

the LAST
ALCHEMIST
in PARIS

*& other curious
tales from chemistry*

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Mr Khama is Coming to Dinner

If you know your Periodic Table you would perhaps have expected the first chapter to be about hydrogen, the lightest chemical element with atomic number one, consisting of only one proton in the nucleus with charge plus one, and one negative electron orbiting around the nucleus. However, this book will follow its own logic and we will start instead with the element once thought to be the heaviest in the universe, with atomic number 92.

The temperature is approaching +38°C, and the highway between Botswana's capital Gaborone and Francistown stretches out ahead in a straight line, heading north-east. It is the peak of the hot season, and here on the verge of the Kalahari Desert a dusty yellowish hue should colour the landscape, but instead rains have made everything a vibrant green. We stop and see hundreds of identical butterflies assembled in a small mud pool, and back on the well-paved and smooth road we are constantly vigilant to avoid the occasional cow, goat, or donkey feasting on the green grass beside the highway.

At the big coal mine and power station in Palapye we turn left from the main road, and after another hour we pass a big modern

shopping centre and then, without really noticing, we have entered Serowe, considered by some to be the largest traditional village in Africa⁶—a settlement with a population of 90,000 or so spread out in mostly one- or two-storey houses in a very distinctive un-city-like manner.

We see signs directing us to the museum, that we don't find, and the *kgotla*, that we do. This large, very tidy, open space, surrounded by majestic trees and a wall at hip-height, is still the meeting place of the *Bamangwato* tribal councils (the word *kgotla* means 'court' in Setswana), but today it is completely deserted.

But let's now move back to 23 June 1949, when the situation was very different. Serowe, then the largest urban centre in the British Bechuanaland Protectorate, had just seen a massive invasion of South African and British journalists, in addition to the hundreds of tribesmen gathered in the *kgotla*. It was not as hot, as it was winter, but at that time this really was a remote place. There was not a metre of paved road in the Protectorate, the country was poor and austere, and the British preferred to conduct their fairly relaxed administration from the more comfortable Mafeking in the Union of South Africa.

The centre of attention on this day is a tall and fit man in his late twenties who is addressing the crowd, many of whom have journeyed a long way, and an absent woman. Who are they, and what exactly is at stake here?

The young man is Seretse Khama, the heir to the chieftainship of the *Bamangwato*. He is fighting for the recognition from his tribe of his marriage to Ruth Williams. Ruth is a young English woman made of stern stuff, formerly of the Women's Auxiliary Air Force and, because of this marriage, also an ex-clerk at a Lloyd's



FIGURE 5 Seretse Khama addressing the tribal court in Serowe, 1949. Photo © Time & Life Pictures/Getty Images.

underwriters in London. She was fired as soon as the marriage became public knowledge.^{7, 8, 9}

Seretse is probably the only man in the country with a higher education, having a degree from Fort Hare University in South Africa as well as studies in Oxford behind him; currently he is reading law at the Inner Temple in London. The son of the former chief, he is designated by his uncle Tshekedi, the regent, to lead his people into the modern world, but falling in love and marrying a white woman was not part of the plan. Tshekedi and the elders of the tribe disapprove and demand a divorce.

But Seretse gains the support of the youngers of the tribe, and the mood of the delegates has swung in his favour. It could have ended here, with the *kgotla's* decision to welcome Ruth as their

future queen, but instead this will turn into the 'Seretse Affair', a diplomatic and public relations nightmare for consecutive British cabinets, Labour and Tory, lasting well into the mid-1950s.

Why? According to the laws of the Protectorate, the British government had to confirm the new chief, and this was never to happen. First, the case was wrapped in layers of red tape: an enquiry was set up, the findings of the committee suppressed, copies of the report destroyed, and finally, in 1952, the couple was condemned without trial to permanent exile from Seretse's homeland by Lord Salisbury, Tory Secretary of Commonwealth Relations.^{7, 8, 9}

While we cannot know with certainty which factors were decisive in influencing the actions of cabinet ministers and advice from senior officials, there is a remarkable coincidence that may indicate what might have tipped the scale.

At the beginning of the 1930s, atomic physics and nuclear chemistry were seen as little more than an expensive hobby for over-intelligent boffins, and countries emphasizing the usefulness of science, such as the Soviet Union, did little to fund such research. Consequently, radioactive materials were not in high demand. Radium was the most sought after, but even that did not amount to much, and the uranium ores that were its source had no uses except for colouring glass (which it does very nicely but, for obvious reasons, not any more).

As we all know, the situation changed quickly, with World War II, the Manhattan Project, the Bomb, and later the development of civil nuclear power, all relying on uranium. Even though this metal is fairly abundant (2.3 parts per million in the Earth's crust) and more common than tin, for example, workable deposits were few when demand set in. Moreover, the process from ore to metal

was relatively complicated and unexplored, so new uranium mining and production could not be set up overnight.¹⁰

In 1939 uranium sat in a very remote corner of the periodic table. With an atomic number of 92 it was the heaviest known element, until 1940 when neptunium and plutonium were discovered, and only a select few knew about those two elements until after the war. In fact, its periodic geography was not quite settled. In 1939 it had not yet moved from its original home, placed right under tungsten (W).^{*} The whole series of *transuranium* elements were still to be discovered and placed into their special category—the *actinoids*, with the atomic numbers 89 to 103—in the late 1940s.

During World War II, the US had obtained a virtual monopoly over uranium, controlling the two principal sources in 1949: Eldorado in Canada, and Shinkolobwe in the Katanga province of what was then the Belgian Congo.¹¹ The Soviet Union had to make do (or so it was thought) with the captured supplies remaining from the German atomic bomb project, and what could still be produced from the old Joachimsthal (Jáchymov) mine in the present day Czech Republic.

Although cheap and abundant atomic energy was no doubt an alluring prospect for the British government, national security in the form of nuclear weapons was probably higher on the agenda. British scientists had participated in the Manhattan Project, but even so the US did not share all its results with its former ally, leaving the Britons to work out the missing pieces for themselves, and, equally importantly, to find their own uranium.

^{*} And in my 1946 edition of Niels Bjerrum's *Laerebog i uorganisk kemi* it still sits there, even though Bjerrum was Niels Bohr's old chemistry teacher.

When asked by nervous politicians, geologists predicted (quite accurately as it turned out) that in due time prospecting would locate sufficient uranium deposits to enable both long-term use of nuclear power as well as the development of atomic weapons. How they did that prediction is beyond the scope of this book, but geological maps showing the composition of the ground in terms of different rock types were already widespread in 1948, and given the type of rock, predictions could be made about which minerals were likely to be found in that location.

However, to actually find any uranium ore one needs to be out in the field, and with uranium there was help that could turn even the most amateurish stone collector into a uranium prospector*: the Geiger counter. This affordable handheld instrument measures radioactivity, although alpha-particles (helium nuclei with two protons and two neutrons ejected at high speed) are more difficult to detect than beta-particles (electrons) or gamma rays (similar to X-rays but of even higher energy). These three types of radiation are usually just called 'ionizing radiation', as they can strip electrons from nuclei to create charged ions; and that is also how they are detected by the Geiger counter.

When the radiation is passed through a tube filled with gas—for example, the noble gas neon—these gas molecules (or rather atoms, as neon is a one-atom molecule) will be hit by the high-speed particles or high-energy photons and electrons knocked out of the neon atom, giving a positively charged neon ion. Now the tube contains ions and can suddenly conduct electricity, just like a water solution of a salt (which neutral molecules cannot), and this is what creates the reading on the meter. But usually the counter

* As illustrated on the cover of US magazine *Popular Mechanics* in 1949.

also makes a very distinct clicking sound, to help the prospector home in on the source of the radiation easily.

Whether any of these amateurs actually hit gold and collected, at least in the US, a hefty reward from the government, I don't know. At the end of the war, however, for a nation wanting to acquire nuclear arms quickly, promises from geologists and prospectors of future mines were a small consolation. A convenient solution seemed at hand when it looked likely that low-grade ores from the Rand gold fields not far from Johannesburg, in the Union of South Africa, could be used to obtain uranium.^{12,13} The pro-British Prime Minister of the Union, Field Marshal Jan Smuts, was eager to cooperate, and negotiations were already ongoing when his party suffered a landslide election loss in 1948, and the Nationalist Party under D. F. Malan came to power.

The new regime immediately started to implement its apartheid ideology, and in June 1949, coinciding with the Serowe *kgotla*, the Mixed Marriages Act was voted in by parliament without resistance. Consequently, a high-profile black-and-white married couple right on their doorstep would not be tolerated by the Nationalist Party. This was also the message from D. F. Malan to the British government after Seretse's triumph in Serowe. The exact consequences if the British did not cooperate were not spelled out, however.

That they had been under pressure from South Africa was long denied by British governments, who used a number of half-truths and groundless accusations as excuses for their actions.⁷ However, evidence to the contrary was presented by the Cambridge historian Ronald Hyam in 1986,¹⁴ and independently by journalist Michael Dutfeld in his 1990 book *A Marriage of Inconvenience*.⁹

The Nationalist Party probably spent some time deciding what their best instrument of persuasion was, and it seems they chose

uranium. Shortly after having delivered, in person, the first angry message from the South African Prime Minister, the Union's London High Commissioner Leif Egeland sent a note to the Secretary of Commonwealth Relations stating that the uranium negotiations would be suspended, at least until the end of October 1949.

Then, a third actor entered the scene, possibly pushing the uranium issue to the top of the agenda. On 29 August 1949, the Soviet Union surprised the world, and especially Western intelligence, by detonating its first atomic bomb more than three years ahead of the CIA's estimates.

The long and the short of the story is that Ruth, Seretse, and their baby daughter Jacqueline were exiled in England by two consecutive UK governments, notwithstanding the cabinets being under heavy fire from national and international press, and, it has to be said, with sincerely bad consciences among some (but not all) of the British officials involved. Prime Minister Attlee noted: 'It is as if we had been obliged to agree to Edward VIII's abdication so as not to annoy the Irish Free State and the United States of America.'¹⁵

In 1952, the first South African uranium plant became operative,^{12, 13} and on 26 September 1957 the Khamas were allowed back home, although Seretse was never officially recognized as chief of the Bamangwato. By then there was, as predicted, plenty of uranium on the market, and South Africa was a lost cause for the Commonwealth anyway—Harold Macmillan's famous 'Winds of Change' speech in Cape Town being only two-and-a-half years away.

The uranium story stops here, but not the Seretse and Ruth Khama story. Readers of Alexander McCall Smith's delightful books about *The Number One Ladies' Detective Agency* might have noted a picture hanging on Mma Ramotswe's wall: that of

Botswana's first President, Sir Seretse Khama, 1921–1980.* Mma Ramotswa holds him great esteem, ranking him equal to the Queen and Nelson Mandela.¹⁶

So, was the Khamas' forced exile the consequence of South African blackmail over a uranium contract? We do not know for sure. Ronald Hyam and Peter Henshaw argue in *The Lion and the Springbok: Britain and South Africa Since the Boer War* (2003)¹⁷ that the UK government was more concerned with the threat of direct annexation of its southern African protectorates by the Union, and that the Khamas' exile was seen as a small price to pay in order to protect the inhabitants of present-day Botswana, Lesotho, and Swaziland from falling under the yoke of apartheid.

At the same time, Hyam and Henshaw note that for most cabinet members this was a question of a strategic nature, including access to important raw materials, based on 'the context and imperatives of the Cold War'. The vulnerability of the protectorates was of most concern to the ministers and their civil servants. There seems, however, to be no evidence in the British archives for a direct link between the suspension of uranium negotiations in 1949 and any actions taken against the Khamas. The answer to whether or not the South Africans were actually playing the uranium card in this game needs to be researched in the archives of Pretoria.

My personal view is that for a short time in 1949, following the detonation of the Soviet Union's bomb, the uranium question may have been important, but that for the overall actions taken by the UK government in subsequent years it was only one of several secondary factors influencing their decisions—racial prejudice being another.

* Lady Ruth Williams Khama, 1923–2002.

There are those who say that the Ruth and Seretse story was one source of inspiration for Spencer Tracy's last movie, *Guess Who's Coming to Dinner*, also starring Sidney Poitier, Katharine Houghton, and Katharine Hepburn, and directed by Stanley Kramer. In this classic Hollywood production,* Houghton—a young white middle-class woman—invites her, very recent, fiancé Poitier, who happens to be black, to dinner with her parents. The film was released in December 1967, six months after the United States Supreme Court outlawed the banning of inter-racial marriages. At that time these laws were very much in use in 17 states of the union, and the 'crime' punishable by jail. The last state to officially remove its so-called anti-miscegenation act from the law books was Alabama, in the year 2000.¹⁸

Why was the CIA estimate for the Russian atomic bomb so embarrassingly off the mark? In Chapter 2 we explore the part of the Periodic Table that provides the answer.

* The film received two 'Oscars' (Academy Awards): Hepburn for Best Actress and William Rose for Best Original Screenplay.