



Centenary Distinguished Lecture

The Centenary Distinguished Lecture was held on Thursday, 24th March, 1994 at the Convention Centre of the Sandton Sun, Johannesburg at 20:00. Herewith the proceedings that followed.

P.R. Janisch:

The South African Institute of Mining and Metallurgy began life one hundred years ago tonight, and eight years (almost to the day) after the 1886 discovery of gold, which has impacted so profoundly on the course of events in our country since then.

The Early Years

That discovery was a matter of fortune, but not in the sense of the conventional prospector's lucky strike. Canny explorers, such as the Strubens, had been around for some years and, if George Harrison had not stumbled over the Main Reef when he did, someone else would surely have done so within months.

The element of luck was that the gold-bearing rocks of the Witwatersrand actually lay exposed to sight. We now know that they are something of the order of 2,5 billion years old. Rocks of that age are usually covered by younger formations. In fact, the bulk of the Witwatersrand Basin *is* covered by lava, dolomite, and Karoo measures. What, one wonders, would our history have been had the Karoo, which stops at the Vaal, extended no more than 60 kilometres further north.

But fortune smiled; the rich ore was there, and relatively primitive methods of mining and treatment were good enough.

There was a rudimentary system of claim ownership, an apprehensive, but realistically greedy government in Pretoria, financial knowhow and capital largely derived from Kimberley, and a willing local labour force. The Rand's technical and professional needs were met by steam-engine mechanics, and some architects and land surveyors. A local authority was established, and took responsibility for sanitation and water supply.

The 1890's

By 1894, much of Johannesburg as we know it had already been developed—a chessboard pattern with plenty of corner stands. The authorities liked them because they could be rated more heavily. There was a system of dams and reservoirs, and several open squares. Market Square stretched from Sauer Street to Rissik Street. Two blocks north at the corner of Fraser and Pritchard Streets, stood the North-Western Hotel, to which I shall refer presently.

But first—the panic of 1890, as the Rand's encounter with pyritic ore rendered mercury useless as a medium of gold recovery. One of many knee-jerk reactions occurred on the Stock Exchange, and it prompted Percy Fitzpatrick to proclaim that grass would grow in the streets of Johannesburg within a year.

By which, of course, he meant that the gold mines were as good as dead. Well, events were to prove otherwise. Our distinguished lecturer [Mr Robin Plumbridge] will make reference to the process that had already been developed in Scotland to treat refractory ore, and had been demonstrated as workable by one of its inventors, MacArthur, at the Salisbury Mill in Fox Street. Taken literally, Fitzpatrick was right, of course. Grass did, in fact, grow in the streets. It is still growing—in one case, no further than the throw of a cricket ball from the Chamber of Mines' headquarters. But perhaps Fitzpatrick, if he were to come back today, would be more impressed by the grass made to grow on the very dumps created by the cyanide process—a chemical and biological achievement by members of this Institute, which can justifiably be described as a triumph.

What had been brought to the Rand in 1890 was a chemical reaction, perfected in a Glasgow laboratory and shown to work at pilot scale. Its efficient application on a production scale required more diligence and technical application than was then available. The financiers—the Randlords—realized that they would have to headhunt the necessary expertise.

But Europe and North America proved fruitful. When the chemists and metallurgists who came to the Rand decided early in 1894 to form a society, the Randlords wisely did not object. Where there is no competition in the sale of your product, it doesn't matter that you reveal your own production secrets if, in the process, you gain the next man's proficiency.

Fourteen of those chemists and metallurgists met on the evening of 24th March, 1894, at the North-Western Hotel, 21 Pritchard Street—The site today is occupied by a branch of Clarke Nissan, in the Bank City Complex, the architecture of which owes something to its predecessors of a century ago. The purpose of the meeting was to elect the first Council and Office Bearers. These worthies accurately reflected the distribution of countries of origin of the members: some from Victorian Britain, Butters from Massachusetts, Feldtmann from German West Africa, and Loevy and Von Gernet from continental Europe. Six of them would, in subsequent years, serve as presidents of the Society.

Their main concern—and this is clearly reflected in debates recorded in the first two volumes of the *Journal* that they quickly established—was cyanide, and the chemistry and metallurgy of its processes: assaying, classification, dissolution, clarification, and gold recovery.

Mining itself had not yet gone deep level, even by the standards of the times, and therefore did not engage their attention. Outside of their business, the politics of the Rand was the order of the day. What is intriguing, from this distance in time, is how the new processes and technical developments could preoccupy the members when the country was in political turmoil. Perhaps they could teach us a few things today. Volume 1 of the *Journal* records a meeting held on the 16th of November, 1895. The next report covered the meeting of the 22nd of February, 1896. It notes that, the week before, Johannesburg had been jolted by the Braamfontein dynamite explosion. The President—A.F. Crosse—offered the government the services of the chemist members of the Society in its investigation into the event—not a mention of the raid, led by Jameson, on the 29th of December, which had so shaken the foundations of the mining industry.

Similarly, although the Society remained silent for three years from October 1899, it resumed its pursuits in May 1902 as if nothing had happened. The members clearly had their priorities straight. Matters that now began to occupy their deliberations were related to deeper mining and included shaft sinking, ventilation, and miner's phthisis, the last of these becoming a dominant issue of the next two decades.

It was in 1903 that the members debated a name change to reflect more closely the growing interest in mining. Not without opposition, the Society became the Chemical, Metallurgical and Mining Society of South Africa.

The Turn of the Century

One last anecdote of those early years. On the 28th of January, 1905, some 150 members of the Society made a technical visit to the local works of South African Breweries. This, by the way, appears to have been close to the full complement of the membership at the time. They were shown around, as the *Journal* describes, in small parties by the chief officials headed by a Mr Douglas, the head brewer. Disappointingly, there is no mention of Mr Charles Glass, who had by then disappeared from the scene.

The 1930's

I move forward rapidly to the 1930's and the major event, on this night sixty years ago, that celebrated the Society's 40th birthday. The occasion was a dinner, followed by spoken reminiscences from a dozen older members, each limited to 15 minutes. The picture of the alert audience that appeared in the *Journal* must have been taken fairly early in the evening, because the meeting went on until after midnight. The reminiscences themselves are well worth reading in Volume 34 of the *Journal*.

The 1930's were highly productive in the technical life of the mining industry, with notable papers being presented on support and environmental control at great depth, the first references to underground refrigeration, and several important studies of the properties and hydrogenation of coal. They were also times of economic upheaval, reflected in the abandonment of the gold standard and the great depression. This, among other things, brought the young mining engineer Rudolf Krahmman to South Africa early in that decade.

The story of his serendipitous discovery of magnetic layers in the Lower Wits, and his brilliant deduction that they could be used to locate gold-bearing Upper Wits measures, have often been recorded. With the backing of Hans Merensky and Gold Fields, he went on to pinpoint these measures along the West Wits Line, and to breathe new life into the industry, which was again beginning to ponder its future. Krahmman presented the results of his investigations to a joint meeting of this Society and the Geological Society in 1936.

What is perhaps less well known is the story of Oscar Weiss, a Hungarian, who came here in 1934 at the request of Consolidated Gold Fields in London to report on the progress of its investment in Rudolf Krahmann. Weiss did so, liked the country, and stayed. He presented a paper to the Society in 1934 on the limitations of geophysical prospecting; another in 1936 on Lower Wits anomalies; and several more until his seminal 1946 paper, written with Frost of Union Corporation, Papenfus of Western Holdings, and R.C. McIntyre, which detailed his work with a gravitational torsion balance that gave rise to the rich discoveries at St. Helena in the Orange Free State.

Weiss ranks with Krahmann in the annals of Witwatersrand exploration, but there is also a human interest side to their relationship. Krahmann clearly didn't like being audited. When he presented his 1936 paper, Weiss criticized him severely on a technicality (something Weiss later regretted). Underlying the surface of this professional rivalry was something else. Krahmann was an admirer of Hitler, and a member of his party. Criticism from Weiss, known to be half Jewish, was to him intolerable. Thus, while the Society played host to two brilliant minds whose contributions to South Africa's economic life were incalculable, it unsuspectingly also witnessed, in microcosm, the kind of human drama associated with another Oscar, now being shown in cinemas around the world. In 1936 Krahmann and Weiss were both awarded gold medals by the Society, but Krahmann refused to accept his.

I have dwelt somewhat on this particular story because, to my great regret, Oscar Weiss himself has apologized for not being here tonight. Aged 90, he is in good health, lives in Sea Point, and must be our oldest surviving former *Journal* contributor and gold-medal winner.

The 1940's

Fifty years ago tonight, in March 1944, Allied forces, which included a large number of members of the Society, were fighting—and tunnelling—their way up the boot of Italy. In Johannesburg, a depleted Society met to commemorate its 50th birthday.

The President was C. Biccard Jeppe, Professor of Mining Engineering at Wits, whose most compelling presence will not be unfamiliar to some of the members of tonight's audience. Is it possible to find a combination of name and occupation more redolent of Johannesburg and the Witwatersrand?

The main business of that meeting of 50 years ago was to hear a résumé of the Society's activities over its first 50 years, prepared by E.H. Johnson, who had been President in 1906. His presentation and personal reminiscences are a useful source of reference.

But two other speakers on the same night made telling points. The first was J.H. Dobson, founding partner of the firm of Dowson and Dobson, and President in 1940. Rising to speak on behalf of the AS&TS he said the following:

'I have asked myself the question: where would have been the Witwatersrand Gold Fields and the ensuing engineering and industrial development of South Africa had it not been for the wonderful achievements of your Chemists, Metallurgists and Mining Engineers? The reply to this question is that South Africa would not be standing on the pinnacle of fame that it stands on today'.

In the manner of the times, this remark was greeted with a loud 'Hear, hear!'.

Dobson went on to detail one result of that technical development. He had come to this country in 1904, when the assay value of discard mine dumps was as high as 4 pennyweights per ton, that is around 7 grams per ton. In 1944 the achievements of the professionals had made it possible to bring *in situ* ore grading 4 pennyweights up from depths of 9000 feet and still make a profit. Certainly, the enhanced value of gold had helped, but the key was the achievements of members of this Society.

With minor updating, Dobson's observations remain valid 50 years later.

The other speaker was H.R. Raikes, the Principal of Wits and a great friend of the Society. He had this to say:

'The industry on the Witwatersrand is organized in such a way—I think differently from any other mining industry—that progress made in one group is communicated to those working on similar lines in other groups. There is no secrecy. There is no trying to get an advantage one over another, and the Society is the forum in which those achievements of progress are discussed, thrashed out and perfected'.

Raikes was echoing similar remarks made by William Cullen in his 1905 Presidential Address. Robin Plumbridge will again make mention tonight of the co-operative nature of our industry, and the many benefits that have flowed from it.

Post-war Years to the Present

The post-war years saw development continue at almost breathtaking pace. New disciplines emerged, notably geostatistics and rock mechanics. International contacts increased and broadened. In 1956 the Society brought itself into line with associates elsewhere in the Commonwealth and changed its name to The South African Institute of Mining and Metallurgy. Among the intellectual giants of that era, whom we would also have wished to be present here tonight, was F.G. Hill, currently our longest-surviving Past President.

Hill's interests, influence, and impact covered a wide spectrum. They included mine ventilation, a paper on which subject earned him a gold medal 50 years ago in 1944. His 1948 Presidential Address dealt pioneeringly with human sciences in mining. Metal technology was reflected in his collaboration with William Bleloch, which set up RMB Alloys, a forerunner of today's Columbus stainless-steel venture. Finally, another interest of his was rock mechanics, on which he was himself an authority but prepared to recognize and mobilize talent in others—not necessarily mining engineers—to develop solutions to the problems of mining at depth.

In South Africa, Hill stands out among those who turned mining from an art to a science. Such science is reflected also now in living memory in the internationally recognized achievements of men like Danie Krige and Herbert Sichel in geostatistics, Cyril Wyndham and Nick Strydom in human physiology, and Austin Whillier in the cooling of deep mines.

In the various fields of mineral processing, we acknowledge the accomplishments of Mintek and Wits in uranium extraction, ferro-alloy production, and carbon or resin adsorption in gold recovery; of Iscor and Pretoria University in new steel-production processes; and of David Horsfall and others in the processing of coal to meet a variety of export markets. In the more competitive fields of diamond and platinum production, which are less open than Cullen and Raikes had observed, where reporting has been possible, the Institute has been the medium. So it continues in its hundredth year.

Any survey of the Institute's numerous publications, produced by an aggregate of more than a thousand authors, must prompt the question: Why did they do it?

Hugh Scott-Russell has commented elsewhere that the names of our achievers are generally unknown outside the industry. Few have sought fame, and few have become rich. One exception was Charles Butters, the fourth President, who was a member of the Johannesburg Reform Committee in 1895 and who made good money from his patented Butters vacuum filter.

But, in general, the only real reward is what the Institute has offered in abundance. This is *peer recognition*—a powerful motivator in any society, and one that the Institute must continue to provide as it moves to face the challenges of its second century.

Dr H. Scott-Russell

A piece of advice attributed to Paul Kruger, the man who was President of the South African Republic one hundred years ago, was the following:

'Seek from the past that which is good, and build on it for the future'.

It is advice that can be applied universally and, whether deliberately or not, it must have motivated my predecessors when this Institute celebrated its 40th, 50th, and 75th birthdays. Those milestones were each marked by retrospectives, as Peter Janisch has so ably presented tonight on our hundredth anniversary.

The parallels do not end there. We find ourselves in times no less daunting than those of our predecessors. Next month will see the birth of a new kind of South Africa; so did May 1902, May 1919, and May 1948.

In our own technical fields, problems of deep-level mining, of extracting the last decimal of a per cent of valuable minerals, of beneficiating raw minerals, and of developing markets for the products, are no different really from those which have faced members of our Institute for a hundred years—and we have the advantage of new tools with which to tackle them, most particularly the digital computer.

In looking forward, the Council chose to mark this Centenary by inviting a distinguished leader of the South African mining industry to present his concept of where we are and where we are going.

The choice of speaker was not difficult. Robin Plumbridge brings to us tonight the experience of fourteen years as chief executive of a major South African mining house; twelve years as a member of the Executive Committee of the Chamber of Mines, including two terms as President; and a deep knowledge of the gold market stemming from his seminal role in the formation of the International Gold Corporation and in its subsequent absorption into the World Gold Council. He is, of course, currently the Chairman of that body and the first South African to hold that post. The Institute recognized that role in the Brigadier Stokes Memorial Award made to him in 1989.

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Mr Plumbridge has not been concerned exclusively with gold. Under his leadership, and starting with the successful conversion of a defunct uranium plant on the East Rand into a zinc smelter, his Group has steadily increased its interests and expertise in the mining and production of copper, lead, silver, and platinum metals, as well as the export of coal. However, it remains first and foremost a gold producer.

Gold was the prime motivation for the founding of our Institute in 1894, and it remains the country's primary generator of wealth a hundred years later. But our Distinguished Lecturer has been the first to acknowledge that South Africa's competitive edge in this business has waned considerably. We no longer produce the cheapest gold. For the time being, we are still the largest producer and, in consequence, industrial disruption and political disorder in this country continue to influence the price. The questions remain: for how long will this be the case, and is it possible that we can again become the force that our rich mineral deposits made us during the century that has passed? I am sure that our guest speaker will have answers for us.

It a great pleasure for me to introduce Robin Plumbridge to you, and to invite him to address us on his chosen topic, 'Mining in a global context: Can South Africa compete?'



From left to right: Dr R.E. Robsinson, Mr R.A. Plumbridge, and Mr P.R. Janisch



Dr H. Scott-Russell making a presentation to Mr R.A. Plumbridge