The Value of Pi in the Bible
(And What It Tells Us about Biblical Hermeneutics)
by Jay Cumming
(2018)

In ancient times, builders and land surveyors were aware that the ratio of a circle's circumference to its diameter was a constant, and they also knew that the number 3 was a rough approximation of that constant. Today, we know that pi is approximately 3.14159265359, but the decimal system for notating non-integer numbers did not spread westward from India until the 12th century of the common era. In ancient times, therefore, the value of pi was not reduced to a single number. Instead, it was described as a ratio. The ratios most often used were 3:1, 22:7, 256:81, 333:106, and 355:113. The last of these is the most accurate, corresponding to 3.14159292035 in decimal notation. But 333:106 is also very accurate, corresponding to 3.14150943396 in decimal notation.

And less accurate approximations were also widely used. The Rhind Mathematical Papyrus, which dates to 1650 B.C.E., discusses how to determine the volume of a cylindrical granary if one knows its diameter, and the formula given in that text indicates that the ancient Egyptians used 256:81 as an approximation for pi, corresponding to 3.16049382716 in decimal notation.

One excerpt, however, from the Bible suggests that, in ancient times, Jewish builders and land surveyors were working in much cruder approximations. Referring to the construction of the basin used for priestly ablutions in the temple of Solomon, 1 *Kings* states: "And he made the molten sea of 10 cubits from brim to brim, round in compass, . . . and a line of 30 cubits did compass it round about." (1 *Kings* 7:23.) If one calculates the ratio between the 30 cubit circumference and the 10 cubit diameter, it appears that the Bible's redactors used the ratio 3:1 as a rough approximation for pi.

But what if the scribes who redacted 1 *Kings* knew that the value for pi indicated in the text was merely an approximation? If so, how might they have signaled that awareness? Perhaps by using *gematria*, a hermeneutical technique whereby the numerical value of a letter is calculated based on its position in the Hebrew alphabet.

Significantly, in the text translated above from 1 *Kings*, the word "line" is used for "circumference" ("a *line* of 30 cubits did compass it round about"). In Hebrew, the word for "line" is *qava*, and it is usually spelled using the Hebrew letters *quf* and *vov*. But in

1

1 *Kings*, it is spelled incorrectly as *qavah*, using the Hebrew letters *quf*, *vov*, and *hei*. If each letter is given a numerical value based on its position in the Hebrew alphabet, then the value of *qava* (the correct spelling) is 100 + 6, or 106, but the value of *qavah* (the incorrect spelling) is 100 + 6 + 5, or 111. Thus, the text misspells *qava*, and the misspelling results in an error in the numerical value of that word, changing a word that has a numerical value of 106 into one that has a numerical value of 111.

Taking this bit of *gematria* into consideration, it appears that the scribes who redacted 1 *Kings* chose a very efficient way to express the value of pi in the biblical text. Decimal notation was not in use at the time, and therefore if they had wanted to write that the "molten sea" was 10 cubits across and 31.415 cubits around (which, of course, would have much more accurately approximated pi), they would have needed to express 31.415 cubits as the ratio 333:106 multiplied by 10, which would have required a great deal of additional text. Instead, the scribes very cleverly wrote the erroneous value of 30 cubits for the circumference of the molten sea and then signaled that they were well aware of the error by *inflating* the numerical value of the word *qava* ("line"), which happens to be the precise word the text uses for "circumference." By giving a numerical value of 111, instead of 106, to that word, these clever scribes hinted that the erroneous circumference of "30 cubits" also needed to be inflated, in the same proportion, and when that is done (30 x 111/106), the circumference of the "molten sea" becomes 31.4150943396 cubits, indicating a very accurate knowledge of the value of pi.

It is as if the scribes had said: "Just as we have increased the numerical value of this word that we are using to describe the circumference of the molten sea, so also, and to the same degree, the circumference of 30 cubits should be increased."

Thus, the biblical text demonstrates that the ancient scribes were aware of a very accurate approximation of pi and that they encoded it into the Bible in a very efficient way. The text makes use of *gematria* (calculating the numerical value of letters), and this use of *gematria* is too illuminating to be lightly dismissed. Rather, it must have been intended by the Bible's redactors, and, more generally, it demonstrates that the numerical value of words was something that the Bible's redactors had in mind as they crafted the Bible's text. This fact suggests that modern Bible scholars, if they want to be objective in their search for the truth about the Bible, should not lightly dismiss the hermeneutical methods recorded in Jewish esoteric literature.

"Woe to the person who says that Torah intended to present a mere story and ordinary words! For if so, we could compose a Torah right now with ordinary words, and more laudable than all of them [in the existing Torah]! . . . Concerning Torah, one should look only at what is beneath the garment. So all these words and all these stories are garments." (*Zohar* 3:152a.)