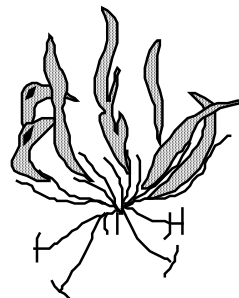


---

## Geological Society of Zimbabwe



Newsletter



---

### October 2007

---



*New Allosaurus and Brachiosaurus tracks, Ntumbe River, Chewore Photos LMB*

**THE GEOLOGICAL SOCIETY OF ZIMBABWE, P.O. Box CY 1719, CAUSEWAY, HARARE**

# Contents

EDITORIAL .....	3
CHAIRMAN'S CHAT .....	3
ARTICLES AND REPORTS .....	4
Zircon Geochronology and Partial Structural Re-interpretation of the Late Archaean Mashaba Igneous Complex, South-central Zimbabwe - Abstract.....	4
Codes and their Introduction .....	5
Zimbabwe's embattled mining sector short of 3 000 professionals .....	6
Reminiscences of a Fossil Find.....	7
Revised stratigraphy and age of the Red Sandstone Group in the Rukwa Rift Basin, Tanzania – Abstract .....	9
Dinosaurs and Other Vertebrates from the Cretaceous Red Sandstone Group, Rukwa Rift Basin, Southwestern Tanzania – Abstract .....	9
Gold not Grain — Harvest of the Nyanga Terraces .....	10
The Nyanga Terraces Field Trip .....	14
NEWS .....	18
Geology Department, University of Zimbabwe .....	18
The Geological Survey of Zimbabwe .....	20
Mining Industry News .....	21
RESEARCH FUNDING OPPORTUNITIES .....	23
GSZ Research and Development Fund .....	23
SEG Timothy Nutt Memorial Fund .....	23
SOCIETY ACTIVITIES .....	24
Talks Presented .....	24
Field Trip.....	24
Summer Symposium, 2007 .....	24
STOP PRESS .....	25
CONTACT DETAILS OF MEMBERS OF THE EXECUTIVE COMMITTEE .....	25
INSTITUTIONAL MEMBERS, 2007 .....	25

## Editorial

Welcome to the second Newsletter for 2007. Our thanks are expressed to all contributors, for their efforts are the only way we can compile a newsworthy document. Apart from our regular columnists, we have an abstract from Martin Prendergast, which throws new light on the evolution of the Mashaba Igneous Complex. There is an update on the various codes that are applied for the reporting of ore reserves that was submitted for your interest by Keith Viewing and an article on Zimbabwe's professional drain, with the realization of the need for your retention, which is reproduced per favour of Andrew du Toit as being relevant for its careful consideration. Mike Raath reminisces about his discovery of *Syntarsus* remains in the Zambezi Valley, which coincides with an expedition fielded by the hon. editor and Dr Eric Roberts of Wits to rescue new bone exposures from this site. Eric's interests in the Cretaceous of Africa are further outlined by two abstracts on the sedimentology and palaeontology of the Rukwa Rift of Tanzania, which formed the subject of his talk to the Society on 18<sup>th</sup> September. Hillary Gumbo records the Society field trip to the ancient terraces of Nyanga, which was a follow-up on Ann Kritzingler's talk to us in June, the text of which she presents in this issue.

The quarterly subscription rates for September 2007 are now:

Individual and Associate Membership	Z\$200,000.00
Institutional Membership	Z\$3,000,000.00
Extraterritorial Membership	\$US20.00 or Rand/Pound/Euro equivalent

Please respond with your payments for this year. It is only you, the Member, who makes your Society viable. Paid up membership has risen to 70 individuals of whom 7 are foreign. We as a Society are currently supported by 9 Institutional Members, who are listed on the last page.

Current advertising rates for this Newsletter are: **Full Page** \$3,000,000.00;  
**Half Page** \$1,500,000.00; **Cards** \$250,000.00.

*Tim Broderick*



## Chairman's Chat

Kudzie Musiwa

The current committee continues to keep the Society going despite all the hardships and loss of membership, mostly to the region. To date, the Society has organised a well attended trip and talks as follows; "Gold not grain - harvest of the Nyanga terraces" by Ms Ann Kritzingler; "Exploration for copper around Dikilushi Mine, DRC", by Dr. Ali Ait-Kaci Ahmed; and "Late Mesozoic and early Tertiary sedimentary, tectonic and faunal evolution of the Rukwa rift basin, Tanzania", by Dr. Eric Roberts. The Society also organised a trip to Nyanga led by Ann Kritzingler and Mr Bornwell Mupaya.

The Macgregor Memorial Lecture will not be presented this year as I had said in the last newsletter. It will be deferred to 2008 as the nominee needs more time to prepare his presentation. As soon as a date has been set, you will be notified of the programme.

Sadly, while the committee is trying to find ways of assisting the mining-related departments at the University of Zimbabwe, the Geology Department was forced to deregister its first-year

intake of students due to the lack of teaching staff. The other two departments, Mining and Metallurgy, have been administratively merged and are to get seconded lecturers from the University of Zambia to assist with teaching. For the time being it seems to be working for these two departments but the situation is dire. The Society is therefore appealing to the mining industry and its membership for ideas to save the departments from folding. I am sure we all do not want to see the Geology Department close. Any suggestions, ideas or comments can be e-mailed to [kudzie@eng.uz.ac.zw](mailto:kudzie@eng.uz.ac.zw)

On a happier note, the Society would like to thank Mimosa Mine for donating sixteen billion Zimbabwe Dollars in kind to the departments of Mining and Metallurgy.

It is my sincere hope that you will always support your Society from wherever you are and the committee will strive to keep it active. The best way of doing this in the near future is to make an effort to attend and contribute to this years Summer Symposium, which is to be held on Friday 30<sup>th</sup> November at the Geology Department, UZ. This is our one chance to meet, exchange ideas and update ourselves with geological progress and the happenings and efforts of our colleagues.

The newsletter editors are Tim Broderick ([pbroderick@mango.zw](mailto:pbroderick@mango.zw)) and Forbes Mugumbate ([zgs@africaonline.co.zw](mailto:zgs@africaonline.co.zw)). Please send articles to be included in the February 2008 issue of the GSZ Newsletter.

## Articles and Reports

### Abstract

#### **Zircon Geochronology and Partial Structural Re-interpretation of the Late Archaean Mashaba Igneous Complex, South-central Zimbabwe**

*M.D. Prendergast<sup>1</sup> and M.T.D. Wingate<sup>2</sup>*

<sup>1</sup>Guesachan, Shielhill Road, Kirriemuir, Angus DD8 4PA, Scotland, UK

<sup>2</sup>Geological Survey of Western Australia, 100 Plain St., East Perth, WA 6004, Australia, and Tectonics Special Research Centre, School of Earth and Geographical Sciences, University of Western Australia, WA 6004, Australia

Ion microprobe (SHRIMP) U-Pb zircon dating has determined the age of a gabbroic enclave within the supraregional intrusive komatiitic Mashaba Igneous Complex (MIC) to be  $2743 \pm 11$  Ma and that of an interpreted comagmatic thick differentiated komatiitic flow within the adjacent Mashava-Masvingo greenstone belt to be  $2754 \pm 13$  Ma. Recent geological observations support a revised structural interpretation of the MIC as an assemblage of three separate horizontal layered sills emplaced almost coevally at two different crustal depths: the chromitiferous Prince Sill intruded concordantly, and prior to regional folding, into the basal sedimentary rocks of the late Archaean Upper Bulawayan Supergroup, the relatively thin and evolved West Sill within early Archaean greenstone and gneissic basement, and the major Northwest Arm-Main Sill mainly within adjacent basement gneiss. The sill assemblage was vertically linked via ultramafic dykes and, as previously proposed was fed through the dyke-like Northeast Arm, whose overlying layered rocks are here interpreted as correlatives of the Northwest Arm-Main Sill. The new precise age for the MIC is 50 million years older than the former geological estimate of ca. 2700 Ma. The comparable date for the volcanic phase supports the interpretation

of both as component phases of a putative Masvingo W komatiitic sill-flow complex but is incompatible with interpretation of the late Archaean lithostratigraphy of the Mashava-Masvingo belt as a thrust-stacked package of unrelated continental and oceanic rocks.

The full paper is to be published in the *South African Journal of Geology*, 2007, vol. 110, pp. 179 - 190.

## Codes and their Introduction

*Submitted by K.A. Viewing*

**The Reporting Code.** Prepared by the Institution of Mining and Metallurgy Reserves Committee in collaboration with the Geological Society, the European federation of Geologists, and the Institute of Geologists of Ireland. Effective March 2001. Adopted by the Pan European Resources Committee on its formation in 2006. An update is in preparation, and is due to be completed in 2007. Website: [www.percreserves.com](http://www.percreserves.com)

**Australasian Code for Reporting of Exploration Results, Mineral Resources and Ore Reserve (JORC Code).** Prepared by the Joint Ore Reserves Committee of the Australian Institute of Mining and Metallurgy, Australian Institute of Geoscientists, and Minerals Council of Australia. Effective from December 2004. Website: [www.ausimm.com.au](http://www.ausimm.com.au)

**Definition Standards on Mineral Resources and Mineral Reserves.** Prepared by the Canadian Institute of Mining, Metallurgy and Petroleum (CIM) Standing Committee on Reserve Definitions. Adopted by the CIM Council on 14 November 2004. The Mineral Resource and Mineral Reserve definitions are incorporated, by reference, in National Instrument 43-101 – Standards of Disclosure for Mineral Projects, which became effective 1 February 2001. Website: [www.cim.org](http://www.cim.org)

**South African Code for Reporting of Mineral Resources and Mineral Reserves (SAMREC Code).** Prepared by the South African Mineral Resource Committee under the auspices of the South African Institute of Mining and Metallurgy. Effective from March 2000. An update is to be published in 2007. Website: [www.saimm.co.za](http://www.saimm.co.za)

**A Guide for Reporting Exploration Information, Mineral Resources, and Mineral Reserves.** Submitted by the Resources and Reserves Committee to the Board of Directors of The Society for Mining, Metallurgy and Exploration, Inc, USA. Effective March 1999. Website: [www.smenet.org](http://www.smenet.org)

**Cerification Code for Exploration Prospects, Mineral Resources and Ore Reserves.** Prepared by the Mineral Resources Committee of the Institution of Mining Engineers of Chile in collaboration with the Ministry of Mining. Established in December 2002. Effective from December 2004. Website: [www.iimch.cl](http://www.iimch.cl)

*Adapted From: In Reserve.* An article by Stephen HENLEY, 2007, Chairman of the Pan European Resources Committee, UK, published in *Materials World*, Vol. 15 (8), pp. 37-38, which describes the on-going process to harmonise the reporting of ore reserves around the World. The PERC is one of the members of the Committee for Mineral Reserves International Reporting Standards (CRIRSCO) and is the European equivalent of the Australian JORC, the South African SAMREC and similar bodies in the USA, Canada and Chile.

## Zimbabwe's embattled mining sector short of 3 000 professionals

*Barnabas Thondhlana*

Zimbabwe's central bank is mulling a possible relaxation of exchange control regulations to stop massive skills losses in the mining sector. The country's embattled mining sector has a deficit of more than 3000 professionals. Reserve Bank of Zimbabwe governor Gideon Gono said last week that the central bank might have to move in to avert worsening skills losses across the sector. Skilled mining professionals are leaving the country for regional countries like South Africa, Namibia and Zambia, where they are remunerated better. Gono would not give a timeframe for the new measures, but this would mean that executives and key skilled people in the mining sector might have to be paid in foreign currency. "The country's skills base is diminishing in the sector and we should do something. We might have to relax the exchange regime so that those who can pay can do so," he said. "We will look at whatever they are paid in those countries and we will match that. But, again, I am thinking aloud," he added.

Gono's comments come a few months after the Chamber of Mines raised concerns with his office, highlighting the problem of skills across the sector. Zimbabwe's mining sector employs between 30 000 and 35 000 people and requires at least 7000 professionals. Currently, the sector has between 3000 and 4000 professionals, leaving a deficit of around 3000. RioZim human resources and external affairs manager Aaron Mudhuwiwa says the situation is "desperately critical", especially in the technical disciplines. RioZim is Zimbabwe's second-largest gold producer, after Metallon Gold. Mudhuwiwa said: "When mining-industry professionals started to leave, we said, and we continue to say, 'Pay them better, give them a Nissan Wolf double cab . . . sorry, rather use a Toyota Vigo 3000 TDI' and again say to them, 'You will stay, won't you?' Well is it really working . . . The mining industry is in dire straits with regard to skills today. "Do you realise that even if all the wrongs in our economy were righted and we had a great site for a new mine, [we would not be able] to open it [owing] to the fact that we cannot man it skillswise – effectively," Mudhuwiwa warned.

He said Zimbabwe was losing the majority of its professionals to better-paying countries, dismissing the myth that mining professionals were heading south. "There is an almost mythical belief that we are losing our skills mainly to South Africa. This is not really true. The fact is that our people pass through South Africa *en route* to other parts of Africa and the broader world," Mudhuwiwa said. He indicated, however, that South Africa had a huge skills gap in the mining sector. "They (South Africans) have 15 000 vacancies in the petro-chemicals, mining and power-generation industries," he said. Mudhuwiwa said it was unlikely that Zimbabwe would succeed in retaining professional staff because of poor remuneration. "Whatever levels of salaries we choose to pay the young professionals will still not enable them to buy a car or work towards owning a house. "As long as the situation remains like this, we will not be able to keep our own people in our country," Mudhuwiwa said.

He said the country's tertiary institutions were experiencing a serious skills flight because of poor remuneration and poor working conditions. Lecturers could not afford to do research work because of a stifling environment, he said. "A case in point here is the infrastructural state of the University of Zimbabwe, where buildings and related infrastructure are in a poor state of repair. "With very few lecturers left, the institution can only churn out a small number of degreed personnel for industry. "People are also now sending their children to 'better universities' outside Zimbabwe. Chances of such children coming back soon after qualifying are very slim," Mudhuwiwa said. The skills haemorrhage has hit Zimbabwe as a result of the seven-year economic recession plaguing the country. It is believed that, of the country's estimated 13

million people, four million now reside in the diaspora. As a result, Zimbabwe has been reduced to a training ground for the world's bustling economies.

*From Mining Weekly (SA), 8 June, 2007*

## Reminiscences of a Fossil Find

*Mike Raath  
September, 2007*

The fossil dinosaur remains in the Mana Pools National Park have a very special place in my heart. I stumbled on these bones when I was doing a major traverse across the Zambezi Valley in mid-1972, just before the escalation of the Chimurenga War at a time when I was Curator at the Queen Victoria Museum. I had started right up in the north-east corner of the country, near the Mozambique border, and then just headed steadily westwards to come out on the main road to Chirundu. When I got to the Mana Pools region it was getting quite late of an evening, so I headed off to the Rekometjie Tsetse Research Station, where I had arranged to spend a couple of days while exploring in the area. The following day I set out on an abandoned tsetse track, marked as a solid red line on the map, heading east from the Research Station. The track was barely visible through the bush re-growth and I had to keep diverting because of trees that had been pushed over by elephant. Eventually I came to the remains of an old concrete ford across an incised river where the concrete was still more or less in place, but very badly undercut. I stopped and walked down the badly eroded approach to judge whether my vehicle would make it or not. As I was walking down my eye focused on something sticking up out of an erosion hollow in the Forest Sandstone that forms the banks and I immediately thought I recognized it as the top end of a tibia of the same species of little dinosaur that I had been involved in discovering down in Matabeleland ten years earlier at Nyamandhlovu. This was very exciting for me, because it was the first indication of this little dinosaur apart from the original discovery. I raced up to the bone and sure enough my suspicions were confirmed - it was indeed a tibia of *my* animal, *Syntarsus*. So I quickly carried on down into the bed of the river where almost at once I saw more fossil bone eroding out of the bank just upstream of the ford. I then decided to walk a little further up the river to see if anything else was showing and, sure enough, there were other dinosaur skeletal remains eroding out at scattered places along the river. These were not of *Syntarsus*, but rather the remains of a much bigger dinosaur called *Massospondylus*. Then eventually, almost exactly one kilometre upstream from the ford, I came to a sharp bend in the river, which appeared to be fault-controlled, and there I saw a loose block of sandstone lying in the river bed that had obviously fallen from the cliff. From 30 or 40 paces away I could see that it was literally *covered* in fossil bone. With the hair on the back of my neck standing straight up I raced to it and right away could make out familiar bones of *Syntarsus*, but what was especially exciting was the fact that I could see bones from the skull and some teeth. These were the first bits of skull of this dinosaur ever found. Although the original specimen from Nyamandhlovu was a virtually complete skeleton, its skull and neck had been eroded away by the stream that had exposed it before being discovered by boys at Northlea School, where I was a teacher at the time.

I collected a few loose scraps of bone that were lying around and determined to come back to the site as soon as I could to do a proper excavation. This I did in September 1972, and over the next several years I kept coming back to excavate more as the security situation permitted. I then started a major research project on this bone bed, which ultimately got me my doctorate in 1977. I was able to show that that particular deposit was a 'mass death' of one community of *Syntarsus*, probably as a result of a flash-flood in the desert where they lived at the time some 200 million

years ago. I recovered the remains of more than 40 individuals in my excavations, and was able to differentiate the sexes by particular features on some of the bones. I was also able to reconstruct something of the social structure of this 'flock' because there were adults and juveniles present in the preserved sample, as well as both sexes among the adults. I could also calculate roughly the size, and therefore the age, at which these dinosaurs reached sexual maturity. So that one deposit gave us an incredibly detailed insight into many aspects of the life and times of this species of dinosaur.

Now there is renewed interest in the site because of new exposures in that same bone bed. Colleagues of mine are planning a trip, under permit, to rescue what is in danger of erosion, and to further study the circumstances of preservation in that one spot. I was originally due to go with them, but have had to pull out much to my regret. I'd love to see *my* site again. I last saw it in 2001, during the time of the total solar eclipse, when there was no bone showing at all. Erosion since then has re-opened the deposit, and from pictures that I have seen it seems almost as rich as when I first saw it more than 30 years ago.

*For the ongoing saga you will have to listen to the Hon Ed's presentation on recent activity in the fossil world of Zimbabwe at the Summer Symposium. The cover picture and that below should whet your apatite and raise your curiosity, so we hope to see you on Friday 30<sup>th</sup> November at the Geology Department at UZ.*



*Syntarsus rhodesiensis - Distal section of caudal column and part of a maxilla*

*Photo Di Hull*



## Revised stratigraphy and age of the Red Sandstone Group in the Rukwa Rift Basin, Tanzania

Eric M. Roberts<sup>a</sup>, Patrick M. O'Connor<sup>b</sup>, Michael D. Gottfried<sup>dc</sup>,  
Nancy Stevens<sup>b</sup>, Saidi Kapalima<sup>d</sup>, Sifael Ngasala<sup>d</sup>

aDepartment of Geology and Geophysics, University of Utah, Salt Lake City, UT 84112, USA

bCollege of Osteopathic Medicine, Ohio University, Athens, OH 45701, USA

cDepartment of Geological Sciences, Michigan State University, East Lansing, MI 48824, USA

dDepartment of Geology, University of Dar es Salaam, Tanzania

### Abstract

The Red Sandstone Group comprises a succession of red sandstones and mudstones exposed in the Rukwa and Malawi rift basins of southwestern Tanzania and northern Malawi. Stratigraphic, sedimentologic, and paleontologic investigations of the Red Sandstone Group in the Songwe Basin (a sub-basin of the Rukwa Rift Basin) help clarify the age and depositional history of these strata, which have previously been assigned ages ranging from Middle Jurassic to late Miocene. These seemingly incompatible Mesozoic and Tertiary age assignments for the Red Sandstone Group are, in part, explained by our discovery of two distinct units (Units I and II) that are of different ages but composed of lithologically similar red sandstones and mudstones in the Songwe Basin. Based on distinct, temporally limited vertebrate fossil remains, a Cretaceous age is proposed for Unit I and a Paleogene age for Unit II. The identification of different-aged units in the Songwe Basin suggests a complex structural and stratigraphic history for the Red Sandstone Group in the context of East African Rift evolution.

*Cretaceous Research* 25 (2004) 749–759

## Dinosaurs and Other Vertebrates from the Cretaceous Red Sandstone Group, Rukwa Rift Basin, Southwestern Tanzania

Patrick M. O'Connor; Patrick O'Connor; Michael D. Gottfried; Nancy J. Stevens;  
Eric M. Roberts; Sifa Ngasala; Saidi Kapilima; Remigius Chami

### Abstract

The Rukwa Rift Basin Project was initiated to conduct exploratory field palaeontology in poorly sampled terrestrial strata in southern and western Tanzania. Here we report the discovery of a series of new fossiliferous localities from Red Sandstone Group deposits in the Rukwa Rift Basin. These localities contain a diverse Cretaceous terrestrial/freshwater vertebrate fauna that consists of members of several major clades, including fishes, turtles, crocodyliforms, dinosaurs and mammals. Expeditions conducted in the austral summers of 2002-05 have identified numerous fossil-bearing localities, with specimens ranging from isolated elements to semi-articulated sauropod and theropod dinosaurs. Notable among the finds are the most complete mammal specimen recovered from the Cretaceous of continental Africa, megaloolithid dinosaur eggshell, and both theropod and sauropod dinosaurs. Given the scarcity of Cretaceous terrestrial faunas from sub-equatorial Africa, this portion of the East African Rift System holds great promise for providing new palaeontological data that will contribute to testing and refining a number of biogeographic hypotheses that have been advanced to explain Gondwanan vertebrate distributions in the latter half of the Mesozoic.

Submitted to the Journal of African Earth Sciences

## Gold not Grain — Harvest of the Nyanga Terraces

Ann Kritzinger

*Affiliated to Zimbabwe Geological Survey*

[annkritzinger@gmail.com](mailto:annkritzinger@gmail.com)

### Introduction

The agricultural theory explaining the archaeology of the Eastern Highlands of Zimbabwe is well documented (Soper 2002, Sutton 1983, Summers 1958). It is based on the assumption that small livestock were penned in thousands of stone-built 'pit structures' to provide manure to raise the soil fertility of hill slopes for the purpose of intensive terrace farming between the 14th and 19th centuries.

This research addresses anomalies in the agricultural interpretation from a mining perspective. Conducted by Ann Kritzinger under a 5-year foreign researcher permit granted by the Research Council of Zimbabwe in March 2005, its initial phase gained from the expertise of Mainford Toga, then Lecturer in Metallurgical Engineering, University of Zimbabwe.

### Terraces and tanks

The Nyanga terraces extend over an estimated 7000 km<sup>2</sup> from the Makaha Gold Belt in the north to the Biriwiri region of Chimanimani in the south, the Mozambique border in the east to the Nyangombe catchment on the west. They are labour-intensively built and can rise for many flights up stony hillsides visible in aerial photography. The 'pit structures' are not sunken. They are tanks built up from bedrock within heavy-duty retaining platforms. A tunnel enters each tank from uphill and a small drain exits down slope, both constructed on the incline through the platform.

In the agricultural theory the exposure of tunnels to hilltop runoff is explained as 'sewage farm' effect (Soper 2002:76,127-8; Sutton 1988) to enable liquid manure in the tank to be flushed through the drains. In this style of livestock management from the continent of Europe small 'dammed basins' at drain exits are considered to have impounded effluent. Phosphate tests reveal an absence of direct evidence for manure in these basins and in the 'pit structures', endorsed by lack of abrasion on paving and stone walls that one would expect from the presence of livestock (Soper 2002:91,178).

The nature of their droppings precludes the stalling of goats or sheep to provide slurry in this manner, and record of domesticated pigs in pre-colonial Nyanga is lacking. In the late 1990's a small assemblage of bones of *Bos taurus* excavated on Mount Muozzi 40 km north of Nyanga town focussed attention on dwarf cattle. With 'an average shoulder height around one metre' (Soper 2006:27; Soper 2002:242-8) and horn span of 49-52 cm (Plug *et al* 1997), such animals could not move freely through the largest dimensions of the tunnels—the lintelled entrance into the tank that seldom varies from 1m high and 50 cm wide.

Tunnel entrances uphill can be as little as 30-54 cm high and the fixed design feature of a bend inside most tunnels, frequently angled at 90 degrees, further prohibits the passage of animals (Kritzinger and Toga 2007). The tunnels are solidly roofed with slabs but 'no evidence of roofing has ever been noticed' in regard to the tanks themselves (Soper 2002:90).

**Lack of direct evidence in agricultural theory**

Grindstones, rubbing stones and very heavy hammer stones are frequently found in the terraced regions. These implements common to pre-mechanical mining can be confused with grain grinding in early sites worldwide (Cranstone 1994:144-47). Carbonised seed is important direct evidence for studies of early agriculture but searches for these cultigens have proved unproductive.

To date (unquantified) finds of *munga* and *rapoko* were reported by Summers (1958:176) at two sites at Ziwa National Monument, two carbonised seeds of sorghum 60 km apart by Soper (2002:249) and one of *rapoko* at Ziwa (details of a further 37 cannot be traced in the site reports). To confuse the issue, 'slag and large quantities of ash' were also present at one of Summers' Ziwa sites (Summers 1958:94).

**Methodology**

In its initial two years the study put to test inconsistencies inherent in the agricultural theory in an area of 20 km radius centred around Lat 18°22'S and Long 32°35'E at Sanyatwe. Research was conducted chiefly through the process of landscape archaeology, a concept of multidisciplinary investigation, which enables emphasis to shift from site-specific archaeological excavation to extensive field walking associated with practical geology and historical geography.

Soil study tests were directed at geochemical analysis with special emphasis on gold (see current results in 'Direct evidence—gold'). Incidences of unexpected high coarse-sand fraction and terrace soils transported and deposited from different parent origin (Soper 2002:18) were collated from archaeological data for a forthcoming mineralogical study. This study will include sampling of 'cultivation ridges' several hundred metres long and 7-10 m wide that belong to the Nyanga complex and show geomorphological issues comparable with those of the terraces.

Crop trials were undertaken to test the soil fertility of terraces in three experimental plots of *rapoko*: one fenced and manured with cattle dung, the second manured but left unfenced, and the third neither fenced nor manured. A plot of *munga* was also tested. Grazing of *rapoko* by kudu and *munga* by hare was particularly problematic at shooting stage, with both millets stunted at maturity and producing more chaff than seed (Kritzinger and Toga 2007).

Geological studies were centred on a terraced hill in Sanyatwe where bedrock gold was found less than 2 km from a river panned for gold. The primary-source quartz reefs are parallel and approximately 25-35 cm wide, yielding gold values of 14-19 grams a tonne (g/t) at depths of 8 m. The footwalls of shafts sunk on these veins are in weathered dolerite, the hanging walls being altered granite. Laterite is eroded into the hillwash below. Forthcoming examinations further afield will include terraced areas on the Umkondo Group.

**EPO applications**

A block of four gold claims was registered in August 2005 by the Gungutsva brothers, discoverers of the Sanyatwe vein gold. Indications that such occurrences recur further afield in similar geology led to an application by the Ntau Mining Syndicate for four EPOs covering 220 000 hectares from Sanyatwe in the south to Ruangwe Range in the north. These were approved by the Mines Affairs Board in October 2006.

**Mining v farming**

The Eastern Highlands are not known for the occurrence of gold. In his bulletin covering the portion east of Long 32°38' between Lats 17°30' and 18°30' Tyndale-Biscoe (1957:10) noted that, 'No mineral deposits of commercial value have so far been proved to exist in the area'. Twenty

years later the region was pronounced of little economic importance by Stocklmayer (1978, 1980). In 2003 this negative assessment—and the mineral potential of the Eastern Highlands—required re-evaluation following the artisan miners' gold rush to the lesser slopes of Chimanimani.

#### Prospective dolerite?

Re-evaluation of Chimanimani geology by the Zimbabwe Geological Survey (ZGS) detected the presence of 'supergene' auriferous deposits in a mantle of near-surface laterite always overlying dolerite—the geological horizon most favoured by the terrace builders.

Dolerite is not considered a prospective rock for precious metals on the continent of Africa, but in the 1970s EPO reports for the Nyanga District recorded high values for copper and nickel related 'in all cases' to dolerite sills and dykes (Final reports 221, 325, ZGS). In the Muda River region of Mozambique the exploration company CAMEC announced the discovery of gold hosted in dolerite dykes in 2004; earlier this year Gryphon Mines Ltd published values of over 1000 ppb coinciding with a dolerite intrusive in Burkina Faso similar to the Golden Mile dolerite in Western Australia.

Tim Broderick has pointed out that remnants of greenstone belt lithologies occur in the terraced regions underlain by older gneisses, whilst Bornwell Mupaya has detected their presence in the field at Sanyatwe.

#### Eluvial bench-mining

Until the recent banning of this activity, hundreds of informal gold panners active in the rivers were living testimony to the existence of gold in dolerite zones across the Eastern Highlands. Primary-source gold found within terraces in 2005 puts a new perspective on the purpose for their construction. It seems probable that the early miners of the Eastern Highlands stripped off lucrative eluvial deposits in a widespread activity of bench-mining, leaving the 'terraces' we see today.

The longitudinal slope of the terraces rules out irrigation but is compatible with the technique of ground sluicing, a method well known in past ages for working eluvial and colluvial deposits commonly found on hillslopes. Georgius Agricola (1556:viii,346-7) recounts 'the season when a torrent rises from storms of great violence or long duration, and rushes down the mountain' and this torrent 'collects and carries together with earth and sand ... particles of gold loosened from veins and stringers'.

Stripping-ratios of waste removed against the amount of 'pay dirt' to be washed or sluiced are very high for placer deposits. Depending upon grade, more than 90% of the material mined can be waste. Extraction of ore and the dumping of waste is in keeping with the disturbed landscape of the Eastern Highlands.

It is also normal practice in mining for deposits to be worked out and then abandoned. This routine fits archaeological evidence for only single-phase occupation in the terraced regions, where the absence of burial sites is at odds with a culture devoted to intensive farming. The justification that the terraces were built by a 'small locally shifting population' and sited not from choice but from 'land pressure' (Soper 2002:233) conflicts with the fact that the fertility of the soil improves as the terrain flattens out into upper stream valleys, generally only a few minutes' descent away.

It is debatable that this comparative ease of access weakens a second argument that the terrace builders fled to the hills from Ngoni and Gaza raids—an event that would limit the period of terrace farming to the mid-1800s. On a wider scale this ‘Refuge’ theory is challenged on historical issues (Mazarire 2005:19-25).

### **Hydraulic tanks**

The hydraulic design of the tanks incorporates principles for the recovery of a heavy metal such as gold by gravity concentration, a method requiring a controlled stream of water and a sloping surface in the manner of a sluice. The curve incorporated in the tunnels is similar to the inside bend in alluvial rivers—the ‘point bar’ where heavy minerals fall out of suspension and collect as alluvium. Such a function for this laboriously engineered feature is more logical than an obstruction to the passage of livestock. The paved floor, often steeply inclined and inappropriate as a corridor for hooved animals, ensures the provision of the clean water necessary in mineral processing.

In a mining model the small ‘dammed basins’ present at drain exits and also at around 6-10 m downhill exhibit the features of tailings ponds for the collection of concentrates. Furrows bringing water from sources often more than 500 m away and frequently shown to be feeding groups of tanks (Soper 2006:54-60, 2005:38-40; Summers 1958:235-6) are further evidence of a dedicated management of water essential to gold recovery plants.

### **Direct evidence—gold**

In contrast to the lack of direct evidence for farming and the keeping of livestock, 26 samples out of 29 collected and assayed for gold have given positive results, with an average grade of 7.58 g/t. Results of ten rock samples from terraces ranged from 4-19 g/t. Five samples of infill taken at tunnel exits into tanks registered 0.14-0.21 g/t. Two samples of soil from drain exits yielded trace values, and a third the high grade of 12 g/t. Two samples of laterite showed 0.03 and 0.13g/t. From slag scatter two samples recorded 0.88 and 46 g/t. Four samples from two slag heaps of 50 cm radius and 0.25-0.5 m deep gave grades of 0, 3.5, 26 and 28 g/t. Two samples of flux (?) recorded 0 and 4 g/t. The third zero result came from an associated artefact of *dhaka*.

### **Historical landscape**

There is silence in the historical record about terrace farming in the land now Zimbabwe, but it is well known that references to the export of gold from the hinterland of Sofala date back to the 10th century (Summers 1969:169). A map based on a hitherto-neglected Portuguese document featuring the gold, copper and iron mines of eight dynastic rulers between the Zambezi and the Limpopo (Pereira 1857) is in preparation. The discovery of all ‘localities’ is recorded as 1500, with most of the mining ‘districts’ falling within Zimbabwe’s greenstone belts of the central plateau.

By far the largest holding is that of Manyika with 21 gold and ten iron mines. It was found that more names are retained in terraced landscape features of the Eastern Highlands of Zimbabwe—from Makosa in the Makaha Gold Belt to Mkondwe in the Penhalonga Gold Belt—than in the Upper Revue valley in Mozambique, long thought to be the geological host for the renowned Manyika goldfields. Six of the mines are named after Manyika dynastic houses, giving historical weight to early exploitation of the terraced hills in Manicaland Province.

### **Conclusion**

Practical tests revealed that the terraces are unsuitable for cereal production. The tanks are skillfully engineered to a hydraulic plan that is excessively labour-intensive for the purpose of cattle kraals but ideally suited to the recovery of gold by gravity concentration. Gold was

discovered in bedrock vein-quartz within terraces, and in pit structure soils. Massive slag heaps, crushing stones, and some crucibles discovered in the area of study support the hypothesis that gold, not grain was the product of the Nyanga terraces.

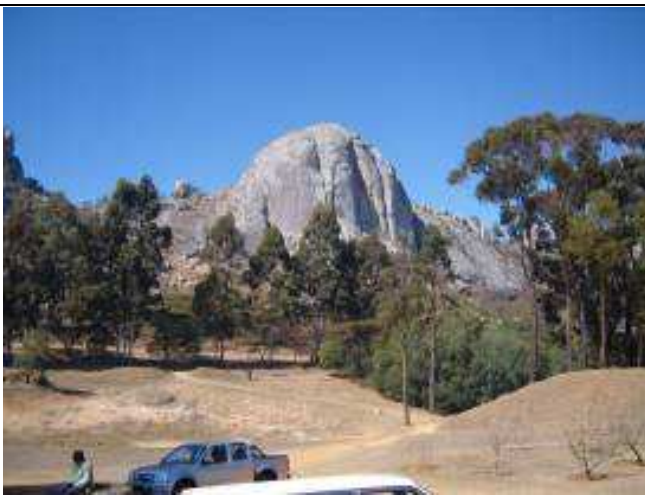
### References

- Agricola, 1556. *De Re Metallica*. Basel. English translation and notes, H.C. and L.H. Hoover, London 1912.
- Beach, D.N. 1996. Archaeology and history in Nyanga, Zimbabwe: An overview. *Aspects of African Archaeology* (Papers from the 10th Congress of the Pan African Association for Prehistory and Related Studies), edited by G. Pwiti and R. Soper, University of Zimbabwe Publications, Harare, pp. 715-718.
- Cranstone, D. 1994. Early Surface Features of Metal Mining: toward a typology. *Mining Before Powder*, **12**, (3). Historical Metallurgy Society, Derbyshire.
- Kritzinger, A. and Toga, M. 2007. The Mystery of Nyanga Terraces and “Pit Structures”—a mining perspective. *Proceedings of the Research Council of Zimbabwe 8th Symposium*.
- Mazarire, G. 2005. Defence consciousness as a way of life: “the Refuge Period” and Karanga defence strategies in the 19th century. *Zimbabwean Prehistory* **25**, pp. 19-26.
- Pereira, I. 1857. *Annaes do Conselho Ultramarino, Parte não official, Serie II*, Outubro, pp. 186-187, Lisbon.
- Plug, I., Soper, R. and Chirawu, C. 1997. ‘Pits, tunnels and cattle in Nyanga: new light on an old problem. *South African Archaeological Bulletin* **52** (166), pp. 89-94.
- Soper, R. 2002. *Nyanga: ancient fields, settlements, and agricultural history*. British Institute in Eastern Africa, London.
- Soper, R. 2005. Pit-structures with associated walls in Nyanga National Park. *Zimbabwean Prehistory*, **25**, pp. 38-40.
- Stockmayer, V.R. 1978. The geology of the country around Inyanga. *Rhod. geol. Surv., Bulletin* **79**, 173 pp.
- Stockmayer, V.R. 1980. The geology of the Inyanga North – Makaha area. *Zim. geol. Surv., Bulletin* **89**, 167 pp.
- Summers, R. 1958. *Inyanga: prehistoric settlements*. Cambridge University Press, Cambridge.
- Summers, R. 1969. *Ancient Mining in Rhodesia*. Museum Memoir No 3, Salisbury.
- Sutton, J.E.G. 1983. A new look at the Inyanga terraces, *Azania*, **19**, pp. 12-19.
- Sutton, J.E.G. 1988. More on the Cultivation Terraces of Nyanga: the Case for Cattle Manure. *Zimbabwean Prehistory*, **20**, pp. 21-28.
- Tyndale-Biscoe, R. 1957. The geology of a portion of the Inyanga District. *Sth. Rhod. geol. Surv.*, Short Report No. 37, 11 pp.

---

## The Nyanga Terraces Field Trip

*H. N. Gumbo*



*A view from Geoff Cox's Place our residence for the trip*

The field trip spanned two days, the 1<sup>st</sup> and 2<sup>nd</sup> September 2007. Our host was Ann Kritzinger who is doing self-funded research on the ancient terraces, gold mining and pits in the Nyanga area. We all assembled at London Store, some 61km along the road from Rusape to Nyanga, at 9am on the first. A total of 10 people attended we checked in at Geoff's Place, a pleasant, scenic situation opposite Vukutu where we stayed for the week-end.

We then set out for our first field stopover at Gungutsva Mine. This is a small gold working by locals on a quartz reef at the side of a hill hosting many ancient terraces. All the way along a path leading to the small working are piles of pink, barren quartz rubble which may have been waste rock from some mining activity.



*The small open pit with the auriferous quartz vein. Chairman Kudzi and Mupaya as scale*

The small working is at UTM 36K 0457779E/7976961N. It is on a 15-20 cm-wide quartz reef with up to 19g/t Au located along a dolerite/granite contact. Another occurrence of gold

outcrops a few tens of metres away at 457725E/7977020N and this assayed 7g/t. A shaft is located at 457815E/7977007N with assays of 14 to 19g/t gold.

Down the hill is some ferricrete known to contain 0.77g/t gold at UTM 458024E/7976976N. If this is extensive, it may potentially form a resource for a small worker.

Our next stopover was a long feature marked on the topographic map as a possible ancient trench near the Nyachara River. On inspection, it turned out to be a 1976 vintage trench with some ceramic pipes being exposed. This appears to be a recent trench for a water pipe from a nearby stream, which could have been for irrigation. The north end of the trench is located at about UTM 459143E/7976506N.



*Group photo near the long trench. Author is photographer. Our hostess Ann is at centre*

Lunch took place under some shady trees where we had parked our cars. We then left for our third site at Vukutu near Geoff's Place where there is a lot of slag at what is suspected to be an old smelting site (UTM 458895E/7970711N). The slag assayed about 19g/t gold

By proceeding along the same track, we went to visit some ancient structures that could either be granaries or furnaces. Vukutu is a modern centre of stone sculpture and the source of some of the serpentine that is carved into artefacts such as a fish and pangolin could be from around our first site visited. There was a very interesting debate about what these structures were, but it certainly looks like an ancient koppie settlement.

This marked the end of our first day's activity at about 5.00 in the afternoon. We then retired to our pleasurable accommodation at Geoff's Place where we were treated to a sumptuous braai with Ann providing both protein and starch for the occasion. We were lucky to come across the most sort-after beverages at London Store.





*Ancient remains of a settlement – furnace or granary?*

Sunday the 2<sup>nd</sup> started reasonably early with a breakfast treat of egg rolls and tea before setting out for the day. This was a “ninga” day, these being old pit structures. Our first stop was at Kadzema farm site where an old “ninga” encouraged a lot of debat about what the structure was actually used for. The “ninga” remains are on a raised platform with a hole at the centre probably measuring 10 metres across. An adit about a metre in diameter enters this hole from a few meters away. The top of the hole could have been previously covered and there is evidence for a back outlet to the hole. There were two schools of thought, one being that it was some kind of “bunker” into which warriors retreated during battle. The other thought was that they were used as a gold processing “plant”. Traces of gold have been found within the “ninga” structures.



*Ancient furnace*

The second stopover was at a ninga and ancient furnace on Rommens Farm. The “ninga” is very similar to the one visited first and the furnace is quite intact - and what a beautiful structure! The furnaces are seen in other locations in the area in various sizes. They are said to have male and female structures, depending on the design at the front end. The furnace is located at UTM 36K 461217E/7973483N.

This marked the end of our field trip at around noon when we returned to Geoff’s Place to “checkout”. Before leaving for Harare, we went to Nyamazi Lodge, some 16 km from London Store along the road to Mutasa past Bonda Mission. For those lucky enough to find the place, we were treated to an affordable but very tasty lunch of a variety of stews. We then set off for home in the mid-afternoon after a very exciting and refreshing trip to the Eastern Highlands.

# News



## Geology Department, University of Zimbabwe

*Nyikadzino Matura*

The first semester for the academic year 2007-2008 started on 10<sup>th</sup> September 2007. The Department of Geology has only four lecturers left from a complement of eighteen. These lecturers have no capacity to teach all the courses offered and, as a result, we did not register any part one students. How sad!! This is the first time in the history of the department that this has happened and the impact of this hiatus in training will be felt far beyond our borders.

Part two and three students are also find themselves in a very difficult situation, as we do not have lecturers to cover certain courses. In fact most of our courses have no lecturers in place. We are appealing to those with the passion and ability to teach at part 2 and 3 level to go through our departmental brochure below, choose a course they believe they can teach and get in touch with us at the Department to work out the teaching modalities.

The fourth year honours students have finished all their taught courses and are now doing their field projects. Please support them out there!

During this year's graduation ceremony, expected to be held later this year, the Department anticipates 10 BSc graduates, 5 BSc Special Honours graduates, 3 MSc graduates, 1 M Phil graduate and 1 D Phil graduate, making it one of our best graduation ceremonies in recent times.

### SUMMARY OF COURSES OFFERED

### PART 1, PART 2, PART 3 & PART 4

#### INTRODUCTION

The Geology Department is part of the Faculty of Science and the degree structure is a course unit. The details of this system are found in the Faculty regulations. This handout is NOT a definitive manual but a guide to what the department offers and how the system works. Geology can be studied as a minor or major subject. In choosing your courses you must be aware of what CORE courses, PRE-REQUISITE courses and CO-REQUISITE courses are:

#### COURSES

You are required to attend at least 10 (but normally 12) courses at each of Parts I, II or III and you must pass at least 28 courses, 20 at Part II and /or above, to be awarded a B.Sc general degree. A core course is one which must be passed in order to be awarded a major in a subject. Pre-requisite courses are those which must be passed in order to take particular courses at Part III and co-requisite courses are those which must be taken along with a particular course. You must attend ALL lectures, practicals and field classes, which may be held on any day of the week even public holidays. Absence requires written explanations such as a note from the doctor or Student Health Centre etc.

#### ASSESSMENT

The final mark in each course will consist of coursework assessment and examinations.

*Coursework Assessment:* Coursework assessment may be made in any way, usually in the form of marked tests and/or exercises and/or practical work. Fieldwork is an important part of Geology and will also be assessed. Coursework assessment may count up to 50% of the total course mark, so it is essential that all assignments are submitted, even if you are repeating the course.

#### EXAMINATION

The year is divided into two semesters with examinations held at the end of each. There are details in this brochure as to which courses are examined when. For a guide to style and content of examinations see previous papers although they are subject to change.

#### INFORMATION

The 'topics' section of this handbook is meant as a guide only and more detailed syllabi will be provided at the start of each course by concerned lecturers. It should be noted that wide reading and extra curricular study is essential and

examinations may contain material that is not explicitly covered in Lecturers or published syllabi. Textbooks maybe borrowed from the student section of the department library. It is open every working day from 2-3pm. A record book is kept by the sectary in charge. Please do not abuse the system by keeping the books for longer than the maximum two nights.

### **PRACTICALS**

You will require the following for practical classes: calculator, coloured pencils, a full set of drawing instruments, stereonet. Hard backed exercise books are recommended for practical work. These may be collected at the end of the year to be made available to the examiners. You will be provided with your own stereonet, which should be brought to all practical classes and fieldtrips.

### **EMPLOYMENT OPPORTUNITES**

Students can qualify to be a geologist after three years of study but to enhance chances of employment in the mining industry it is advisable to pursue geology up to 4<sup>th</sup> Year Special Honours. Possible areas of employment are: Mining Geology, Exploration Geology, Hydrogeology, Environmental Geology, Engineering Geology, Curatorship, Economic Geology, Academic/Researcher and Banking.

### **PART ONE COURSES**

For a candidate to be enrolled for Part I Geology they should have 'A' Level passes in Mathematics and any two of the following: Chemistry, Physics, Biology and Geography

#### **GL106: PLANET EARTH AND ITS MINERALS (Core Course)**

Course weighting: 1.0 and is offered in the first semester.

Structure of the Earth, Mineralogy, Structural Geology.

#### **GL107: INTRODUCTION TO PETROLOGY**

Course weighting: 1.0 and is offered in the first semester.

Igneous Petrology, Metamorphic Petrology, Sedimentary Petrology

#### **GL 108: ECONOMIC AND APPLIED GEOLOGY**

Course weighting: 1.0 and is offered in the second semester.

Economic Geology, Environmental Geology, Principles of Stratigraphy, Zimbabwean Stratigraphy, Palaeontology.

#### **GL109: INTRODUCTION TO MAPS AND FIELDWORK (Core Course)**

Course weighting: 1.0 and is offered in the second semester.

Introduction to Geological Maps, Introduction to Geological Fieldwork (Harare Area).

### **PART TWO COURSES**

#### **GL213: ADVANCED MINERALOGY (Core Course)**

Course weighting: 2.0 and is offered in the first semester. GL106 and GL107 are Pre-Requisites.

Igneous Petrology, Metamorphic Petrology, Trace Element and Isotope Geochemistry and Geochronology.

#### **GL214: IGNEOUS AND METAMORPHIC PETROLOGY (Core Course)**

Course weighting: 1.0 and is offered in the second semester. GL213 is Pre-Requisite.

Igneous Petrology, Metamorphic Petrology.

#### **GL215: SEDIMENTOLOGY**

Course weighting: 0.5 and is offered in the second semester. GL106 and GL107 are Pre-Requisites.

#### **GL216: STRUCTURES AND PLATE TECTONICS**

Course weighting: 1.0 and is offered in the second semester. GL109 is Pre-Requisite.

#### **GL217: APPLIED GEOLOGY II**

Course weighting: 1.0 and is offered in the first semester. GL108 and GL109 are Pre-Requisites.

Engineering Geology, Environmental Geology, Mining Geology.

#### **GL281: FIELD WORK II (Core Course)**

Ten days of fieldwork in the Magondi Mobile Belt, Karoo Supergroup (Gokwe) or a similar location.

### **PART THREE COURSES**

#### **GL309: ADVANCED IGNEOUS AND METAMORPHIC PETROLOGY AND GEOCHEMISTRY**

Course weighting: 2.0 and is offered in the first semester. GL213 and GL214 are Pre-Requisites.

Igneous Petrology, Metamorphic Petrology, Trace Element and Isotope Geochemistry and Geochronology.

#### **GL313: GEOLOGICAL EVOLUTION OF SOUTHERN AFRICA**

Course weighting: 0.5 and is offered in the second semester. GL214 and GL215 are Pre-Requisites.

Archaean Stratigraphy, Proterozoic Stratigraphy, Phanerozoic Stratigraphy.

#### **GL315: GEOTECTONICS**

Course weighting: 1.0 and is offered in the second semester. GL216 is Pre-Requisite.

Rock Deformation, Plate Tectonics, Planetary Geophysics.

**GL317: ADVANCED ECONOMIC AND APPLIED GEOLOGY**

Course weighting: 2.0 and is offered in the second semester. GL213 and GL217 are Pre-Requisites.  
Economic Geology, Remote Sensing, Hydrogeology, Coal Exploration, Geochemistry.

**GL382: FIELDWORK III (Core Course)**

Course weighting: 0.5 and is offered in the second semester.

Ten days of fieldwork in the Harare-Bindura-Shamva Greenstone Belt, Zambezi Mobile Belt or a similar location.

**Bsc 4<sup>th</sup> YEAR SPECIAL HONOURS IN GEOLOGY**

For a candidate to be eligible for this Degree programme they should have at least an average of 65% in their final degree classification at Part III. Candidates with less than 65% but with relevant industrial experience may be considered on a case by case bases. This degree programme is offered in one year after completion of third year.

**HGL401: HARD ROCK GEOLOGY** - Course weighting: 2.0

Igneous and Metamorphic Petrology and Structural Geology, Geochemistry and Geochronology.

**HGL402: SOFT ROCK GEOLOGY** – Course weighting 2.0

Basin Analysis, Hydrocarbon Geology, Hydrogeology, Environmental Geology and Engineering Geology.

**HGL403: ECONOMIC GEOLOGY** – Course weighting 2.0

Ore Deposits Studies, Geostatistics and Ore Petrography.

**HGL452: FIELDWORK (Core Course)** – Course weighting 1.0

**HGL460: MINI PROJECT COURSE** – Course weighting 2.0

Hard Rock and Soft Rock Mini Project will be done.

**HGL470: PROJECT (Core Course)** – Course weighting 3.0

This is a major project carried out in collaboration with the sponsoring company over a period of twelve weeks. A write up of not more than 40 pages is expected.

## Geological Survey Department



**ZIMBABWE**

*Forbes Mugumbate*

Several geoscientists have recently resigned from the Department. Among these are two seniors; Mrs Irene Goromonzi, Chief Economic Geologist, and Mrs Ntombizodwa Masuku, Chief Geophysicist. This has resulted in the derailment of important programmes. The main activities for senior geologists this year were to give hands-on training to newly recruited geoscientists, all of whom came from the Ministry of Education where they were teachers. The training includes report writing, literature searches and reviews, mineral identification and determinations, and mineral resource evaluations. Mrs Masuku leaves at a time when all posts in the Geophysics Section are filled by inadequately trained and inexperienced geophysicists who needed her for training and guidance.

More resignations are expected as working conditions in government continue to deteriorate. However, despite poor working conditions, professional conduct among geoscientists is essential if we are to avoid placing the geology profession into disrespect. In this regard, the conduct of some junior geologists who left the Department is shameful. Some of them went away without handing over equipment, let alone keys to their offices. The Department has now to waste resources trying to recover this equipment. One of them found it more convenient just to abandon the job rather than tender his resignation.

The remaining geologists are largely involved in office-bound activities with limited fieldwork, mainly in response to Ministry of Mines requests. A large part of their activities are concerned with gathering technical information for potential investors, essentially Chinese, although enquiries from western mining companies and individuals remain high.

Field visits have mainly been to areas with reported new mineral discoveries, in most cases diamonds. The oft-exaggerated stories of people who have amassed wealth from the Chiadzwa diamonds have caused many villagers to be aware of and exploit anything that glitters. A recent report was from Chimanimani where a conglomerate horizon was subjected to intense pig-rooting. Apparently for diamonds, these are said to be smaller, rarer, and cleaner than those from Chiadzwa. However, the assertion remains to be verified.

A bizarre incident that was investigated by the Geological Survey was an allegation of a diesel occurrence near Chinhoyi. Although this was instantaneously dismissed, the Geological Survey was nonetheless requested to investigate and give a scientific opinion on the allegation. The investigations revealed that diesel had been fraudulently poured into pipes that were in turn implanted into a rock. This was meant to make the diesel appear as if it were oozing from the rock.

The government has once again shown confidence in some members of staff of the Geological Survey. Following appointment of this writer to the Zimbabwe Investment Authority Board early this year, Bornwell Mupaya, Regional Geologist, was recently appointed a board member to the Pan African Mining Development Company. This is a new mining company jointly owned by the governments of Zimbabwe, Zambia and South Africa. We take this opportunity to congratulate Bornwell.

Enerst Mugandani, Geologist, is the latest beneficiary from the "Look East Policy". He spent five weeks in China attending a course on petroleum exploration and development.

## **Mining Industry News**

*Fadzanayi Bornwell Mupaya*

The mining industry in Zimbabwe continues to face serious viability challenges, despite high metal prices, due to the prevailing harsh economic environment. Only the platinum mines maintained a high production level. ZIMPLATS organized a stakeholder's tour in July and explained that they intend to open a new underground mine in the near future. In terms of their social responsibilities, the company is commended for building a school and houses for local people at Turf Growth Point. Mimoso Mines are acknowledged for donating equipment, including computers to the Zimbabwe School of Mines and to the Department of Mining Engineering and Metallurgy at the University of Zimbabwe.

There has been an unprecedented demand for ground holding potential for coal exploration. All coal localities are now covered either by Special Grant or Special Grant applications. Steelmakers started mining coal in Special Grant 4417 near Chiredzi, and have also been granted SG 4600 covering the Mkwesine, Malilangwe and Bendezi coal localities. Tuli Coal Mining has also commenced mining coal from west of Beitbridge. However, the Hwange Coal Mining Company is still struggling to replace ageing mining equipment and to retain their skill base. The low coal price regime has not helped the company to mobilize sufficient revenue for its restoration to viability.

Production of alluvial diamonds from the Chiadzwa diamond prospect is reported to average some 3000 carats per day, a figure that is expected to increase once detailed exploration justifies capitalization of the project. Elsewhere, however, the level of exploration for diamonds is very low, especially given the pull-out from the country of De Beers. Only Canister Resources is sustaining its exploration efforts in the Tsholotsho area.

The discovery of diamonds in Marange, within a former De Beers EPO, has triggered a pegging spree of claims across most of the EPOs areas abandoned by that company. Obviously this is a speculative move by mostly small-scale operators, and the Ministry of Mines needs to arrest the momentum. The belief is that all the kimberlites that were discovered by De Beers have an economic diamond potential.

An horizon of conglomerate, which was recently discovered within the Lower Argillaceous Formation of the Umkondo Group near Chimanimani, was invaded by informal miners in their search for alluvial diamonds. However, the authenticity of this claim is still being investigated.

A Chinese-based Company, Labenmon Mining, has pegged about 45 km<sup>2</sup> of the Snake's Head area of the Great Dyke for lateritic nickel and they have commenced building infrastructure to process these laterites. The process will involve leaching of the nickel from the laterites before electrolytic refining at their laboratory in Msasa.

A fire at the BNC smelter has disrupted nickel production but indications are that, given their excess processing capacity, the organization will be able to recover its production levels by year end.

The gold sector continues to face delays in the payment of foreign currency for gold that has been delivered to Fidelity Printers and Refineries. Some of the producers have not been paid for their deliveries made in March 2007. Such a situation has affected the importation of spare parts, machinery and other inputs and has resulted in a decline in gold production.

The recent monetary policy review by the RBZ included an undertaking to offer loans to small-scale miners, which is a welcome development. However, serious bottlenecks could be experienced in processing these loans, due to the shortage of geologists, metallurgists and mining engineers to evaluate the viability of each prospect before the loans can be disbursed.

Like other productive sectors, the mining industry is being seriously affected by electricity supply constraints and the situation deteriorated during the month of September. As a result, the Chamber of Mines and ZESA signed a memorandum of understanding for the supply of electricity in return for the payment of energy in foreign currency. Also, the Chamber of Mines undertook to encourage its members to enter into individual electricity supply contracts. ZESA in turn has undertaken to ensure that there is a dedicated line or transmission grid available to ensure a reliable power supply.

## Research Funding Opportunities



### GSZ Research and Development Fund

N. Matura

The objective of the Research and Development Fund is to give financial assistance for the development of earth science research and training in Zimbabwe. This financial assistance shall be in the form of annual Grants. Grants shall be made for activities over the course of up to one year. Those wishing to continue beyond one year must make subsequent and separate applications. The purpose of the Fund is to support:-

- Research projects on earth science topics of interest (Note that grants from the Fund will not be made to support projects which result in results that are not available to all members of the geological community in Zimbabwe);
- Scholarships for postgraduate study in earth sciences;
- Field trips and short courses for the training of Zimbabweans in earth sciences; and
- Travel to conferences to present earth science results.

In recommending the award of Grants, the following shall be considered:-

- The objective and purpose of the Fund;
- Potential benefits of the proposed activity to the geological and mining communities in Zimbabwe, in terms of development and/or the generation of new knowledge;
- The availability of matching funds, source or provided by the applicants; and
- The aim of awarding more than one Grant in a given year.

Grants made from the Fund shall be on condition that:-

- Results from the supported activity will be presented to the Society via a talk and an item or items in the Newsletter;
- Submission to the Fund Subcommittee of an annual report by 31 December of the year in which funding is granted; and
- Submission of a financial report to the Fund Subcommittee, with copies of receipts, by 31 December of the year in which funding is granted

All applicants for the award of Grants from the Fund shall be Members in good standing for the current membership year. Normally, the principal applicant should have been a member in good standing for at least twelve months.

Applicants for Grants should submit to the Research and Development Fund Subcommittee an application containing details of the applicants, summary of the activity, justification of the activity, proposed methodology, timeframe, budget for application and details of matching funds, if any. If you would like to apply for support, please contact the Research and Development Fund Subcommittee Secretary, N. Matura ([nematura@science.uz.ac.zw](mailto:nematura@science.uz.ac.zw)) Applications for this year should be made by 1 February, 2008.



### SEG Timothy Nutt Memorial Fund

David Love and Nyikadzino Matura

A fund in memory of Timothy Nutt has been established by the SEG Foundation at the request of his family and close friends. Tim was a prominent consulting economic geologist, a SEG Member and contributor to the Exploration Reviews pages of the SEG Newsletter. He worked extensively throughout Africa and had strong professional and emotional ties to the country of Zimbabwe. He was attacked and killed on April 12, 2003, while carrying out exploration work in Eritrea. He was 49.

In accordance with the wishes of Tim's widow, Jacquie, the fund is to provide financial support for students and young economic geologists located in Zimbabwe or in southern Africa with ties to Zimbabwe. The fund may be used to support travel to technical meetings, field trips, research grants, technical lectures, SEG student chapter activities or any other activities approved by the SEG Regional Vice President for Africa. SEG members resident in Zimbabwe will aid the Vice President in selecting recipients.

The Fund is now soliciting applications. If you would like to apply for support, please contact either Nyikadzino Matura ([nematura@science.uz.ac.zw](mailto:nematura@science.uz.ac.zw)) or David Love ([davidlove@science.uz.ac.zw](mailto:davidlove@science.uz.ac.zw)). Applications for this year should be made by 1 February, 2008.

## Society Activities

### Talks Presented

Dr. Ali Ait-Kaci Ahmed. Anvil Mining PLC. *Exploration for copper around Dikilushi Mine, DRC.* 17<sup>th</sup> August, 2007, Engineering Department, UZ.

Dr. Eric Roberts, University of the Witwatersrand. *Late Mesozoic and Early Tertiary Sedimentary, Tectonic and Faunal Evolution of the Rukwa Rift Basin, Tanzania* . 18<sup>th</sup> September, 2007, Engineering Department, UZ.

### Field Trip

Led by Ann Kritzinger to the pit structures and terraces in the Sanyatwe area near Juliasdale, including the Gungutsva Mine on Mr Kadzima's farm and smelting sites on Vukutu. 1<sup>st</sup> and 2<sup>nd</sup> September 2007. Meet at London Store.

## Summer Symposium 2007

30th November 2007

Department of Geology, University of Zimbabwe

Come and hear presentations on:-

- Advances in Mineral Exploration Techniques
- Developments in Reserve and Resource Classification
- Skills Situation and Challenges
- Latest fossil finds
- Environmental Management

There are still some vacant slots, so if you would like to present, please let us know by responding to [kudzie@eng.uz.ac.zw](mailto:kudzie@eng.uz.ac.zw)

We are looking for 15-minute presentations on a broad range of subjects of interest to geologists and hope that we will all come together on this day.



- **STOP PRESS:** The Physical Sciences and Earth Sciences in particular are now well represented in the Zimbabwe Academy of Sciences. Dr Teddy Zengeni is Dean of the College of Physical Sciences; Ambrose Made is the Honorary Treasurer of ZAS; Dr Keith Viewing is a Committee Member. Newly inducted Fellows to the Academy within the College of Physical Sciences on 20<sup>th</sup> October 2007 were Tim Broderick, Eng Samuel Kundishora, Paul Markham, Prof Fortune Mhlanga, David Murangari, Prof Levy Nyagura, Dr Richard Owen, Dr Francis Podmore, Dr Nyembe Shoko and Prof David Simbi.

**GEOLOGICAL SOCIETY OF ZIMBABWE:  
CONTACT DETAILS OF MEMBERS OF THE EXECUTIVE  
COMMITTEE**

NAME	PORTFOLIO	EMAIL
Musiwa, Kudzai	CHAIRMAN	<a href="mailto:kudzic@eng.uz.ac.zw">kudzic@eng.uz.ac.zw</a>
Mwatahwa, Collins	Vice Chairman /Treasurer/Members	cmwatahwa@unki.co.zw
Hanssen, Gayle	Secretary	dms@zol.co.zw
Du Toit, Andrew	Summer Symposium	dutoit@mweb.co.zw
Broderick, Tim	Newsletter Editor	pbroderick@mango.zw
Matura, Nyikadzino	Rand Committee	nematura@science.uz.ac.zw
Gumbo, Hillary	Society Talks	hgumbo@mweb.co.zw
Gwavava, Oswald	Webmaster	gwavava@science.uz.ac.zw
Manda, Luckson	Bulawayo Representative	LManda@Rockover.co.zw
Mugumbate, Forbes	Geological Survey Rep/Newsletter	zgs@africaonline .co.zw
Mupaya, Bornwell	Geological Survey Rep/Talks	zgs@africaonline .co.zw

## Institutional Membership, 2007

African Consolidated Resources Limited

Anglo American Corporation Zimbabwe Limited

Mineral Resources Centre, University of Zimbabwe

Pan-African Mining (Pvt) Limited

Rockover Resources (Pvt) Limited

Samrec Vermiculite Zimbabwe (Pvt) Limited

SRK and Partners

University of Zimbabwe, Geology Department

Zimbabwe Platinum Mines Limited