#7 – “seventh of Petrie”

O. Kruglyakov and P. Selivanov

The most perfect core is of red granite from Gizeh, On this a continuous groove of the drilling point can be traced for several rotations, forming a true screw thread, and showing a rapid descent of the drill. The grooves run continuously across the quartz and felspar crystals without the least check; as the felspar is worn down (by rubbing) more than the quartz, the latter crystals stand highest; yet the grooves run with an even bottom through a greater depth of quartz than of felspar. Every mechanician who has examined this agrees that nothing but a fixed point could have cut such grooves.

W.M. Flinders Petrie Tools and weapons... (British School of Archaeology in Egypt and Egyptian research account : 22nd year, 1916).

and in one part a single groove may be traced around the piece for the length of five rotations, equal to 3 feet; even at the ends of this groove there is no sensible difference in its character, as if the cutting point had begun to fail; but merely owing to irregular action of the tool, the grooves become confused and cannot be individually traced further.

Now no loose powder could cut down exactly to the same depth in materials different in hardness, like quartz and felspar; still less would it cut more out of the slightly more prominent quartz; but a fixed point must cut to the same depth in each material.

The spiral was described as a "drunk screw"; I therefore traced very carefully a normal plane, at right angles to its axis, and measured off the distances to the spiral: they are thus, at successive quarter turns, in inches:—

	Quarter turns.				First repeated.
Turn 1 ..	3·14	3·11	3·07	3·08	3·06
„ 2 ..	3·06	3·03	2·99	2·97	2·95
„ 3 ..	2·95	2·94	2·91	2·87	2·83
„ 4 ..	2·83	2·82	2·80	2·77	2·76
Mean	2·995	2·975	2·942	2·922	2·900

Here, if there were any "drink" in the screw, it would appear as an irregularity in the order of the means of such quarter; whereas they proceed as regularly as the small variations due to texture, will permit. There is not $\frac{1}{100}$ inch irregularity in the mean spiral, though the pitch is $\frac{1}{10}$ inch.

(Petrie, W. M. F. (1884). On the Mechanical Methods of the Ancient Egyptians. The Journal of the Anthropological Institute of Great Britain and Ireland, 13, 88. doi:10.2307/2842001)

The words of the great British archaeologist Petrie are regarding the granite core of tubular drilling that he found in Giza, technically analysed and named “core #7”.

Let us try to use these quotes as planning abstracts for our analysis of the surface of core #:

- the grooves form a spiral thread,
- for several revolutions of the furrow in the spiral are continuous,
- the depth of the location of the bottom of the furrow is stable and does not depend on what thickness of granite grains of varying hardness had to be cut, which indicates the fixation of the cutting tooth of the tool,
- the pitch of the spiral thread of 0.1 inches is unchanged and has an irregularity in its size of not more than 0.01 inches.

The core #7 is stored in the London Petrie Museum in a glass display case and seems to be inaccessible to us now.

(http://petriecat.museums.ucl.ac.uk/search
Enter UC16036 in the search frame there)

Photography was too slow and “bulky” a task at the time when W.M.F.Petrie found and described his core #7. Apparently, it was impossible for Petrie to take five to ten pictures of the surface sequentially and arrange them into a panoramic image of the core.

If he had made such a panorama of the core surface, we could have long ago been able to evaluate and study in detail the notion of *a continuous groove of the drilling point traced for several rotations, forming a true screw thread, and showing a rapid descent of the drill.*

There is no such panorama from Petrie. There is no such panorama from anyone. There are only words, words and words again…

Indeed, in the panorama image (a core after experimental drilling is shown here) we can see purely circular grooves, grooves merging and diverging and grooves moving “from row to row” (that is, forming a “spiral”):

In the 21st century, when there are decent digital cameras in every smartphone, there are still no panoramas of the “Petrie’s seventh” even today!

So what a beautiful thing it is, to show the core #7 panorama to everyone interested in the subject and put an end to the conversation surrounding the ‘spiral’!

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The fourth thesis – the 0.1-inch of the mean spiral thread pitch is constant and its irregularity is not more than 0.01-inch.

Petrie again:

... There is not 0.01-inch irregularity in the mean spiral, though the pitch is 0.1 inch.

(Petrie, W. M. F. (1884). On the Mechanical Methods of the Ancient Egyptians. The Journal of the Anthropological Institute of Great Britain and Ireland, 13, 88. doi:10.2307/2842001)

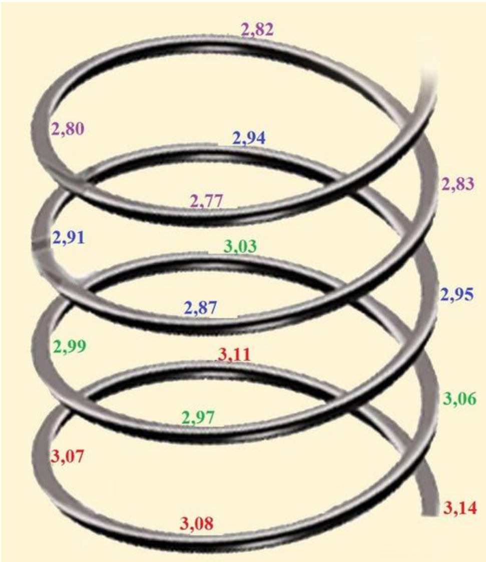
Let us make the Petrie's table colourful:

	First repeated				
Turns quarters	1	2	3	4	1
Turn 1	3.14	3.11	3.07	3.08	3.06
Turn 2	3.06	3.03	2.99	2.97	2.95
Turn 3	2.95	2.94	2.91	2.87	2.83
Turn 4	2.83	2.82	2.80	2.77	2.76
Mean	2.995	2.975	2.942	2.922	2.900

Each row of the table represents here one turn of a spiral. The columns – distances from the reference plane to the each turn (illustration on the left).

In the bottom row of the table Petrie has shown arithmetic mean of distance from the reference plane in each column. Thus, the bottom row is a chain (from right to left) of conditional distances (increasing distances) of the conditional "averaged" groove from the reference plane.

Each new increment (the difference between the values of same colour in the neighbouring columns) should be equal to the previous one for an "ideal" turn in a genuine steady spiral thread.



For each real turn on the Petrie core the distance increments vary, they have no regularity: each such turn oscillates around the conditional «averaged turn» of the uniform spiral.

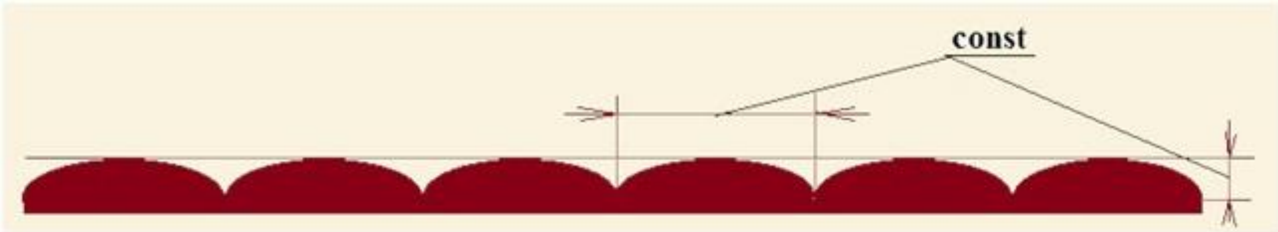
Petrie calculated his «averaged turn» over real distances to imitate the smoothing of individual features of real turns and obtained the values of its pitch and increments:

- the pitch of the averaged turn is 0.095 inches;
- increments in quarters of a turn – 0.02; 0.033; 0.02; 0,022.
-

How can the data obtained by the conditional turn data indicate the absence of even 0.01-inch irregularity of the real grooves points? Why did Petrie think that the contrived "accuracy" of some conditional turn somehow suggests that the deviations of **real** grooves are insignificant? How could four turns that have been selected on unknown criteria indicate the uniformity of all turns of the core grooves?

In general, such averaging for the case of the alleged fixed tooth is nothing more than a clumsy Petrie trick, both in details and as a general picture.

Here is a sketch of a profile of a core surface section as described by Petrie:



And, despite the anecdotal nature of the described table, it is considered a kind of revelation, it is given as an argument!

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Christopher Dunn:
http://www.gizapower.com/petrie/chris5.htm

I first checked the width between the grooves using the microscope. At this point, I was certain that Petrie was wrong in his evaluation of the piece. The distance between the grooves, which are scoured into the core along the entire length, was .040 – .080 inch. I was devastated that Petrie even got the distance between the grooves wrong! Any further measurement, I thought, would be just perfunctory. I could not support any theory of advanced machining if Petrie's dimensions of .100-inch feed rate cannot be verified! Nevertheless, I continued with my examination.

The crystalline structure of the core under the microscope was beyond my ability to evaluate. I could not determine as surely as Petrie did that the groove ran deeper through the quartz than the felspar. I did notice that there were some regions, very few, where the biotite (black mica) appeared to be ripped from the felspar in a way that is like other artefacts found in Egypt. However, the groove passed through other areas quite cleanly without any such ripping effect. Though again, I support Brownlee's assertions that a cutting force against the material could rip the crystals from the felspar substrate.

I then measured the depth of the groove. To accomplish this, I used an indicator depth gauge with a fine point to enable it to reach into a narrow space… …The depths of the grooves were .002 and .005 inch. (Actually, because there were clearly discontinuities in the groove at some locations around the core, the actual measurement would be between .000 and .005 inch).

Then came the great question. Was the groove a helix or a horizontal ring around the core? I had deferred to Reid and Brownlee's assertions that they were horizontal, and I was, at this juncture, painfully assured that it was the correct thing to do. It was Petrie's description of the helical groove that made Core #7 stand apart from modern cores. It was one of the principal characteristics upon which I based my theory of ultrasonic machining. But what I held in my hand seemed to support Reid and Brownlee's objections to this theory, for they said that the core had a similar appearance to any other core one may produce in a quarry.

I had rejected my initial plan to fixture the core and rotate it around its central axis to check for a helix. The fixture would have taken time and material to make and, though I had a willing toolmaker, Gary Bryant, to manufacture the fixture, I had opted for a cheaper, more primitive, though equally effective, method. The white cotton thread was the perfect choice to inspect for a helical groove. Why not use a thread to check a thread!

I carefully placed one end of the thread in a groove while Nick secured it with a piece of Scotch tape. While I peered through my 10 X Optivisor, I rotated the core in my left hand, making sure the thread stayed in the groove with my right.

The groove varied in-depth as it circled the core, and at some points, there was just a faint scratch that I would probably not have detected with my naked eye. As the other end of the thread came into view, I could see that what Petrie had described this core was not quite correct.

Petrie had described a single helical groove that had a pitch of .100 inch. What I was looking at was not a single helical groove, but two helical grooves. The thread wound around the core following the groove until it lay approximately .110 inch above the start of the thread. Amazingly, though, there was another groove that nestled neatly in between!

I repeated the test at about 7 different locations on the core with the same results. The grooves were cut clockwise looking down the small end to the large - which would be the top to bottom.

In uniformity, the grooves were as deep at the top of the core as they were at the bottom. They were also as uniform in pitch at the top and bottom, with sections of the groove clearly seen right to the point where the core granite was broken out of the hole.

*(**Christopher Dunn, The infamous core of Petrie #7**)*

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Finally in general Mr Dunn is completely convinced of the truth of Mr Petrie's statements about helicity by wrapping a thread and looking at the table familiar to us:

http://grahamhancock.com/phorum/read.php?1,282614,283526

- *Can you please provide its exact location on the photo by marking the visible grooves you measured from where they begin in the photo, and each successive turn, to where they end in the photo so we can understand exactly what it was you were measuring.*
- *As you know, I verified that it was a spiral groove, using a cotton thread to wrap around the groove. I will provide you, though, with Petrie's meticulous measurements, which are given below in inches.*

… shows the well-known Petrie table (see above).

But the irregularity in the width of the spiral groove fields Mr. Dunn decided to explain by the dual-start. If each of the grooves is a “previous one that made a revolution”, then the width of the field between them is the spiral pitch. If the thread is a dual-start, the field between two adjacent grooves is half a pitch.

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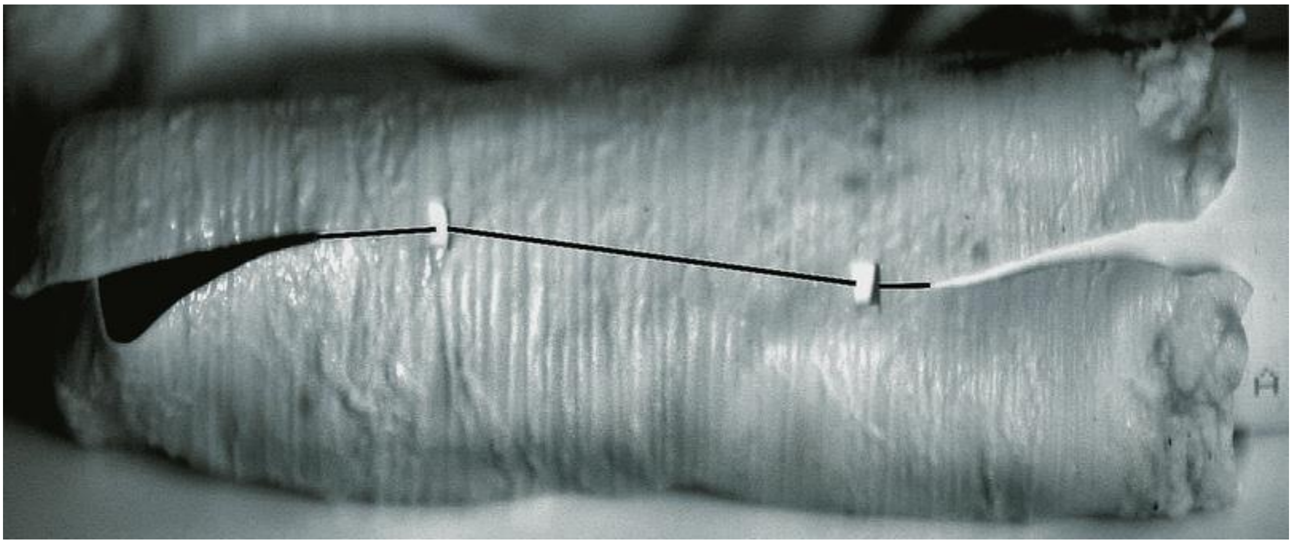
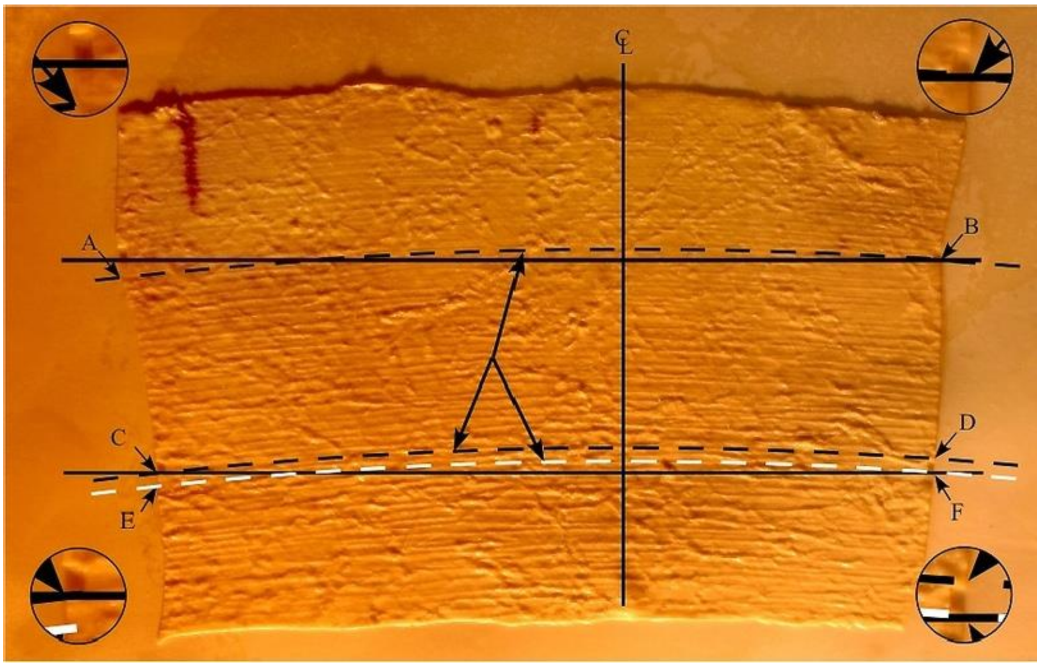
In 2003, a latex cast of the core surface has been made for Mr. Dunn.



Rolled upcast of the core surface

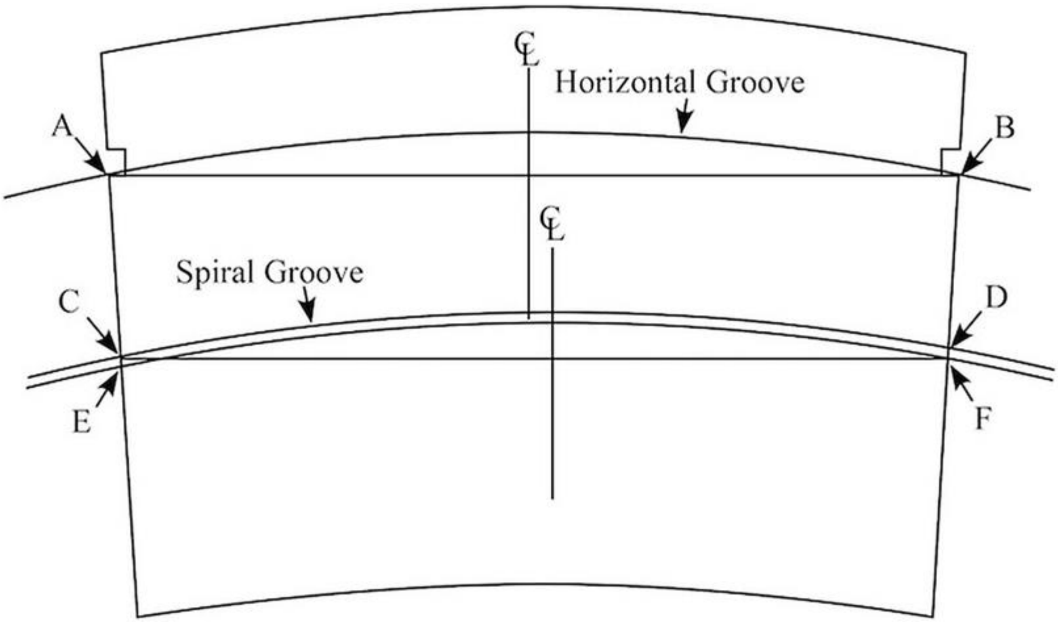
According to him, the cast immediately has proved (but how could it be otherwise!) Petrie’s correctness about the spirality of the grooves: the spiral and non-spiral grooves leave fundamentally different initial and final impressions in the cast.



The cast of core surface with Dunn tracked motion paths of the “fixed tooth”

Christopher Dunn believes that such a performance with ideal lines superimposed on the indistinguishable grooves of the impression can prove something.

Look:



A Dunn’s play with ideal «impressions» on the cast.

In general, Dunn decided to continue to satisfy the public with indirect evidence of the helicity of the grooves – their indistinct impressions on the cast.

And again following the tradition Dunn habitually has wound the thread with confidence: it is irrevocably understood for him now that the groove spiral is regular in any point along the entire length of the core.

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2 March 2020, a nice day – photographing of Petrie’s core #7 at his London Museum. The photographing allowed us to create a panoramic view of the core surface and examine its features in detail now. Many thanks to the wonderful London photographer Rebecca Phillips-Lee.

Remember that:
1 inch is 2.54cm or 25.4mm
0.1-inch = 0.254cm = 2.54mm
0.01-inch = 0.0245 cm = 0.254mm

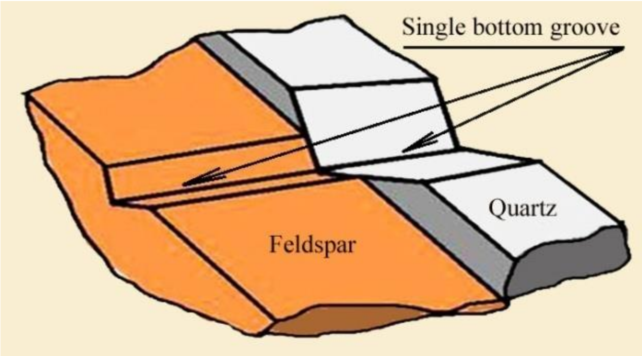
The pictures clearly show Petrie's "undetected" **little** irregularity in the field width between the grooves. The width varies from a millimeter to three ones, but Petrie with Dunn didn't notice it…

If we try to explain such irregularity of the fields width by the thread double start, it should be also explained why the single start with the wide fields is repeatedly replaced by double start with the fields narrowing!

If in the same figure the ruler is transferred directly to the core without changing the scale, the sharpness of the irregularities of the fields between the grooves becomes simply glaring:

There is one question: what is it that the mechanic-mathematician Petrie is up to?

The third thesis is that the depth of the location of the bottom of the groove is stable and does not depend on what thickness of granite grains of varying hardness had to be cut, which indicates the fixation of the cutting tooth of the tool.



...as the feldspar is worn down (by rubbing) more than the quartz, the latter crystals stand highest; yet the grooves run with an even bottom through a greater depth of quartz than of feldspar.

Isn't it interesting by what process has already worned the feldspar up to the moment when the cutting tooth appears there?

By what tool it has been abrading inside the granite massive up to the coming of the magic tooth there?

Mr. Petrie is somehow silent about how the surface of the fields between the grooves was created in general.

What is the drilling method by which only grooves are created? The total surface area of the “grooves cut through by a fixed tooth” is only a small fraction of the total core surface area. In other words, if the wall surfaces of the future hole and core were created by grinding with something inside the stone massif, why then do we need to run some kind of tooth there too?

The grooves in the quartz grains of the core #7 are sometimes even and smooth, sometimes they whimsically wriggle, break, sometimes their edge - sides are crumbled. The groove depth is unpredictable, well visible by the depth of the shade in it: the deeper the groove, the darker the shadow in it. The illusion of the grooves greater depth in the quartz is created by the crests at their edges, but it is scratched on average over all the core no stronger than the feldspar!

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The real profile of the Petrie’s core surface where the edges of the grooves are not crushed is as follows:

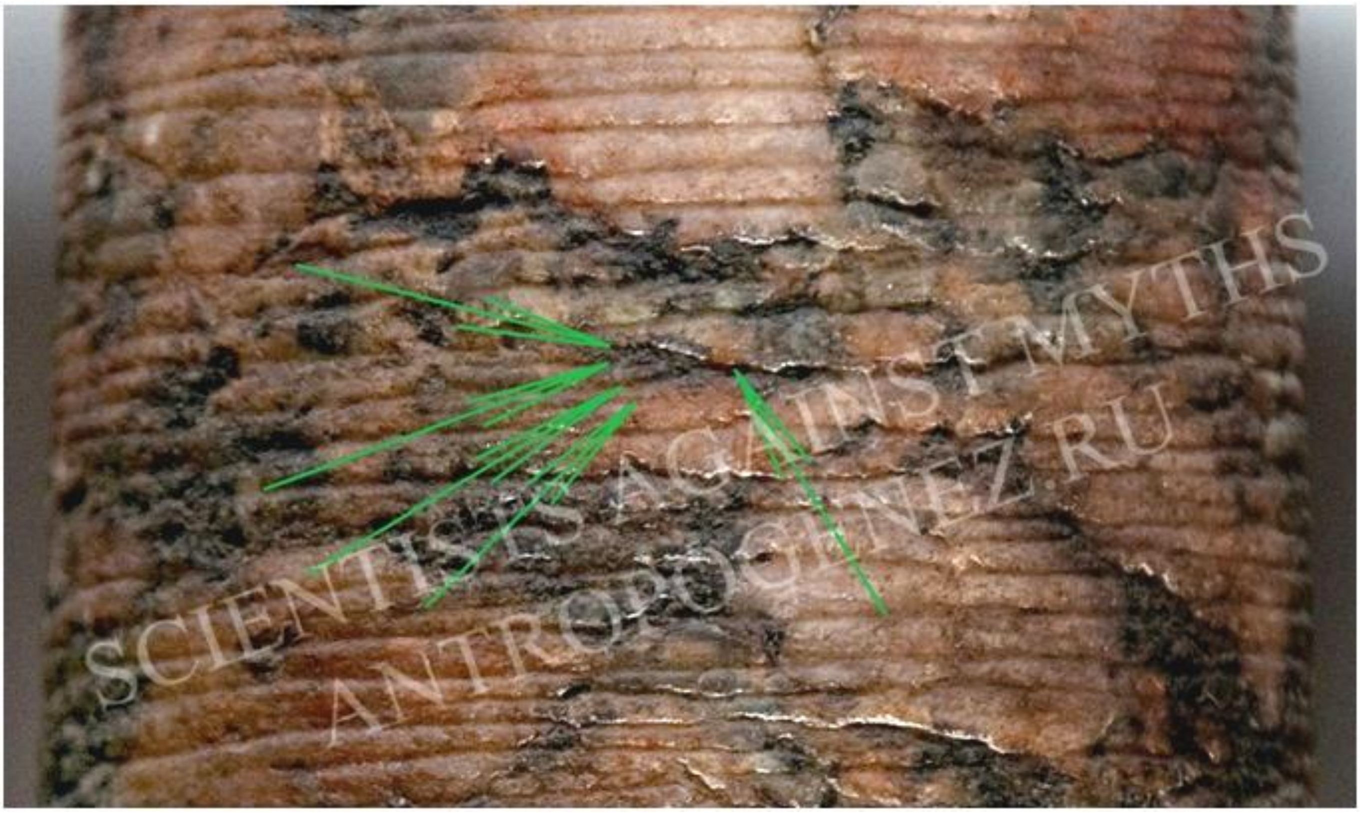
The second thesis is that for several revolutions the grooves are continuous

Even according to the shown core surface fragments, it is difficult to talk about the grooves continuity, although the continuity is not impossible.You can, shurely, assume that some of the grooves encircle the core. You can assume…

Once again we read the already quoted words from Dunn:
…because there were clearly discontinuities in the groove at some locations around the core…

And for a moment, let us get back to Petrie quoting:
…but merely owing to irregular action of the tool, the grooves become confused and cannot be individually traced further.

In many places on the surface of the core, the grooves are not just confused. What kind of instability has the forward movement of the drill with teeth along the edge, that the grooves they have done are confused, merged and again diverge into several new grooves? One tooth turned into three teeth here, or into four ones?:



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The first thesis concerns the deepening of a drill in granite by screwing, with thread on the walls of the hole and core with the pitch of 0.1 inches per one revolution with the instability of the pitch not more than 0.01 inch. Here is a complete panorama of Petrie's core #7, which no one tried to make and demonstrate. Figure is rotated counterclockwise to maximize its size on a page.


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And in conclusion, the final chord is performed by professional geologist and mineralogist P. Selivanov:

Here is the full 360-degrees panorama of the core surface. First of all, after the careful tracing of all the grooves we can see on the core, we get the following picture:

If you remove the beautiful granite substrate, the picture becomes like this:

For convenience, the grooves are numbered on the right and left sides, so that it is easy to find a match at the edges.

But the attempt to find here a spiral thread with a constant pitch and other miracles, obtained using the sophisticated equipment that Petrie tells us about, is a very difficult task, at least for an honest and consistent person. The lines converge, diverge, break and behave in all sorts of other similar, non graceful ways.

Yes, we might not have noticed, skipped some thin lines, but we were promised not them. We were promised a *honest spiral, real thread. Maybe someone sees it here?*

In addition to the wild dance in the directions of the grooves, aptly called by Petrie himself "drunk screw", the heterogeneity presence in the density of their location is noteworthy: somewhere there is a lot of them, somewhere they are completely sparse. To understand why this happens, first we traced mineral grains.

To notice the feldspar, or rather potassium feldspar (PFS) is quite simple - its crystals here are quite large and have a remarkable pink color; to trace them is not difficult.

But further – it's trickier and more interesting, because granite does not include the PFS and quartz only. It also contains medium or acid plagioclase (oligoclase-albite), but this mineral is colorless.

Plagioclase, like the PFS refers to feldspars and its hardness is the same as that of the PFS – 6 on the Mohs scale, while quartz has a hardness of 7.

A geologist in the field works can not only scratch but also crack the stone and detect the plagioclase gleaming cleavage planes and so distinguish it from quartz. It's easy to determine the plagioclase when studying a thin stone section with a polarizing microscope in the laboratory too.

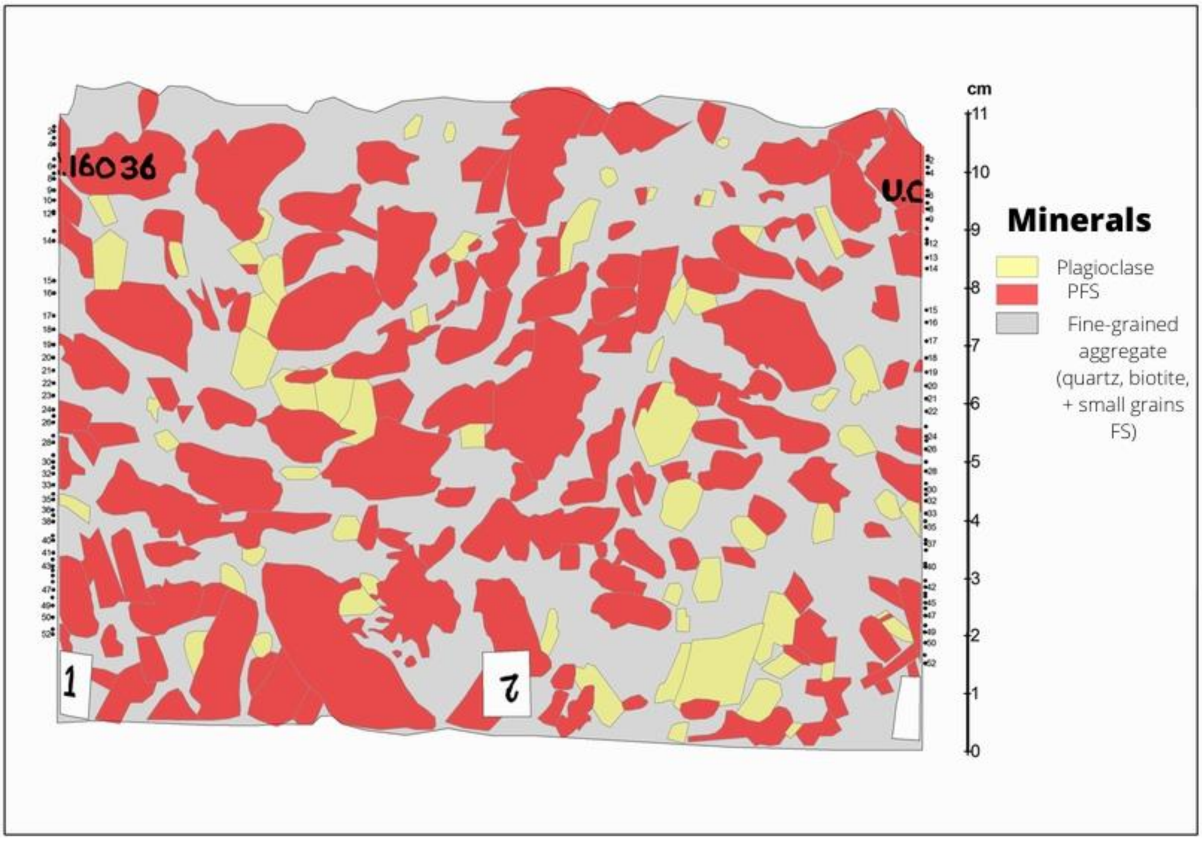
But the Petrie's core #7 has a surface that is complicated by the presence of the grooves. Because of it there is a high probability of a mistake. Nevertheless, using knowledge of zoning in plagioclase, looking at shades and knowing the typical forms of crystals, it can be identified.

Here is an example of the plagioclase decryption (by the way, not all plagioclase grains are marked in the figure):

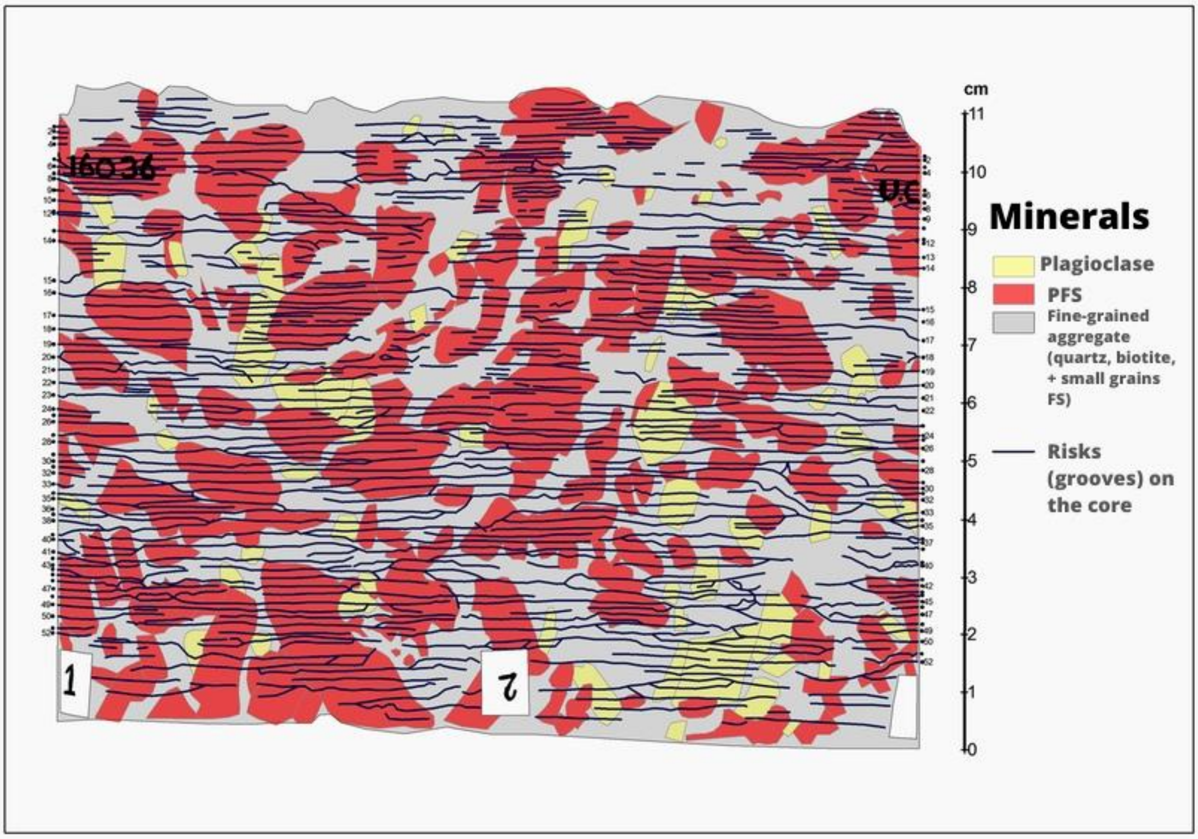
After the large crystals of PFS and the most expressive crystals of plagioclase deciphering, a fine-grained mass remains. The mass mainly consists of quartz, although it includes a lot of the same plagioclase and even a certain amount of PFS too. In addition to the mentioned minerals, granite contains black mica, biotite, which largely determines the fragility of some zones and their chipping.

Perhaps let us stop on it, not sinking into the painful jungle.

Here is the mineralogical map of the core surface:



Well, the most interesting thing begins when we put the grooves of the Petrie-Dunn "spiral thread" on this surface mineralogical map:



And, lo and behold, we see that the thickness of the grooves noticeably correlates with the locations of large feldspar (PFS and plagioclase) crystals. Where there are none, the density of the grooves decreases and they become more meandering.

Chipping that leads to a decrease of the grooves number, and is obviously associated with the finer-grained structure of the plots and with the presence of a tiny amount of mica, and this, in part, could also explain such a *difference in the density of grooves.*

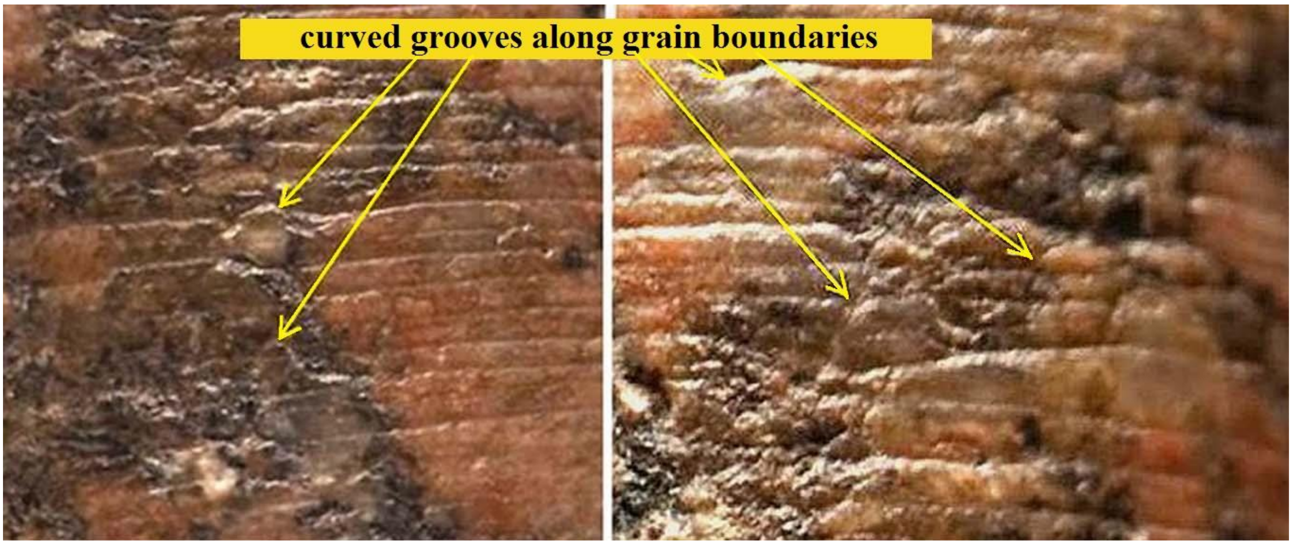
But not by chipping only!

There are places where quartz forms rather large inclusions between feldspar grains but does not crumble.

Here are a few examples when spar and quartz grains are crossed by the grooves:

The depth difference between the grooves in quartz and feldspars is quiet noticeable.

Perhaps Petrie mistakenly thought that plagioclase is quartz, and so concluded that the grooves bottom location was unchanged. When the groove in the quartz is deeper, the position of its bottom remains unchanged, but in this case the groove is usually a curve, what cannot be overlooked.



What a wonderful tooth that prefers to make grooves in softer feldspar and often makes them deeper than in quartz (which contradicts fables Petrie, by the way)?

Why does this tooth have such a love for targeted cutting – "refreshing" the boundaries between the grains of minerals?

And what way finally, does this tooth split into two, three, four teeth, and then reassemble into one again?

Are these the incredible drilling technologies or, nevertheless, drilling with a free abrasive that always leaves (and this has been repeatedly tested and confirmed experimentally) exactly such traces that we observe on the Petrie's core # 7?

But even the frankly poor quality pictures of "thread and core experiments" was still enough to compare it with our tracing, where modern computer technology allows us to "pull" the image at the reference points, levelling out promising and other distortions.

In the following image the Dunn thread is marked with a yellow dotted line:

Naturally, only a small fragment is visible, on which, however, it is noticeable how hard it was for this researcher when he sought the only right path. In two places, he had to look for the weakest, at least some, even conditional hints of a grooves, ignoring the deeper, but «ideologically incorrect» ones, located right next to them.

If someone was not convinced by our research, then we suggest that you continue our own with the yellow dotted line and continue tracing the coil of the ideal spiral.

Help Christopher Dunn find traces of impossible technologies: the task is just to connect the end of the left black mark No. 50 with the right black mark No. 49 so that you get a perfectly straight line running along the grooves on the core. Good luck!

If you accomplished the impossible and succeeded – congratulations, you helped Christopher Dunn! You have a whole ONE impossibly perfect coil of spiral and about fifty indecently chaotic.

Even if you found the coils, it would not cancel the fact that the rest is a shame, which is indecent to show: "hold the bolt, this is a wonderful bolt, hi-tech bolt, though it has only one normal coil, the rest of the thread is cut with a blunt file in the hands of a drunk up to the amazement of the locksmith."

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This article, you have read has no words on how such core could be obtained, and how a hole in granite from which this core was taken could be drilled. A very detailed story about this can be found here:

https://antropogenez.ru/drilling/

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Sources:

W.M. Flinders Petrie Tools and weapons... (British School of Archaeology in Egypt and Egyptian research account : 22nd year, 1916). 1917

W. M. Flinders Petrie, On the Mechanical Methods of the Ancient Egyptians The Journal of the Anthropological Institute of Great Britain and Ireland, Vol. 13 (1884), pp. 88-109

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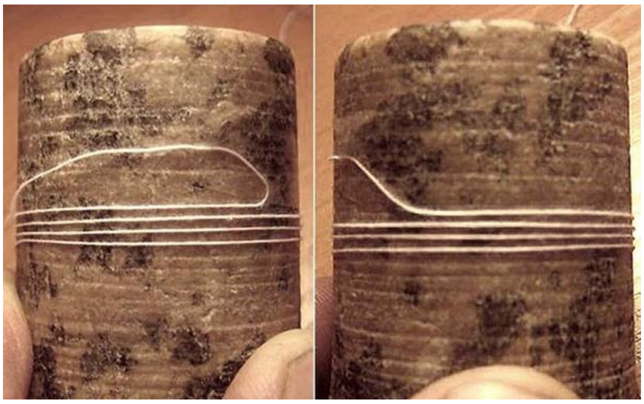

P.S. You say: "thread?"

I carefully placed one end of the thread in a groove… … I rotated the core in my left hand, making sure the thread stayed in the groove… (Petrie's Infamous Core #7. Chris Dunn.(1999) Part Two)

Here it is, the thread spiral in the groove on our experimental core! And in the second picture - also a thread spiral in the groove. In the same groove!