district, others including Fred Struben claimed their own role in the discovery.
3. The unverified maps and reports from the Struben family are inconsistent and have been challenged since the 1930s.
4. The discovery story has been revised in Struben's favour from 1986 to 2020 without new information and relying on the unreliable track record of the Struben family.
5. The new version has moved from an idea in 1986 to being conveyed as factual by 2020 illustrating the dangers of creeping certainty and the Evans Effect in modern publications.

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Introduction

Case histories of gold discoveries can make fascinating reading and are particularly useful as educational tools for explorationists, managers and students. Some of these histories are recorded immediately following discovery by the people directly involved in the exploration.

Other histories are written by a new company that has taken over a property after a discovery, or by an individual senior manager who has been allocated the task and might be somewhat distant from exploration and discovery. It is unusual that a new discoverer would be anointed after a century of mining operations, particularly operations as large and well documented as the Witwatersrand goldfields of South Africa. For this reason, the rewriting of the 1886 Witwatersrand discovery one century later makes an intriguing investigative story.

Many mineral discoveries are preceded by periods during which important new observations, findings and ideas provide the impetus for optimism and ongoing searching. The discovery itself may be marked by a change of trajectory beyond mere optimism to the awareness of payability and options for development. This change of trajectory may be sharp such as a discovery drill hole, or more subtle and protracted. The

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discovery, and hence discoverer, may be obvious, receiving contemporaneous community recognition following the change of trajectory.

The various roles during the period preceding discovery may be re-evaluated over time as more information becomes available. However, despite aspects of this pre-discovery period growing in importance, such contributions do not signal a new discoverer. In any later re-evaluations, care is necessary to ensure that the nature of new evidence is independent (*i.e.* not coming from parties seeking enhanced recognition) and verified with additional information from multiple sources. Re-evaluations can potentially vary from important new understandings of the history around a discovery to opportunistic revisionism to credit one party.

Until 1986, it was widely accepted that George Harrison was the discoverer of Witwatersrand gold in March 1886 on the farm Langlaagte in what is now the City of Johannesburg. The Witwatersrand was proclaimed by the government as public gold diggings on 8 September 1886. Harrison discovered gold in what is now known as the Main Reef and Main Reef Leader of the Main Reef group, and this sequence of a few tens of metres' thickness has subsequently produced 800 million ounces (Moz) Au from the Witwatersrand Basin.

Since 1986, the revisionist claim is that instead of Harrison, it is Fred Struben who should be credited as discoverer based on his work 15 km to the northwest near Roodepoort in the Pretoria goldfield. In a major review, the revision to henceforth recognise Struben as the sole discoverer of the Witwatersrand is presented with little scope for doubt and as a *fait accompli* (Frimmel & Nwaila, 2020).

The cases for Harrison or Struben being the rightful discoverer of the Witwatersrand goldfields are examined here after extensive research of older documents in the public domain. The complete process of suggesting and then promulgating a new 'discoverer' after a period of 100 years is examined to test the rigour behind the revision and reliability of the sources, and to learn what it might mean for the reliability of some of the recent documentation of the Witwatersrand goldfields.

Witwatersrand goldfields

The Witwatersrand goldfields based around Johannesburg in South Africa dominated global gold production during the 20th century (Figure 1). This dominance ended shortly before 2010, and to illustrate the slide, South Africa's annual gold production is exceeded today by Western Australia (approximately 3 Moz and 6 Moz per annum, respectively).

For the current study, the relevant geology can be condensed to the south-dipping Archean Witwatersrand Supergroup running east–west through the City of Johannesburg along a series of ridges and watershed (being the Witwatersrand or white-water ridge; Figure 2). The modestly mineralised lower Witwatersrand (West Rand Group) of shale and sandstone dominates the north of this ridge. The strongly mineralised upper Witwatersrand (Central Rand Group) is mostly on the south side of the ridge and comprises sandstone and conglomerate, a shale unit and numerous reef packages within four main reef groups (McCarthy, 2006; Phillips *et al*., 2024; Tucker *et al*., 2016).

Data sources pertaining to the 1886 discovery including the comprehensive investigation of Ethel and James Gray

With no living witnesses from the 1880s, there are some limitations on data sources and especially on any new information during the later part of the 20th century. This study has relied upon confirmed and verifiable documents, statements and actions of prospectors at the time, decisions and behaviours, especially relating to the government, key players and the general community during 1884–1887. These sources are publicly available.

The most detailed version of the Langlaagte discovery is the work of Ethel and James Gray completed during the 1930s and published in 1940. This was written half a century after the discovery when there were only a few living participants from 1886, and some memories were fading. Significantly, the Grays' research was independent in that they appear to have had no personal interest or links to people connected with the discovery of the goldfields, and this factor plus the thoroughness of their research makes their work so important. The timing of their research was fortuitous, as it coincided with the lifting of an embargo by the state and libraries of a vast amount of documentation of the early years of the Witwatersrand goldfields (Gray & Gray, 1940, p. 198). The Grays' research examined thousands of pages in what is the most comprehensive research and documentation of the discovery. Their book had a limited print run of 300 copies and 198 pages, with an additional 208 plates being mostly photos of key documents and maps. The Grays found no authentic evidence to disprove Harrison's role as discoverer; they made several uncomplimentary observations of the behaviour of other claimants who overstated their own roles in the discovery following the departure of Harrison. Their contribution to the community is recognised by the naming of James and Ethel Gray Park in Johannesburg east of Rosebank.

A further detailed investigation of the discovery period was a Commission on Enquiry report (Malan *et al*., 1941). Other sources of information used here include the revisionist publications from Pretorius (1986), Cunningham (1987), Frimmel and Minter (2002), Handley (2004), Frimmel *et al*. (2005) and Frimmel and Nwaila (2020).

Case in support of George Harrison as discoverer of the Witwatersrand

There had been a history of minor gold discoveries in the Transvaal area from the 1850s including in the important Barberton area around 1882. The first discovery of gold that led to actual workings near the Witwatersrand was made in late 1874 by Henry Lewis on the farm Blaauwbank (Figure 1b), which led to the first company being established in the greater Witwatersrand region (Lednor, 1986, p. 49). However, March

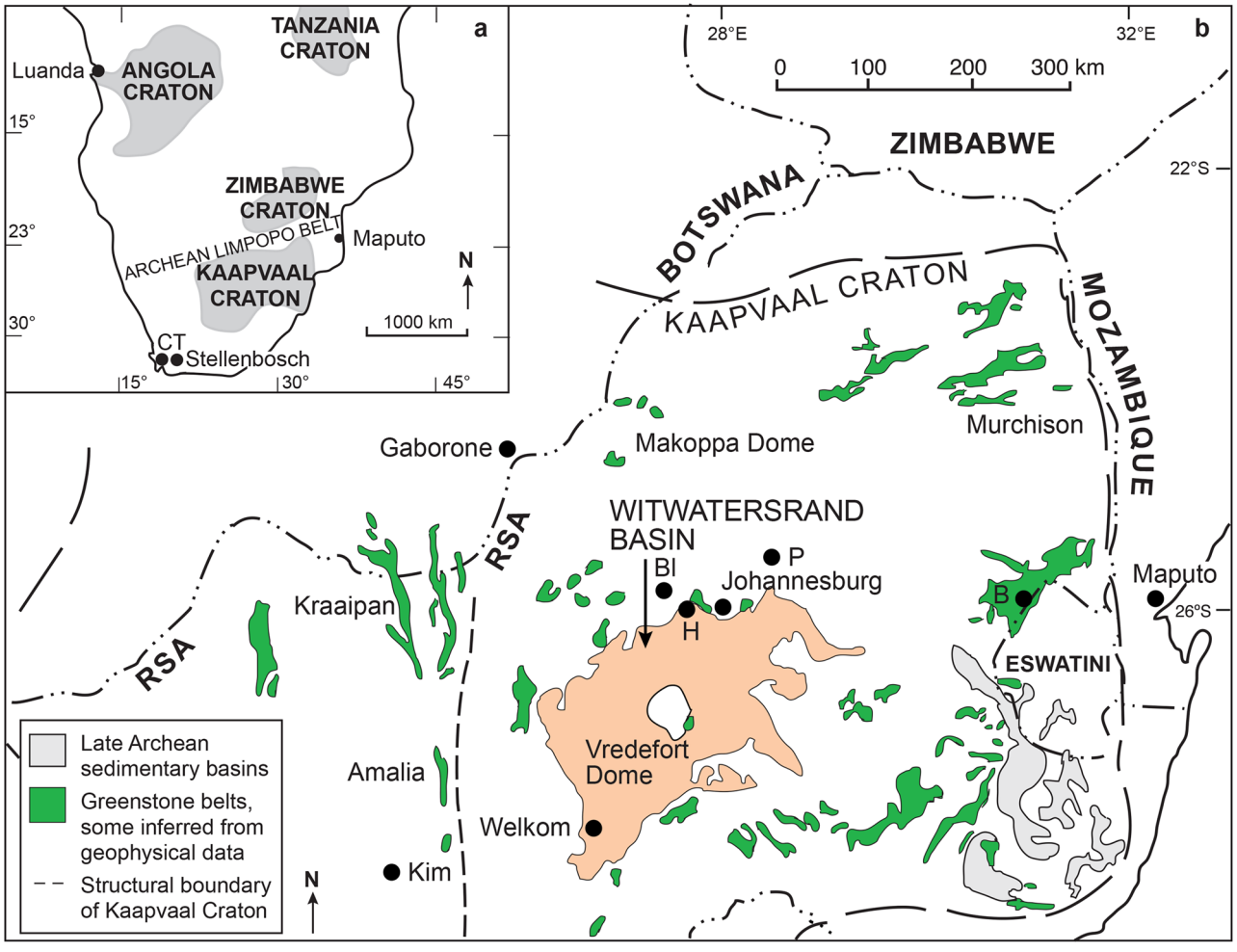

Figure 1. (a) Regional map of southern Africa, with (b) the Archean Kaapvaal Craton, the Witwatersrand Basin and Johannesburg. Significant locations in the 1880s include Pretoria (P) the seat of government; Blaauwbank (BI) the first actual gold workings near the Witwatersrand in 1874; Barberton goldfield (B) with its gold discoveries in 1882; Kimberley (Kim) with its diamond discoveries in 1867; and Honing Klip (H) as a base for some activities of the Struben family. Most of this part of South Africa was known as the Transvaal Province from 1910 to 1994.

1886 was the dramatic inflexion point for the Witwatersrand area and subsequently the Transvaal Province and whole of South Africa with respect to gold, population, exploration, mining and the economy. The discovery of the Witwatersrand goldfields is recorded in official government documents, and in detailed reviews by Gray and Gray (1940) and Werdmüller (1986).

George Harrison has generally been credited as the discoverer of the Witwatersrand goldfields in March 1886. Only basic details are known of his personal history and his process of making the discovery, and subsequent life, and he did not feature in the development of the Central Rand gold mines (Antrobus, 1986 preamble; Werdmüller, 1986). By the end of 1886, he had left the Witwatersrand permanently before the first gold was produced from Wemmer Pan mine in May 1887 (Handley, 2004).

In late 1885, some months before the discovery, George Harrison had joined George Walker looking for work. Walker worked at the Confidence reef (a mine based upon an auriferous quartz vein and quite unlike the classic Witwatersrand reef), and Harrison gained work on the farm Langlaagte. The latter was working as a labourer, and he noticed gold in lithified conglomerate. He had discovered the Main Reef group. This was on the farm Langlaagte (meaning *long shallow valley*). By March 1886, the mining of the Confidence reef by the Struben brothers had failed and led to Walker leaving that operation and rejoining Harrison.

On 29 July 1886, a petition was prepared asking for the government to recognise a new goldfield, and it was signed by 74 of the local prospectors and interested parties (The Star, 1936; Figure 3). The petition acknowledged Harrison as the discoverer of Witwatersrand gold, and, as the legally recognised discoverer, he became entitled to the 'Discoverer's Claim'. His partner George Walker was one of the signatories confirming Harrison to have been the legitimate discoverer. In the same month, Harrison went to Pretoria to see President Paul Kruger. On 24 July 1886, he had signed a statement in the office of the State Secretary in which he said '… I have a long experience as an Australian gold-digger, and I think it is a payable goldfield' (Gray & Gray, 1940, p. 91). Harrison's statements were very plausible because Australia was a major gold producer at this time, especially from Victoria where much of the gold was won from Cenozoic quartz pebble gravels and conglomerates—something



Figure 2. Bare ridge, approximately 5 km east of the centre of Johannesburg looking south towards Kensington in the 1980s. The ridge is dominantly Government Subgroup quartzite of the lower Witwatersrand (West Rand Group), and the view is up the sequence.

most prospectors working in Victoria would have been aware of.

Knowledge of Harrison's personal background relies primarily on these statements to the government in Pretoria when describing the potential for his new discovery at Langlaagte. Harrison sold his Discoverer's Claim (Claim 19) to Marsden on 16 November 1886 and had soon left the Witwatersrand scene. Reputedly he died near Barberton a few years later. Like others at the time, he did not appreciate the ultimate magnitude of his discovery.

Harrison's role as discoverer is based upon the document signed by 74 of his contemporaries, the Government documents including his signed statement and the observation that he was awarded the Discoverer's Claim 19.

Johannesburg City and the recognition of Harrison

From 1886, a completely new township was established that became the City of Johannesburg. The name of the township was derived from the names of two early officials Christiaan Johannes Joubert and Johannes Rissik. The city celebrated Harrison's discovery with the establishment of George Harrison Park in October 1947 near the site of his find at Claim 19 on the farm Langlaagte, now part of inner Johannesburg. A plaque there says: 'Claim No. 19 is registered in the records of the Mining Commissioner of the Witwatersrand goldfields in the name of George Harrison as "Zoekersclaim" or Discoverer's mining claim being the claim, which under Article 9, Law Number 8 1885, was given to the discoverer of payable gold without payment of licence fee for digging'. Harrison and Walker are mentioned together in one place on a plaque, but in another sentence, it is confirmed that the Discoverer's Claim was awarded to Harrison (Figures 4 and 5).

The Special Publication of the Geological Society of South Africa to mark the centenary of the Witwatersrand (Werdmüller, 1986) confirms the discoverer as being Harrison. Others who have attributed the Witwatersrand discovery to Harrison on Langlaagte farm include Pretorius (1975, p. 19, who includes Walker), Viljoen (1986), and Frimmel and Minter (2002).

With minimal further verified record, little more insight can be gleaned regarding the actual Langlaagte discovery except to summarise that an experienced gold prospector while employed on the farm was sufficiently observant to notice gold grains in rocks on some low hills. In retrospect, we would all love to know the date, time, exact location, prospecting methods and number of visible grains of gold comprising his discovery; that he did not meticulously record these would have been indicative of the era and his priorities at the time. Although Harrison had the confidence and knowledge to realise that he had found a payable goldfield, like everyone else he was not aware of the ultimate significance of finding gold in the Main Reef group and the Witwatersrand Basin.

The sudden interest in Langlaagte from 12 April 1886 is recorded by Malan *et al*. (1941, pp. 21–22) documenting the signing of agreements, formation of 'The Langlaagte Company', two petitions to the government, changing ownership of land and the appearance of promoters on the scene—all supposedly occurring within nine days.

Trajectory of action following the Langlaagte discovery

What Harrison achieved was the discovery of the Main Reef group and an economic goldfield that was neither a modern alluvial accumulation nor within quartz veins. The importance of Harrison's discovery is exemplified by the reaction of

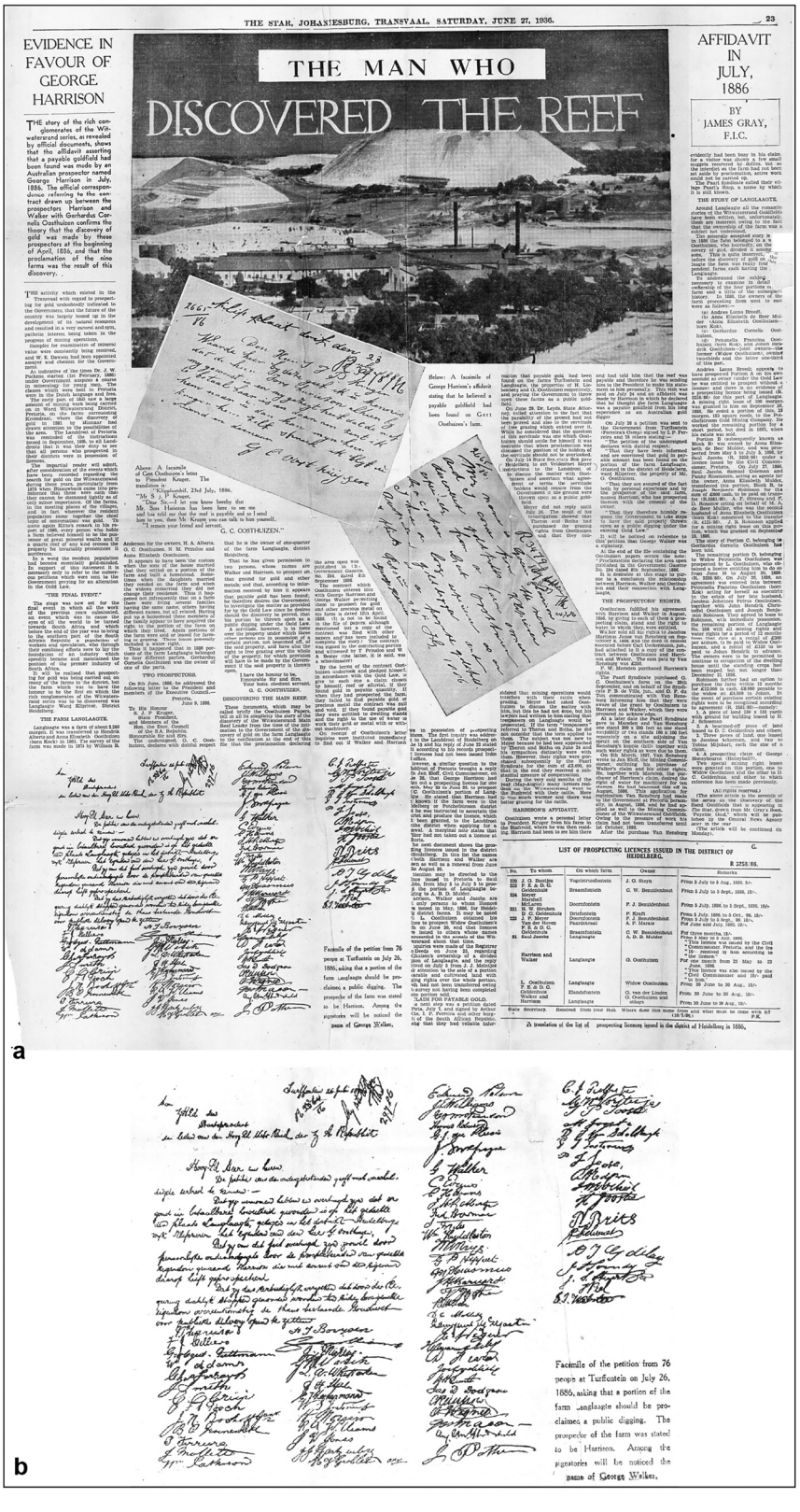

Figure 3. (a) Page 23 of The Star newspaper of Johannesburg of 27 June 1936 showing the 74 signatures confirming that George Harrison was discoverer of gold at Langlaagte. (b) An enlargement of the page showing George Walker's signature is in the third column of names, seventh from the top.

prospectors and the whole community over the following months and years (Fox, 2002; Rosenthal, 1970). Remarkably rapid progress occurred following March 1886, including:

- Claim 19, the Discoverer's Claim, was awarded to Harrison on 29 July 1886 following a petition supported by 74 signatures.

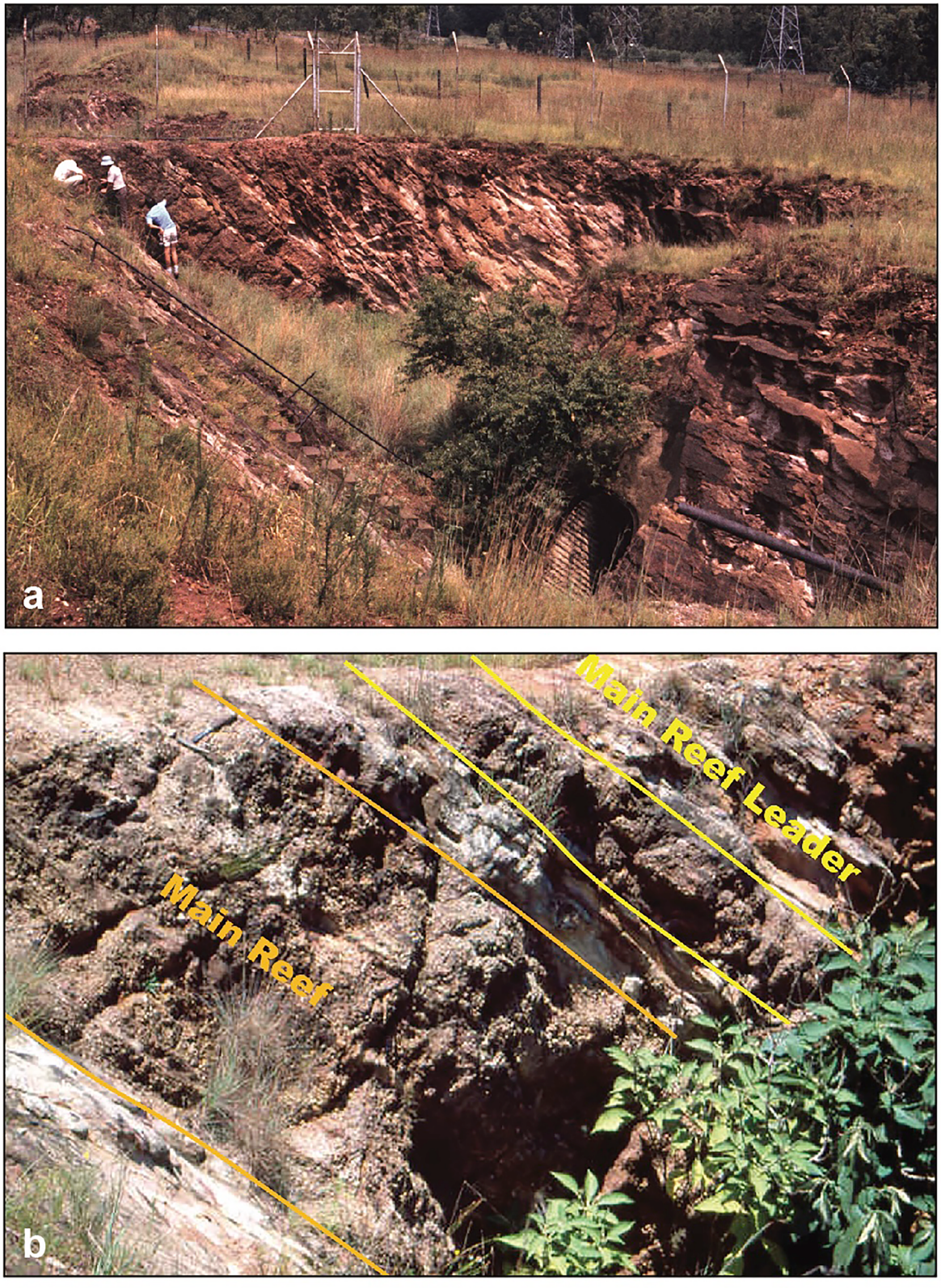

Figure 4. George Harrison Park on the site of the 1886 Langlaagte discovery. (a) The area has been vandalised in recent years but still preserves quartzite and conglomerate dipping at ~35° to the right (south). Photo taken around 1986 by Bruce Cairncross. (b) As far as is known this is the only accessible, well-exposed example of *in situ* Main Reef that exists. Photo by the late Morris Viljoen.

- In September 1886, the Main Reef group had been traced on the ground from Roodepoort to Driefontein (Germiston), and this 40 km length was proclaimed as a goldfield. At this time, the first large company, Witwatersrand Gold Mining Company, was formed, and it then consolidated many of the small claims.

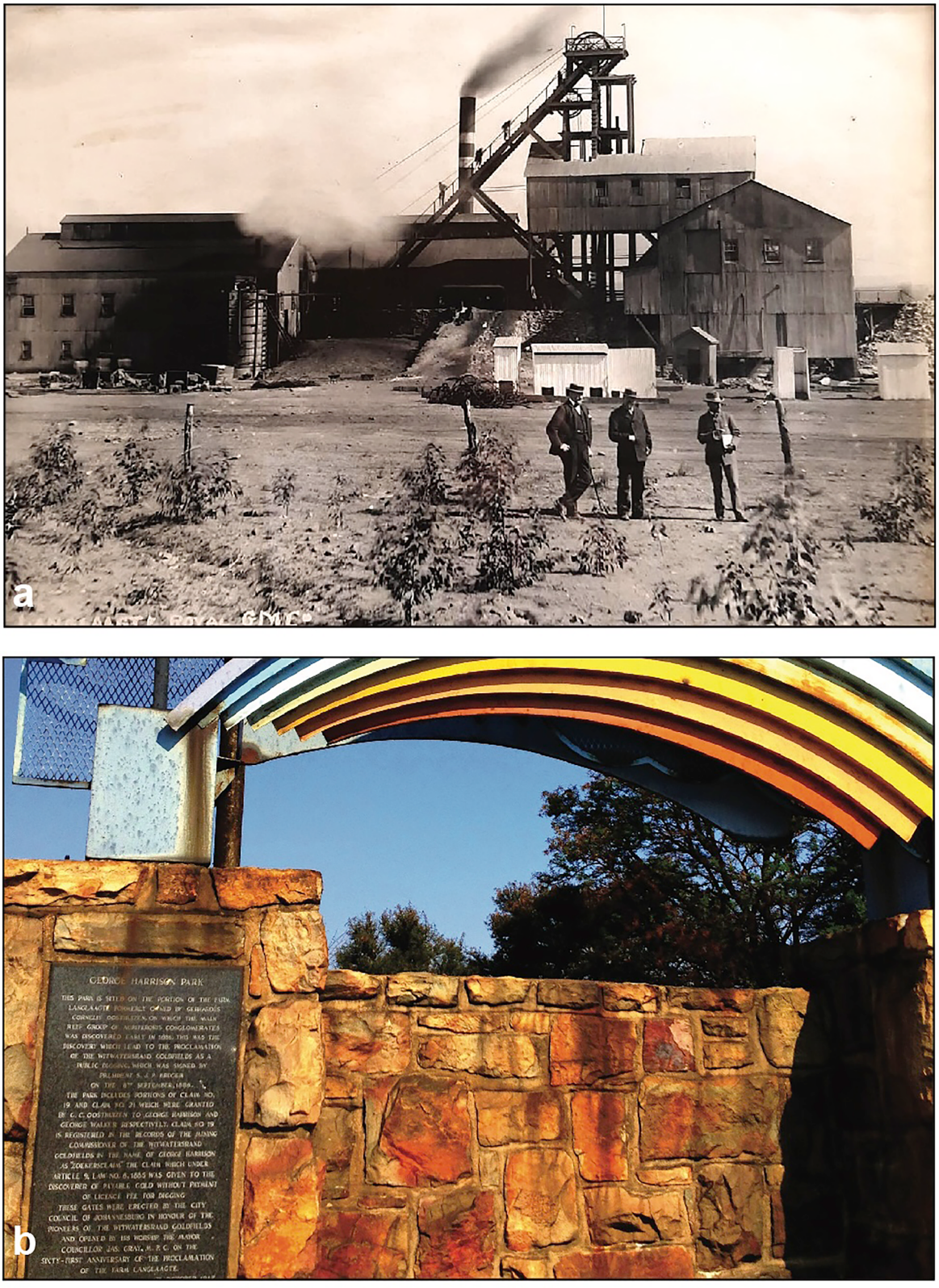

Figure 5. Langlaagte district. (a) Directors of the old Langlaagte Royal Gold Mining Company thought to be at the western end of Commissioner St. Photo from Bruce Cairncross collection. (b) George Harrison Park with the plaque on the left of the gateway describing the role of George Harrison in the discovery of the Witwatersrand. Photos supplied by James Bell, The Heritage Portal and the late Gavin Whitfield.

- In April 1887, the first battery and shaft were erected on Jubilee mine.
- In May 1887, Wemmer Company produced ~2 kg Au from 290 t with the first stamp mill.
- A shaft was sunk at Langlaagte to 30 m.
- By July 1887, Wemmer gold mine pays a dividend of 40% of its capital.
- By 1890, near-continuous mineralised conglomerate was identified for 50 km.
- By 1892, over 1 Moz pa was being produced from the Witwatersrand.
- By 1893, drilling had demonstrated mineralisation below 700 m depth.
- By 1895, South Africa was producing around 2.5 Moz pa, replacing the USA as the world's largest gold producer.
- South Africa retained this pre-eminent position in global gold production for the whole of the 20th century except for 1903 during the Anglo-Boer War.

Although there appears to have been agreement of Harrison's role in the 2–3 months after his discovery with no one disputing that he was the discoverer, Harrison did not stay around the Witwatersrand long enough to cement or defend his legacy. As the fuller impact of his discovery became apparent, several others took the opportunity provided by Harrison's departure to revise and insert their own involvements into Langlaagte history.

Subsequent claimants to the title of discoverer of Witwatersrand gold

That George Harrison was the discoverer of Witwatersrand gold appears to be one of the more clear-cut examples in the history of a gold discovery where extensive research and legal documents are in support. However, once the magnitude and importance of the Witwatersrand became apparent, there are reasons why the details of a major gold discovery such as the Witwatersrand might become more, rather than less, controversial with time. The departure of Harrison from the Witwatersrand community created the opening for many claimants to stake claims of their own roles and that of their family and colleagues. Failure of memories regarding the finer details of the early decades is evident in some reports, dishonesty is also suggested in some of the more comprehensive reviews, and more recently the trend has been to redefine what should identify the discoverer, and to speculate upon who may have said what over a century ago.

It appears well established that many different people had intellectual and practical roles leading to the Witwatersrand discovery. Marais prospected widely in the Transvaal area from the 1850s, Lewis in 1874 demonstrated that gold production was viable in the Witwatersrand region, and Fred and Harry Struben mined an auriferous quartz vein on the Confidence reef on the north side of the Witwatersrand range of hills (Antrobus, 1986; Werdmüller, 1986). From the declaration as a goldfield in 1886, many people were instrumental in ensuring the Witwatersrand was developed in a short time so that the broader community benefitted from the discovery (Rosenthal, 1970).

George Walker has been described as a partner of George Harrison, and the former was working with Harry and Fred Struben on their Confidence reef in early 1886 at the time of Harrison's discovery on Langlaagte. He and Harrison were both granted permission on 12 April 1886 to prospect for gold on Langlaagte by G. C. Oosterhuizen (The Star, 1936). As a partner, George Walker was recognised and awarded Claim 21 by the Langlaagte owners but importantly not the Discoverer's Claim. In 1924, Walker claimed that he was the real discoverer of Witwatersrand gold, but this claim was significantly weakened when he was reminded that he had been the 33rd signatory out of 74 recognising Harrison on 29 July 1886 (Gray & Gray, 1940, p. 102; The Star, 1936; Figure 3). No reason has been recorded as to why Walker waited 38 years to mention his role.

George Walker is often linked to Harrison as a joint discoverer, although the Grays consider this unlikely for two reasons. Walker was working on the Confidence reef from late 1885 to early 1886, and his name on a duplicate licence is probably a forgery (Gray & Gray, 1940, p. 92). Before 1924, Harrison was recognised as discoverer; after 1924, several authors added Walker as a co-discoverer, apparently without adequate research (*e.g.* Pretorius, 1975). Holz (1986) in Mendelsohn and Potgieter (1986) twice states that Harrison was the actual discoverer, but there appears to be a typographical error, in later including Walker (p. 3); only mentioning Harrison would be more consistent. Although the Discoverer's Claim was awarded to Harrison, Walker's role as a friend is recognised by him receiving the second diggers claim (not Discoverer's Claim) and a mention on the plaque in George Harrison Park at Langlaagte.

Other claimants to the title of discoverer included Bantjes who was active west of Langlaagte, but his evidence and statements came later and were shown to be inconsistent. Later claims by Meyers and by George Honeyball also appeared to be inconsistent and have been dismissed, although like others they played important roles in the early years on the Witwatersrand. Much later, George Honeyball says Walker was the discoverer, perhaps overlooking the 74 signatories of 1886. While Harrison was living on the Witwatersrand, there is no indication that anybody challenged the claim that he had been the discoverer.

Case in support of Fred Struben as discoverer of the Witwatersrand goldfields

About the Struben family

The particular focus here is on Fred Struben, but several other members of his family were involved either around the mid-1880s in mining or in the 20th century during efforts to build Fred's legacy.

Harry Struben (b. 1840, d. 1915) and Fred Struben (b. 1851, d. 1931) were brothers who worked together on several gold projects including crushing ore at the Confidence reef 18 km NW of Johannesburg. This reef was an auriferous quartz vein of

the Pretoria goldfield (Gray & Gray, 1940) and was on the north side of the Witwatersrand ridge in the lower Witwatersrand (WRG) succession and so removed by 1–2 km from what is now known as the auriferous upper Witwatersrand (Central Rand Group). Today, the area around the Confidence reef is in the Kloofendal Nature Reserve in Roodepoort in greater Johannesburg. By the end of 1887, Harry and Fred had both departed the Witwatersrand region leaving their Confidence reef workings but without any recognition as Witwatersrand discoverers.

Their father was Marinus Struben (b. 1806, d. 1869) a one-time chief magistrate of Northern Natal and subsequently holder of several senior government positions (Cunningham, 1987, p. 11). His son Harry became a noted public figure, served as a member of the Transvaal Volksraad (a legislative assembly), and was mentioned in connection with early attempts at gold mining legislation. Years later, Harry's wife, Mary (b. 1848, d. 1928) played an important role in the family legacy by producing some letters involving Harry and Fred but none from them from the period of November 1885 to June 1887, *i.e.* around the time of the Langlaagte discovery. Mr A Struben, presumably Arthur Alexander (b. 1871 son of Harry) and Godfray Lys (step-nephew of Fred) were very active in promoting Fred's legacy as the Witwatersrand discoverer.

Fred Struben's map of the western portion of the Witwatersrand

Struben was actively prospecting along the western end of the Witwatersrand ridge in the early 1880s. Harry and Fred Struben were in the Witwatersrand district before 1886 working unsuccessfully on an auriferous quartz vein (Confidence reef) well removed stratigraphically from the Main Reef group (Figure 6). He compiled a geographic map of the region on which he recorded the hilly terrain in a schematic manner (sketched with interlocking curves to represent prominent hills resembling coiled barbed wire). The map included streams, waterfalls, roads, homesteads and other cultural features. He also plotted the locations of geological outcrops that caught his attention as well as the locations of significant results of his prospecting such as 'Dana Reef: first discovery of gold made here; Confidence Reef; Line of the Confidence Reef; Iron slate angle so much contorted; Gold Found F.S.; Colour F.S.' and the locations of numerous reefs. A statement on Struben's map confirms that there are three identical maps, although cross-checking suggests that the maps may not be the same (Gray & Gray, 1940).

There is unverified speculation in the late 20th-century literature that the Strubens identified gold in conglomerate, but there is no detail as to the date or location. Gray and Gray (1940,

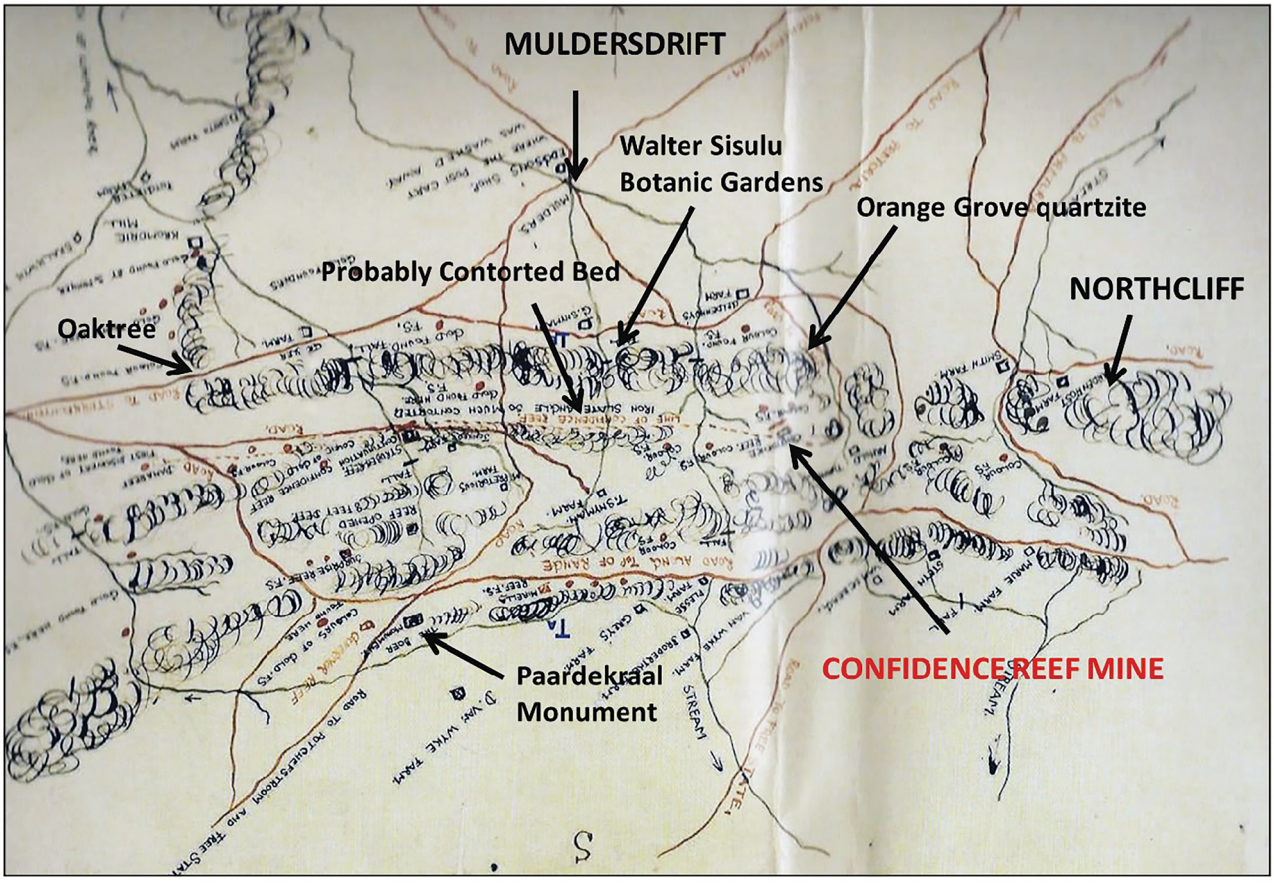

Figure 6. Reproduction of a map produced by Fred Struben covering an area now occupied by the northwest suburbs of Johannesburg and the lower Witwatersrand (West Rand Group). Harry and Fred Struben operated the Confidence reef mine but without success. The Struben's base map is taken from Handley (2004). The Main Reef outcrop is situated south of this area mapped by Struben. Most of this mapped area is the lower Witwatersrand (WRG) sequence.

p. 40) interpreted one letter by Harry Struben as suggesting that even in early 1886, the Strubens were not aware of the existence of auriferous conglomerates. A letter from Godfray Lys dated 11 May 1886 appears to be the first description of crushing conglomerate at the Confidence Reef mill.

Frimmel and Nwaila (2020) on Fred Struben

The most definitive statement supporting Fred Struben as the discoverer is a categoric statement that leaves no uncertainty and is both high profile and potentially influential, given it is in a special volume of Economic Geology. Here, Frimmel and Nwaila (2020, p. 645) say 'The true discoverer was, however, Fred Strubens (*sic*.), …'. The authors simply say the previous stories about Harrison being the discoverer are incorrect, and the real discoverer of the Witwatersrand goldfields was Fred Struben; they acknowledged that many people thought that Harrison and Walker were involved in the Witwatersrand discovery, but that they were mistaken. The statement cites Handley (2004) as evidence.

Prior to this 2020 quote, Frimmel *et al*. (2005) suggest the Struben brothers may have crushed gold from conglomerate probably from the lower Witwatersrand citing Whiteside *et al*. (1976). An earlier and similar description of the discovery by Frimmel and Minter (2002) confirms the identification of auriferous quartz veins well before the Struben brothers were active, and that Harrison recognised auriferous conglomerate on Langlaagte, which started the rapid development of the Witwatersrand. They said, 'Panning of auriferous quartz veins in the region was reported as early as 1852 (Pretorius, 1994). First milling, initially of vein quartz and probably small volumes of conglomerate, was carried out by the brothers F. and W. H. Struben in 1885 (Whiteside *et al*., 1976). In the following year, G. Harrison recognised the auriferous nature of a conglomerate bed on Langlaagte farm just west of Johannesburg, which started the rapid development of the Witwatersrand gold fields'. This statement (Frimmel & Minter, 2002) is very different from that of Frimmel and Nwaila (2020, p. 645) although the reason for the change is unclear.

Handley (2004) on Fred Struben

Des Pretorius bequeathed many of his papers and letters to his friend John Handley who provides a detailed compilation of events leading up to the Witwatersrand discovery (Handley, 2004, pp. 12–18). The compilation includes several events that are readily verified using independent sources, but a large number of ideas that have been derived by Handley and Pretorius from the papers provided by the Struben family cannot be independently verified (possibly some of the same papers of Mary Struben referred to in Anonymous, 1947).

Handley's conclusion is that Fred Struben should be recognised as the discoverer of the Witwatersrand, but two caveats are important here. The first caveat is Handley's adjustment of the term *discoverer* from its usage in 1886. A broad definition of discovery is presented that includes the terms *reconnaissance discovery*, and *discovery* with the latter leading to almost immediate development (Handley, 2004, p. 9). It is possible to have multiple reconnaissance discoveries (such as those of Peter Marais in 1853 and Henry Lewis in 1874), and this is not unlike today when many people may have had a part leading to a discovery.

Handley's redefinition of *discoverer* does not match that of the 74 signatories of 1886 who had firsthand familiarity with the Langlaagte discovery, the South African Government of the 1880s, the City of Johannesburg when they established George Harrison Park in 1947, or the Geological Society of South Africa in their 100th anniversary volume (Antrobus, 1986; Werdmüller, 1986).

The second caveat surrounding Handley's conclusion that Fred Struben was the discoverer arises from his reliance upon documents from the Struben family (in addition to those that were in the public domain for many years). He has essentially overturned a century of research and recording by others with no new evidence except that provided by the Struben family.

Cunningham (1987)

Anna Cunningham has compiled 110 letters from the Struben family between 1884 and 1895 but none from the critical period November 1885 to June 1887 spanning the Langlaagte discovery. With an average of 10 letters per year from 1884 to 1895, it seems unlikely that no letters were written during this 18-month period, and a remaining possibility is that the Struben family have withheld their letters from this critical interval. There are also 43 extracts from the diaries of Fred Struben's sister-in-law Mary and niece Edith. The compilation provides a comprehensive overview of the opinions of the Struben family. Cunningham was aware of serious doubts about the authenticity of material and accounts from the Struben family (Gray & Gray, 1940) but chose to overlook these doubts and the 18-month gap of records to conclude that Fred Struben was the discoverer. Cunningham's Prologue starts 'Harry Struben was referred to as "the greatest discoverer of the goldfields of Witwatersrand" in a letter written to him on 18 August by W. E. Bok, secretary of state of the South African Republic'. The statement is curious for several reasons. First, it refers to Harry Struben, whereas others have focused on Fred Struben. Second there is no reference to this letter written by Bok in the comprehensive work of the Gray and Gray (1940). Third, it is not explained why or how Bok was able to make this statement less than five months after the Langlaagte discovery and months before the first production of gold. Fourth, although the words of the above statement are repeated by Malan *et al*. (1941, p. 30), they are preceded in the same paragraph by 'Although it is not possible to substantiate any claim that may have been brought forward in favour of the Strubens having discovered the Main Reef Group of Conglomerates…'.

Professor Des Pretorius (b. 1925, d. 1998)

Pretorius (1986) gave an opening address at the Geocongress '86 Conference, which marked the centenary of the Witwatersrand discovery. This appears to have been his first public suggestion that Fred Struben was the real discoverer of the Witwatersrand gold and was based upon collaboration with various members of the Struben family who provided access to

Fred Struben's papers. Interestingly, the second abstract in that same Geocongress '86 volume (Viljoen, 1986) contradicts Pretorius' version and confirms the importance of Langlaagte (and thus Harrison).

The 1986 Pretorius version of the discovery overturned his earlier statements of the first two decades of his Witwatersrand tenure as leader of EGRU (Economic Geology Research Unit of the University of the Witwatersrand; Anhaeusser, 1999). In 1975, he says 'In July 1886, four months after George Harrison and George Walker made their historic discovery on the farm Langlaagte …' (Pretorius, 1975). Prior to this, Pretorius (1964) says 'The discovery of the Main Reef Leader at the end of March 1886, on the farm Langlaagte near Johannesburg on the Central Rand started a search for auriferous conglomerate wherever rocks of the Witwatersrand System outcropped'. In both statements, he confirms the importance of Langlaagte (and hence Harrison), makes no mention of the Struben brothers and suggests that it was Harrison who initiated the search for gold in conglomerate.

Honing Klip letter and map of 8 April 1885

One of the more unusual pieces of evidence supporting the claim of Struben as the discoverer is an article in the Transactions of the Geological Society of South Africa in 1947 based on old papers of the late Mrs H. W. Mary Struben, sister-in-law of Fred. The focus of the article is a geological section across the Witwatersrand by Fred Struben allegedly drawn during or prior to April 1885. In Fred Struben's reproduced letter of 8 April 1885 sent from his home at Honing Klip to his sister, he reports:

> On the south side you will see three new reefs marked, they are what I have discovered within the last week, they all three are gold bearing more or less and appear to be fissure veins and if they prove to contain payable gold, which I think they will, then this new discovery (which is quite a distinct formation from the others) means the commencement of a very large Gold Field, and will give work not only for a few machines but for hundreds and thousands of miners. There are I believe innumerable similar veins about to the south of this, extending in length for miles in each direction.…

The significance of being on the south side of the ridge is that the outcrop is poorer than the north side, and it spans the upper Witwatersrand (Central Rand Group) metasedimentary rocks that have subsequently produced over 90% of Witwatersrand gold. On face value, the 1885 letter and 1947 scientific journal article should be enough to establish that Fred Struben discovered Witwatersrand gold a year before Harrison.

However, examination of the content and implications of the Honing Klip letter from the Transactions are rather damning of the Struben claim:

- The authorship of the 1947 article is credited to 'Anonymous'. Fred Struben had died in 1931, although Mr A. Struben, a nephew of Fred Struben, was involved in 1947, as he is acknowledged for supplying to the Society the reproduced geological section and papers that had belonged to his aunt the late Mrs H. W. Struben (Mary).
- To have the vision in April 1885 of very large goldfields and thousands of miners based on his fieldwork and only *thinking* that the rocks are gold-bearing 20 km west of Johannesburg, would not, to use an Australian term, pass the *pub test*[1], i.e. the average person would be sceptical of this claim. Many geologists, these authors included, have walked over the same outcrops in the suburbs of Johannesburg, including some who mapped there in detail such as Mellor (1917) without having any vision matching that claimed by Struben. A similar exercise of walking the outcrops can still be partially repeated today on some excellent exposures to the north and much fewer outcrops on the south side of the ridge.
- Struben claims to have recognised three reefs and veins extending miles to the east and west (he does not say whether these were mapped or walked out by himself); and these were presumably along the geological strike from Langlaagte farm. The implication of his statement is that Struben, a prospector and experienced gold miner who had been crushing ore at his Confidence reef, recognised outstanding opportunities on the ridges where he had been working since 1884 and took no action. Similarly, his business partner and brother Harry Struben took no action to peg the ground, apply for a discoverer's claim or benefit from the opportunities. Again, this would fail a *pub test*.
- The community reaction to Struben's 1885 alleged revelations appears to be exactly zero. At the start of 1886, there were probably one dozen or fewer people on the large Langlaagte farm and around 600 on the whole Witwatersrand ridges. In contrast, that latter number grew to 7000 by 1887, following Harrison and Langlaagte (https://www.sahistory.org.za/article/discovery-gold-1884; accessed January 2025). The lack of any reaction to Struben's 1884–1885 claims coming from within the Struben family, his colleagues and any miner in southern Africa suggests nobody heard or acted upon anything Fred knew or said about extensive goldfields south of the ridge. It is difficult to judge any discovery by Struben on the south side of the ridge to be important if Struben took no action and told nobody, and it had no perceptible impact in the community. It makes little sense that Struben would precede everyone else by many months and have taken no immediate action to challenge the recognition being afforded to Harrison in 1886 (Figure 3).
- Fred Struben produced copies of a map of the Rand with the same date as the Honing Klip letter. This map bears the words 'This is an exact copy of the map sent by Mr Fred Struben to Pretoria on 8 April 1885, showing the position of all gold discovered by him to that date' (Figure 7). However, the actual date the map was made has been queried, and three copies certified to be the same map do not appear to be the same (Gray & Gray, 1940, pp. 28–35).

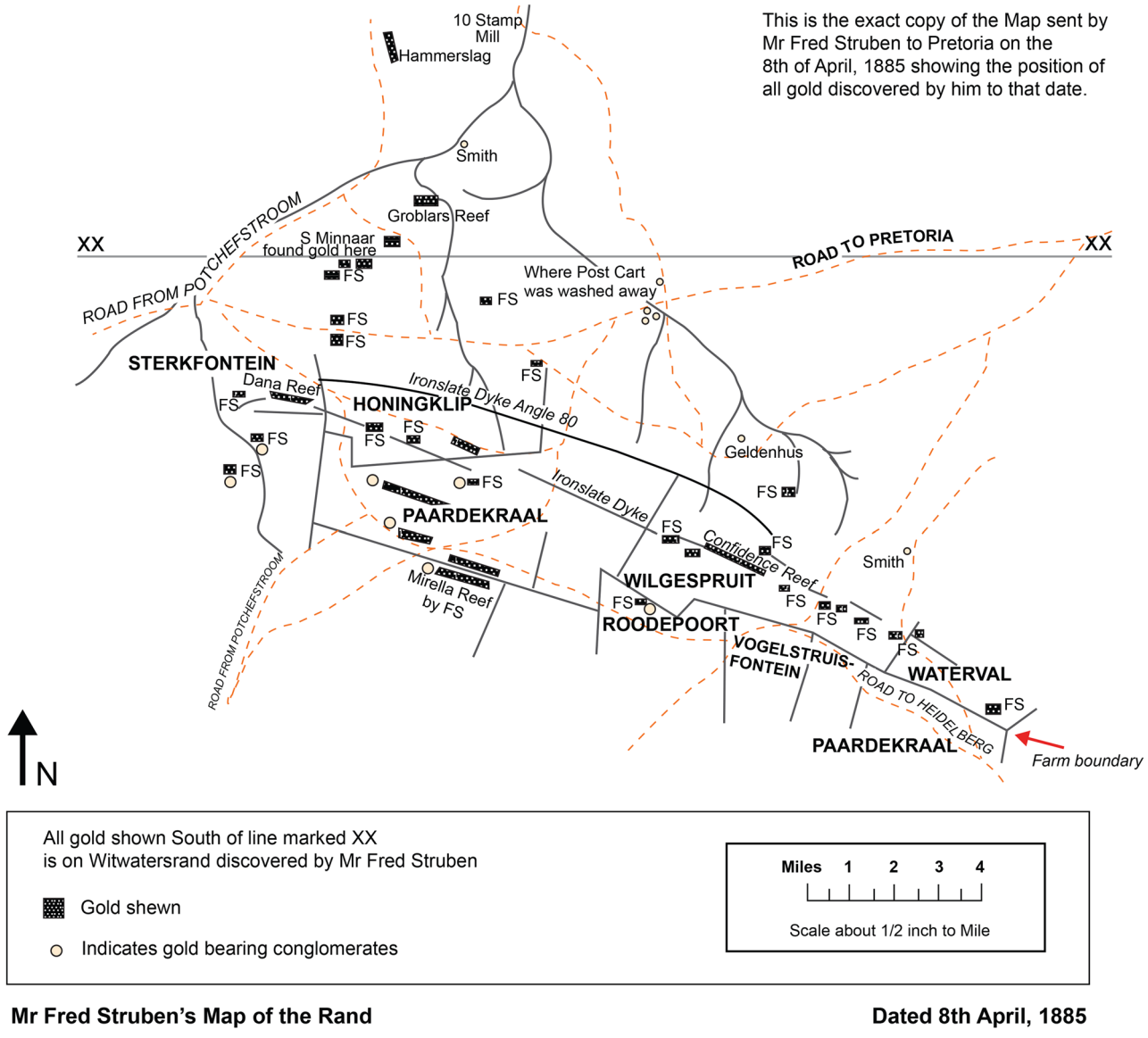

Figure 7. Map of the Rand by Fred Struben purporting to have been sent to Pretoria on 8 April 1885. The map is based upon Plate 13 of Gray and Gray (1940) who provide reasons to question the authenticity of Struben's documents, maps and letters. The east–west ridge (Witwatersrand) from Sterkfontein to Waterval is a major drainage divide with waters flowing north into the Limpopo River and eventually the Indian Ocean in Mozambique. Waters on the south of this ridge flow westward via the Vaal and Orange rivers to the boundary between South Africa and Namibia and thence the Atlantic Ocean.

Today the Honing Klip letter with its map of the Rand cast serious doubt on the authenticity and accuracy of documents from the Struben family. The 1947 article appears to be confirmation of previous descriptions of the family's desire and methods designed to elevate Fred Struben's legacy. The book by the Grays was written seven years before the Honing Klip letter was published in the Transactions of the Geological Society of South Africa, but the Grays had already listed numerous examples questioning and refuting claims by the Struben family.

An earlier publication strongly supporting Struben's claim to being the discoverer of the Witwatersrand was by Captain W. W. Luffman (1926), although it is difficult to assess his limited evidence. He cites two main sources, Mathers who was a British journalist working in South Africa and verbal communications with Fred Struben, and Godfrey Lys who was Fred's step nephew.

Creeping certainty, groupthink and the Evans Effect

Throughout the various re-interpretations of the discovery since 1986, three patterns are evident that also appear in modern management analysis.

A *creeping certainty* is where an initial untested assumption or speculative idea morphs into a fact over time as people come to believe someone else must have tested the assumption and found it to be true. There is a timeline of *creeping certainty* recorded in the trend from the speculative story of Pretorius in 1986, to the narrow research focus of Cunningham and Handley, to a categoric statement of fact supporting Struben (Frimmel & Nwaila, 2020). In this whole process, there was no new information about discovery except some purported newly revealed letters from the Struben family—a family with a questionable

track record with respect to the authenticity of their maps, reports and involvement in the Witwatersrand.

There are elements of *groupthink* being reflected here, such as the allusion of unanimity, exclusion of those who disagree and difficulty for others to challenge unproven ideas. This situation does not provide the environment and confidence to support the unorthodox and inquisitive minds that lead to gold discoveries (Phillips, 2011). There appears to be no evidence of any challenge when Pretorius changed the discovery narrative in 1986.

Revision of the Witwatersrand discovery history also provides an example of the *Evans Effect* of overlooking important but conflicting publications. The Evans Effect is detected in science publishing and citations, is prevalent across many fields and can distort the science and direction of ongoing research (Evans, 2008). Today's scientists can search online including the use of hyperlinks very efficiently, and this puts researchers in touch with prevailing opinion; however, the process may accelerate perceived consensus and narrow the range of valid findings, particularly where major reviews are not balanced. The Evans Effect is already demonstrated for the Langlaagte discovery by comparing Viljoen (1986) and Viljoen and Viljoen (2002) to Tucker *et al*. (2016), with the latter being a revision of the discovery that has switched recognition from Harrison to Struben by following Pretorius (1986) but without new evidence.

Discussion and conclusion

At the centenary Geocongress '86, Pretorius switched his previous version of the Witwatersrand discovery by Harrison and instead promoted Fred Struben as the discoverer. No new verified and independent evidence was provided to support this switch.

Cunningham, working in EGRU in the late 1980s, examined evidence in the form of many Struben papers. Cunningham understood but was not concerned about errors in Struben's map or any inconsistencies in his geology. Pretorius wrote a glowing introduction for Cunningham's book (1987).

Handley worked in EGRU using some Struben family papers forwarded to him by Pretorius. Handley also overlooked the half century of alleged dishonesty and self-promotion by the Struben family as had been documented by the Gray and Gray (1940).

Frimmel and Nwaila (2020) have taken the Handley assertion about Struben's role and proceeded to state that it is factual, and they suggest that any other opinion is wrong.

Probably of more concern than the fine detail of each piece of evidence is the overall quality of data being used, or being rejected, to redefine the Witwatersrand discovery 135 years after the event. To re-interpret the discovery fairly and objectively will require independent sources of information and some consideration of the track record of reliability and independence of the various sources.

The Struben family were actively involved in gold prospecting in the Transvaal area prior to 1886 and especially around the Confidence reef of the Pretoria goldfield. It is not easy, however, to verify any role for Fred Struben in the original Langlaagte discovery or in influencing Harrison (Gray & Gray, 1940, p. 169 para 2).

Promotion of the Struben family's role in the discovery of the Witwatersrand, especially the legacy of Fred Struben, appears to have been a long-term aim of the Struben offspring. The family, including Fred Struben himself, may have misdated maps and diagrams to claim undue credit. There is no definite evidence that Fred Struben ever found gold in conglomerate before Harrison's Langlaagte discovery (except for his own say so). It does appear that auriferous conglomerates were crushed at Confidence mill in May 1886.

The notion of Fred Struben being the discoverer is at risk of becoming embedded in economic geology through repetition, certainty creep, groupthink and the Evans Effect. To avoid perpetuating the Evans Effect, any case for Struben needs to specify that it relies on evidence solely provided by the Struben family. The evidence from the Strubens is not independent and is not verified against any other sources, and the only source of new information, namely the Struben family, has a track record of being unreliable.

It is likely that Fred Struben saw conglomerate during his travels, and the only report that he mined or crushed conglomerate ore came from his step nephew. Even if he did crush conglomerate in May 1886, that does not equate to discovering the Witwatersrand.

The weight of reliable evidence confirms George Harrison as the discoverer of the Witwatersrand goldfield, as elucidated clearly by Gray and Gray (1940, end of preface).

Note

1. *Pub test* is used here to describe a metaphorical test to judge dubious statements made by public figures. The test involves average people sitting in a hotel (*aka* pub) speaking freely and then they are asked whether they would believe the dubious statement.

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