

PROJECT PROPOSAL: INSTALLATION OF AN EXCAVATION PLATFORM IN THE JACOVEC CAVERN,
STERKFORTEIN CAVES, GAUTENG PROVINCE.

Introduction:

The Sterkfontein Caves are situated in the southern quadrant of the Cradle of Humankind and represents the world's richest repository of *Australopithecus* fossils. The highly fossiliferous ancient cave infills have yielded not only the largest number of specimens of the *Australopithecus* (*Au.*) genus, but also the world's most complete single *Au.* Specimen – StW 573, possibly two co-existing species of *Australopithecus* - *Australopithecus africanus* and *Australopithecus prometheus*, some of South Africa's oldest hominin specimens – dated to approximately 3.5 million years, two other hominin species – *Paranthropus robustus* and *Homo ergaster*. Additionally, Sterkfontein has yielded some of the best examples of Earlier Stone Age archaeology found in South Africa, including the largest and most complete Oldowan assemblage yet found in South Africa. The significance of the site for South African and world palaeoanthropology is enormous and research is continually being pushed forward to add resolution to our understanding of the functional and behavioural repertoires of our hominin ancestors within changing environments over the last 3 million years. Currently, there is no other site in South African that allows this long and detailed perspective.

This proposal focusses on exploring, through stratigraphically controlled excavations, the Jacovec Cavern hominin-bearing deposits. Originally identified in 1995 under the guidance of Professor Ron Clarke, the deposits in the Jacovec have yielded 12 hominin specimens representing a wide range of skeletal elements including teeth from at least four individuals, the most complete proximal femur found at Sterkfontein, and an almost complete clavical which displays particularly archaic features. The hominin assemblage was sampled from a partially mixed context. The first specimen (partial cranium StW 578) was excavated from an 'orange' breccia exposed in the roof and the remaining assemblage was recovered from collapsed 'orange' breccia mixed with 'brown' breccia' on the floor of the chamber. The 'orange' breccia has been hypothesised to be the exclusive source of the hominin fossils. All other faunal remains have been recovered from this mixed deposit at the floor of the chamber and have yielded conflicting indications of the deposit age – both potentially very old *Chasmaporthetes* sp. and *Equus*, which is generally associated with younger deposits in the Cradle of Humankind. The issue is that the area where the faunal and hominin fossils were recovered is mixed and so unreliable for biostratigraphic and palaeoenvironmental indications. What is needed is a stratigraphically isolated sample to build a more supportive assemblage of fauna, hominins and sediments.

Stratigraphically, the Jacovec is relatively simple. The different deposits are easy to identify and therefore also easy to isolate in an excavation. A finely laminated clay/sand bed represents the basal deposit and is about 7 m deep. Unconformable overlying these clays and sands is a 'brown' clast-rich deposit of about 1 m maximum depth. Fossils in the 'brown' are rare and highly fragmented. Remnants of the 'Brown' breccia are exposed on the walls of the chamber. Paraconformably overlying the 'brown' is a finely laminated and fine-grained 'orange' breccia with abundant macro and micro faunal fossils generally of excellent preservation. This deposit is of unknown depth but is at least three meters. This breccia is exposed on the highest walls and ceiling of the Jacovec Cavern and provide some logistical complications for excavation. Figure 1 shows the complete Jacovec

sequence as preserved in the eastern wall. The 'orange', 'brown' and underlying clay sands and clearly seen.

Pilot Excavations:

In Late 2012 a pilot excavation was conducted under Stratford's supervision to recover a stratigraphically isolated sample of fauna to test the hypothesis that the hominin material originated only in the 'orange' breccia. A small area (50cm³) of the 'orange' breccia was sampled and yielded abundant microfauna and three hominin specimens. This abundance is highly significant and should be further explored. The laminated structure of both the 'orange' breccia and the underlying clay sands provide a unique opportunity at Sterkfontein to apply multiple absolute dating techniques on sediments directly associated with the opening of the cave system and a hominin-bearing deposit. This is currently the only water-lain hominin-bearing deposit found at Sterkfontein. Initial dating using cosmogenic nuclide dating techniques provided an age of between 3.7 Ma and 4 Ma. This needs to be tested, but if accurate, the Jacovec Cavern hominins will represent the earliest hominin fossils found in southern Africa.



Figure 1. The complete Jacovec Cavern sediment sequence as preserved on the eastern wall.

Proposed excavations and infrastructure construction:

This proposal focusses on the excavation of a stratigraphically isolated hominin, faunal and sediment sample from this potentially very important deposit. Accessing the hominin-bearing sediments exposed on the upper walls and ceiling of the chamber is difficult and requires us to build a platform from which excavations will be conducted. I have been awarded a grant for the materials to construct this platform and am now applying for a SAHRA permit to construct the platform in the western end of the Jacovec Cavern in order to allow our excavation of the 'orange' breccia. This particular area has been identified because of its richness in exposed fauna, stratigraphy and dating appropriate and generally decalcified sediments. This area has also been identified because of its logistical advantage in that the area allows the construction of a stable and safe platform without the need to impact the caves at all. Figure 2 shows the proposed location of the excavation platform. Figure 3 shows a schematic plan for the construction of the platform. The platform will be self-supporting and built to fit exactly within the confines of the chamber. The 3mm steel tubing is extremely strong and will be welded to form frame onto which expanded steel sheets will be welded. A ladder with hand rails will also be welded onto the frame allowing safe access for the excavators and total station operators.

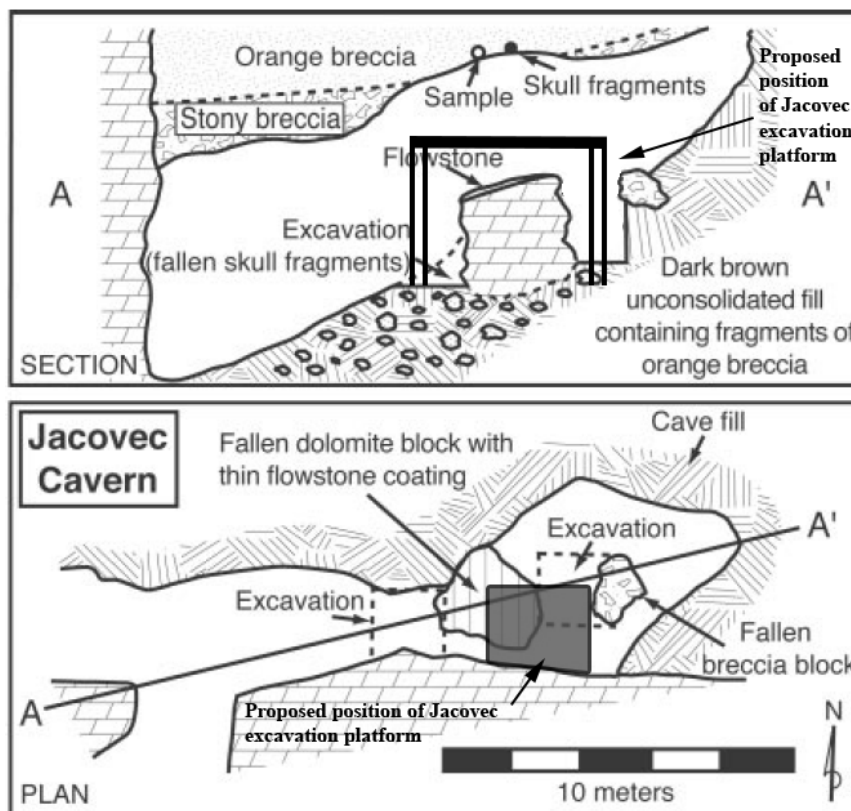


Figure 2. Proposed placement of the Jacovec Cavern excavation platform. Modified after Partridge et al., 2003.

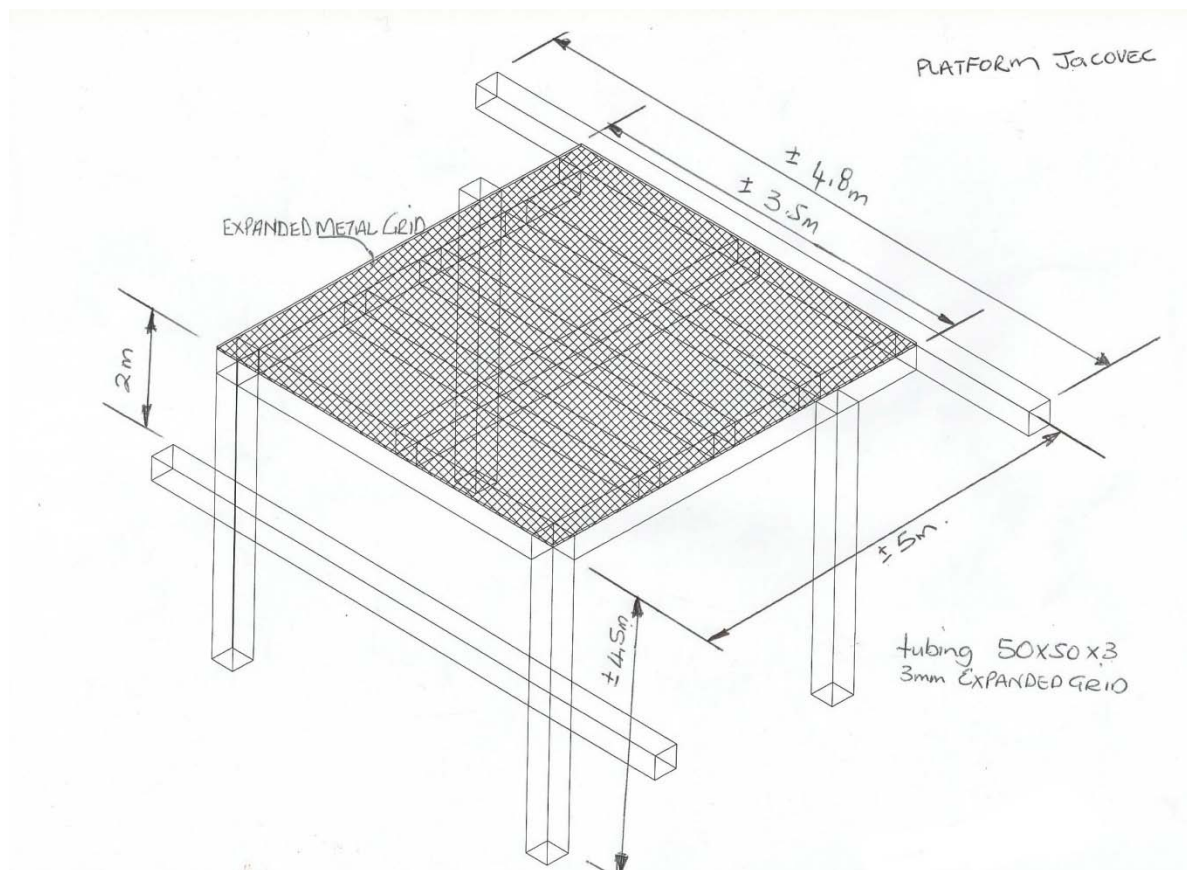


Figure 3. Schematic of proposed Jacovec excavation platform.

Funding has also been secured from the University of the Witwatersrand, Centre of Excellence and the Evolutionary Studies Institute and the Leakey Foundation for detailed stratigraphic and chronological analysis of the Jacovec Cavern sediments. In keeping with Stratford's multidisciplinary excavations and analysis of the Sterkfontein deposits, the Jacovec Cavern excavation will be conducted with high-resolution spatial control using a total station in combination with detailed micros- and macroscopic sedimentological analyses to provide stratigraphic support to the faunal assemblages.