

■ RESPONSE

**Metal Not Cattle: Gold Extraction and Ore Dressing in Precolonial Zimbabwe**

Ann Kritzinger  
 Affiliated to Zimbabwe Geological Survey  
 P.O. Box CY210, Harare, Zimbabwe  
 ICAHM affiliate member  
 P.O. Box 43 Juliasdale, Zimbabwe  
 email: ackritzinger@gmail.com

**Update**

My answer to the responses from Sutton (2010) and Soper (2011) to my paper published in *Nyame Akuma* 73 (Kritzinger 2010: 10-17) is overdue due to the following developments in chronological order:

1. Preparation of my paper presented at the PANAF/SAfA congress in Dakar November 2010 for publication by *Arab World Geographer* (Summer 2011 14[2]: 188-204), following personal email comments from professors Ehret: “very interesting and should be followed up; McIntosh, S: “very interesting ... I admire your courage for taking [“the Arab chroniclers”] on”; de Moraes Farias: “very carefully argued”.

2. Two dry-seasons’ field work to sample for assay randomly selected quartz heaps, soil targeted from peripheries of *in situ* milling sites and from around portable grinding stones, grab sampling of hanging- and footwalls of manmade ‘gullies’, terrace sampling in a commercial exploration pilot – all contributing to the direct evidence of gold. The results identify Nyanga archaeology as a more definite early mining landscape than previously envisaged. This landscape is shortly to become

the field study for a doctoral thesis by a Zimbabwe geologist well versed in mining and metallurgy.

3. Presentation at the International Mining History Congress in Johannesburg, April 17-21 (Kritzinger 2012). Immediate follow-up visits from a retired South African gold exploration geologist (Harding forthcoming) and a South African mining engineer.

**Response**

Turning now to the *Nyame Akuma* responses of Sutton and Soper in defence of their arguments for cattle and crops:

*Crops.* Wild cautioned half a century ago (in Summers 1958: 176) that sorghum “does well under most conditions except those of high rainfall. In other words the highest Ruin elevation sites at Inyanga [Nyanga] would not provide suitable conditions; the [much smaller, lower] Niekerk [Ziwa] area, however, would no doubt produce reasonable crops.” Unsuitability and reasonable crops are not good enough reasons for academically appointing vast hectares of land to specialised farming of sorghum. As early as 1913, the then director of agriculture “expressed doubt as to the value of farming operations at Inyanga [Nyanga], in relation to Rhodesia [Zimbabwe] as a whole.” In 1917 “it was argued that it would be better to develop attention to stock feeds [in Nyanga] than to food for human consumption.” By 1918 a report to the Legislative Assembly “commented discouragingly on the suitability of [Nyanga’s] soil for crop growing” (Petheram 1974: 45).

This observation is mirrored in archaeological site excavations where seeds of “[c]ultigens are sparsely represented” (Soper 2002: 128). Only seed potatoes are grown commercially in Nyanga today, along with orchards (mainly apple and peach), and exotic tree plantations (pine and wattle). Latterly introduced maize and the indigenous millets *rapoko* and *munga* are confined

to village subsistence plots in the comparatively rich soils of the river valleys below the (uncultivated) terraced hills. Sorghum is grown in the drier regions of Penhalonga and Honde valley where the warmer soils are more suitable for optimum growth. Verbeek's terrace soil analyses (Soper 2011: 61) are very valid. Her references to "inconsistent", "very difficult to explain", "the opposite trend is expected" should be noted and her call for mineralogical studies to clarify geomorphological issues (Soper 2002: 18) followed up.

*Terraces.* Yes: tonnes of pay-dirt are required for processing to yield grammes of gold. The term strip-mining was used for general readers. A more accurate term is ground sluicing, well described on 20 December 1898 in the national newspaper *The Herald* by the mining engineer Telford Edwards as "ancient terraces" in the highlands which "owed their existence unmistakably to washing the ground for alluvial [eluvial] gold. Large quantities of quartz debris are everywhere." It is well to note that indigenous mining, including gold panning, is seasonal on the continent of Africa.

The thrust of Thornton's paper (2012) arguing "that there is ample evidence of mining in eastern Mpumalanga and Limpopo Provinces [South Africa], but that the evidence for this has so far been misinterpreted as cattle kraals, agricultural terraces, and enclosures for chiefly elites" is that the "thousands of dry stone structures, stone walling and cairns, from <10m to >100m in size, were created through shallow surface mining for iron ore, ochre, and alluvial [eluvial] gold."

Most if not all artificially terraced areas to the north of Zimbabwe fall into gold belts, e.g. the Lupa belt of Tanzania, the auriferous Rift Valley belts of Kenya, the Adola belt hosting Ethiopia's richest gold mine Lega Dembi. To these must be added current gold exploration in the Tulo belt, northern Mozambique, where I walked Nyanga-type hillslope terracing last year. No record who built them in oral tradition: only

modern deduction that the stones were spewed out in neat flights on hillslopes by volcanic action! Even the terraces of the indisputable gold-mining regions of Peru/Mexico should be reappraised, if only to question the blanket cultivation of grain as a "usual reaction on encountering abandoned hillside terracing" (Sutton 2010: 64-5).

Neither Sutton nor Soper have a good grasp of the principles of surface mining or gravity concentration of a heavy metal, including tailings disposal and/or re-treatment. Regarding the apparent silence about the geological occurrence of gold, the deputy director of the Geological Survey Department says: "The research is shedding some new light not only on the understanding of the archaeology of the Nyanga area, but also on the geology and mineral resource potential of the area" (letter, 13 April 2012).

The geologist Walsh was dissatisfied that he had been "relying on distant memories and Oxford libraries" (personal email comment) in dismissing my evidence of mining activity. He disassociated himself from Love in regard to geological objections referenced by Soper (2011: 61-65) after I took him to the Bende Gap terraces at Nyangui heights, subsequently emailing that my Bende Gap grab-sampling results were "very interesting, and SHOULD be followed up [his emphasis]."

The Bende Gap samples were taken from terraces between 1770 and 1955m, all above Soper's 1700m asl limit for Nyanga terracing. The zone of terracing on hillslopes corresponds to geological bands for the likely formation of eluvial (placer) deposits (Kritzinger, in press: xviii Plate 3). This research is in its infancy but I can say that the granitoids, where "[t]he terraces on the steep-sided granite hills such as those on Ziwa [mountain] look most unattractive from a cultivation point of view" (Wild in Summers 1958: 178), and the Umkondo Group, probably Soper's (2011: 61) "sedimentary series" which I suspect he connects with his Nyangui "village communities" (Soper 2011: 64), are going to be of

key importance, all being geological hosts for gold.

*Work bays or homesteads?* Sutton introduces a eurocentric conception of “family farmsteads” by morphing the comparatively very narrow freestanding platforms of the tank systems into “stone-revetted compounds”. This is very misleading. The 1962 edition of *Britannica World Language Oxford Dictionary (BWLOD)* defines ‘compound’ as “The enclosure within which a residence or factory (of Europeans) stands in the East; also, any similar enclosure round native houses.” Sutton’s compounds consist of “a ring of houses and grain-stores ... on the raised platform,” where there is no ‘enclosure’. Curiouser and curiouser. Sutton’s grain-stores are Soper’s “raised platforms” for which he “produced no direct evidence of function” (Soper 2002: 110). Sutton’s (2010: 63) grain-stores are “constructed of earth and wood with thatch roofs.” Soper’s raised-platforms have, “[i]n some excavated cases remains of charcoal [that] must represent a thatched roof and destruction by fire” (Sutton 2002: 110). There is “much charcoal ... presumably from the burning of the roof” (Soper 2002: 188) – and by inference incineration of the “plastered wickerwork bin up to two meters in diameter and of unknown height” (Soper 2002: 212). Indeed? If all the superstructures have been burnt: then why no *carbonised* seeds of grain? In reality samples taken from four of these oven-type structures record residual values of gold, 0.27, 0.09, 0.08, 0.04g/t. A standard feature of the structures is a stone slab with “one edge chipped to a curve” (Soper 2002: 212). This tooled slab is invariably positioned over what appears to be a stone-built natural draught hole. An interesting fact which appears to have escaped the notice of Sutton and Soper.

Among Sutton’s “ring of houses”, the one “standing directly over the tunnel [is] equipped with a peep-hole in the floor” (Sutton 2010: 63). This is Soper’s (2011: 62) “device through which to drop poles to block the tunnel,” presumably to prevent escape of dwarf beasts. It appears that neither Sutton

not Soper have studied the skilful engineering of these features from inside or outside the tunnels. Of a fairly standardised 16 x 25cm they are usually positioned in the paved half of a circular floor mostly “from two and five metres in diameter” (Soper 2007: 97), the other half being plastered. Sutton and Soper see the paved half as accommodation for goats; the plastered half as a kitchen.

The jury is out as to the precise function of these slots, but it is not going to be Hall’s “ventilator” attributed to me in error by Soper (2011: 62), Sutton’s “small hole through which one can peep” (*BWLOD*), or Soper’s receptacle for sticks, attributed elsewhere as a night alarm to alert the head of the family (sleeping with the goats on the paved floor?). In reality it is very unlikely these floors supported houses. Summers interprets them as “grinding places on their apparent openness and the consistent presence of grindstones” (Soper 2002: 109; see also Summers 1958: 82). Soper (2002: 182, 184, 189, 202, 203) illustrates this “openness” characteristic well in his floor plans, but questions “why such a large proportion of the available homestead space should have been devoted to this particular activity [grain grinding]” (Soper 2002: 109). A fair description of my ‘work bays’ – the frequent occurrence of heavy-duty grindstones and associated quartz chips indicating industrial not domestic work in progress.

Summers (1958: 87) found ten postholes in his excavated site VI, shown in a plan incorrectly labeled IV. Soper found “occasional carbonized poles” or “post bases” in the first three of his excavated floors listed above. This must be the factor leading him to interpret the rings of stone as “low rough walls surrounding clay-walled houses” (Soper 2011: 62), the same blueprint for Garlake’s reconstruction in Nyanga National Park of closely spaced robust poles (exotic wattle or pine) supporting generously thatched roofs. Soper (2011: 64) is correct: “[c]ontemporary settlements throughout the area have not been identified.” This is untenable for agricultural activity suggesting a population

explosion. Miners would sensibly stay on the ground, as rural people do today in biodegradable huts, before they moved on to exploit fresh deposits.

*Uphill entrances.* It took some time for me to understand that Sutton's (2010:63) "deliberate blocking" defining a "restricted gap", and Soper's (2011:62) "siltation after abandonment" are the carefully engineered slopes at the tunnel uphill entrances. With no measurements given in their research I have to rely on my own (Kritzing 2010: 14). An average height of 64cm measured from lintel to paved floor from 24 of the uphill entrances of tunnels is not Sutton and Soper's "standardised 1m". None of the cattle in Sutton's "scatter of written allusions" from Selous to Stead, including Mashona *kasiri* cattle, and the Muozi bones, could "squeeze through the entrances" (Sutton 2010: 63) of a 64-cm height restriction.

It appears Soper (2011: 63) is still of the opinion that the tunnels were made by "excavation" not built up from bedrock encompassing a curve. The interesting feature of the curve is to be a subject for the PhD study. Soper's (2011:61) "siltation or slope-wash" is in fact pay-dirt infill. Such material, almost touching the lintel at a tunnel's entry into a tank, the standard 1m or so at this point, is scheduled for examination in the PhD programme. Bones "removed to the hoed fields" (Sutton 2010: 64) is neat, but do bones decompose completely within 50 years – if Soper is correct (2007: 96) about his demise of the dwarf cattle culture as late as the mid-19<sup>th</sup> century; beginning in the 16<sup>th</sup> century, not Sutton's (2010: 63) 13<sup>th</sup> century. Funding for a definitive dating programme is being sought.

*Settling tanks.* It is unfortunate if it has been understood that I implied gold washing started in the tunnels. It is impossible to recover gold "by crawling in the dark" (Soper 2011: 63) – like dwarf beasts? Settling/washing *tanks* is a mining term. There is no requirement for filling the tanks with water. The freestanding walls of platforms are robust enough to withstand the hydraulic pressure necessary for a washing/settling process

(Kritzing in press: xvi Plate 1a). The outside walls are always roughly constructed, while the stones of the inside walls are carefully chocked with small stones – unlikely finesse for a cattle kraal.

With reference to assay results from "the washing method" (Soper 2011: 61) three points must be kept in mind: the 'nugget effect' when sampling for gold, the efficiency or otherwise of prechemical gold recovery, and the migratory nature of gold in relation to a slope which might contaminate quantitative results after several centuries. This is how gold travels to rivers from placer deposits weathered on hillslopes from a primary bedrock source (Kritzing, in press: xviii Plate 3). Another point to bear in mind when dealing with gold is that background levels are <0.005g/t. They will be registered on the forthcoming PhD geochem grid-sampling programme to define gold concentration patterns.

*Quartz.* It is lamentable that "the occurrence of quartz was not an aspect of [Soper's] research" (2011: 62). However I accept that it is difficult for those without a practical gold-mining background to recognise crushed quartz, especially coming out of tunnels and drains unwashed, where the expectation is dung.

Evidence of grinding to manually liberate gold from quartz gangue manifests in samples from the resting places of heavy-duty grindstones and from the peripheries of rock outcrop milling sites. Assays of 0.07-2.04g/t Au, averaging 0.45g/t from 14 sites across 25km, is direct evidence of ore-dressing. The grinding stones are too heavy and, often 50cm in length, too large to be "normal", if by normal Soper means lightweight grit-free stones used by women for grinding millet. At three undisturbed tank sites, such heavy-duty grindstones are positioned among the coping stones on the very rims of the tanks. Grinding meal to drip-feed dwarf cattle? I think not.

*Radial walls.* I have seen many radial walls, best described in the words of Peters in 1899 (forthcoming): "like two wings, so as to catch water

that might run down in great quantities, and lead it through the passage into the pit.” All are like Soper’s (2002: 89; Plate 15) radial walls “which extend outwards from the platform up to 25m or more. This is interpreted as sheltering a homestead garden”. Other radial walls “curving up-slope ... have been interpreted as sheltering homestead gardens”; others again curve “back along the contour up to 50m above the pit” enclosing large “paddocks” (Soper 2005: 38). Therefore none of these radial walls/gardens are “below the tunnel entrances” (Soper 2011: 63): they are above. I have visited the last mentioned site with the chairman of the Small Miners’ Federation and a senior University of Zimbabwe lecturer. We all remarked on the abundance of quartz float on the site: Soper’s (2005: 40) “ground surface” designated “relatively gravelly”, the significance of which he missed.

*End note.* Sutton’s expressed doubts that “more articulate rumours did not filter through the trade routes to the Mozambique and Swahili coasts over the centuries” suggest that he is not conversant with Arab historians accounts dating from 900 AD. It was the rumours of gold – particularly that of the Manyika – which brought the Portuguese to modern Zimbabwe, not religious zeal. Kritzinger (in press) expands on this subject which Sutton (2010: 64) calls “place-name correlations of uncertain relevance”. A more pertinent question is why the original function of the archaeology has been lost to collective memory. Soper’s (2011: 63) assumption that the cattle of Professor of Animal Science Grandin’s report for Colorado State University lived in open fields is wrong. They were stall-fattened prior to slaughter, mainly for the beef-burger market. Soper’s idea of a slurry by-product in Nyanga is so eurocentric as to be embarrassing and therefore best ignored. Soper’s idea of a slurry by-produce in Nyanga is unknown to traditional practice, with Summers (1958: 257) “very doubtful if any of the local tribes understood the technique of manuring”.

Dwarf cattle have been eliminated to most people’s satisfaction. Remove them from the so-called pit-structures and terrace farming is left

“without [“essential”] enhancement of fertility by manuring” – “one of the prime economic functions of all livestock being the production of manure” (Soper 2002: 126). It is time for facts to counter fantasy. Mining archaeologists will be able to contribute to the ongoing study, but the critical disciplines will be mining engineering, metallurgy, geology, and geomorphology.

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