Abstract

Based upon a woeful lack of attention to detail it is claimed by many that the engineers of King Solomon's day betray such ignorance of circular measure that belief in the Bible as a primary source of truth is necessarily compromised: a charge that is readily refuted when the associated biblical data are examined in the light of simple logic.

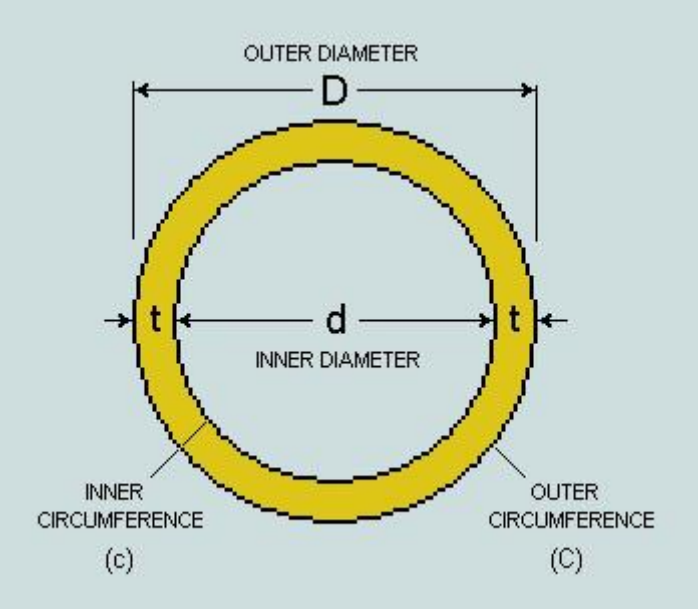
Concerning Solomon's Pi

The demise of a cherished fantasy

"And he made a molten sea, ten cubits from the one brim to the other: it was round all about, and his height was five cubits: and a line of thirty cubits did compass it round about." (1 Kings 7:23, AV)

Thus does the Bible introduce its description of the cylindrical bronze laver constructed by Hiram of Tyre for the ritual washing of King Solomon's temple priests. (The details are confirmed by repetition in 2 Chronicles 4:2). But there appears to be a problem here: the distance around any circle (its 'circumference') is somewhat more than three times the distance across it (its 'diameter')[1]. This is a matter of simple observation requiring little more than a length of string to confirm; so it is hardly surprising to learn that by 1700 BC the neighbouring Egyptians were well aware of it. The mystery deepens when it is remembered that the Hebrews had been slaves in Egypt until c.1270 BC; that their leader, Moses, was educated as a prince in the Egyptian court; and that the Phoenicians were well versed in Egyptian art and technology. So how could the Hebrew intelligentsia, as late as c.950 BC, be ignorant, seemingly, of this simple truth?

Here, in the view of the critics, is clear evidence of the ineptitude of the very people who claim to be the sole trustees of God's Inerrant Word to man! They ask, 'Can anything these people have written or said be taken seriously'? Jews and Christians alike will be wise not to underestimate the strength and destructive nature of this argument, for true faith cannot be founded on sand!



A plan view of Solomon's 'molten sea'

What has been ignored, of course, is the fact that a vessel of the kind described has a *wall*, and that wall has *thickness*. It follows that the laver had an *inner-* and an *outer-* diameter and, correspondingly, an *inner-* and an *outer-* circumference. The writer does not qualify the dimensions he provides; his statement is ambiguous and invites misunderstanding. However, the following analysis should clarify the matter and forever silence the critics.

Let **d** and **D** represent the inner- and outer- diameters, respectively; **c** and **C**, the corresponding circumferences; and **t**, the wall thickness. Further, let π' (pi dash) represent the ratio 'circumference to diameter' in each case. We then have the following 4 possibilities:

[1] **d** = 10; **c** = 30, and thus $\pi' = c/d = 3$

[2] **D** = 10; **C** = 30, and thus $\pi' = C/D = 3$

[3] **d** = 10; **C** = 30, and thus, because $c < 30$, $\pi' = c/d < 3$

[4] **D** = 10; **c** = 30 and thus, because $C > 30$, $\pi' = C/D > 3$

[Observe here the use of '<' and '>' to mean 'less than' and 'greater than', respectively]

Clearly, only [4] meets the requirement that π' is greater than 3. Thus, if π' is to become π, the inner- circumference must equal 30 cubits and the outer- diameter, 10 cubits. However, against this interpretation is the fact that an inner-circumference is hard to measure - that is, until one remembers the practical matter of casting the laver. Its mould must have had a raised solid circular centre around which a length of tightly pulled string would reveal what would later become its inner-circumference. [Thus, for the technicians in charge of the casting, both **c** and **D** would have been readily measurable; consequently, it would probably have been taken for granted that these were the logical dimensions to record. So, from the writer's point of view, there was no ambiguity attending his use of the whole numbers **30** and **10** – and also, in this way, avoiding the use of fractions].

At this point it becomes necessary to bring **t** (the wall thickness) into the proceedings. Not forgetting that **D** (the outer diameter) incorporated a double thickness of metal, we have,

$(D - d) = 2t$; so that $d = D - 2t = 10 - 2t$; and

$$c/d = 30/(10 - 2t) = \pi' \text{ ---------- (i)}$$

For the sake of argument, let us assume $\pi' = \pi = 3.1416\ldots$, so that on this basis we may calculate t.

Transposing (i), we have

$10 - 2t = 30/\pi$, whence

$$t = \tfrac{1}{2}(10 - 30/\pi) \text{ ---------- (ii)}$$
$$= \tfrac{1}{2}(10 - 9.549) = 0.225 \text{ cubits}$$

Since the cubit is a unit roughly equivalent to 18 inches[2], the wall thickness of the laver was of the order of

0.225 x 18 = 4.05 inches, i.e. about the width of an adult male hand

Significantly, in a parallel passage (2 Chronicles 4:5), the writer there adds the comment **"And the thickness of it (the wall of the laver) was an handbreadth..."** – which, in justifying our reading of π' as π, confirms the calculation and effectively rebuts the assumptions and accusations of the critics!

Clearly, if these writers of 1 Kings and 2 Chronicles now had the opportunity to qualify their description of the brazen laver, each would have said 'Its inner- circumference was 30 cubits; its outer-diameter, 10 cubits'.

[1] The ratio 'circumference/diameter' of any circle is a significant universal constant and is designated by the lowercase Greek letter π (pi). For most practical purposes its value 3.14159… may be approximated by the fraction 22/7, but so important is this number to the mathematician, scientist and engineer that it features on every scientific electronic calculator where it is now typically available to 7 decimal places at the touch of a button.

[2] From Wikpedia: The Near Eastern or Biblical cubit is usually estimated as approximately 457.2 mm (18 in)

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