BS"D

Chemical Testability

Mois A. Navon, 5762

> *Our Rabbi's taught [in a Braita]: There is no manner of testing tekhelet…But [the Amora] R. Issac bar R. Yehuda used to test it thus: he used to mix liquid alum, fenugreek juice, and urine of a forty day old child and soak the blue thread overnight until morning; if the color faded it is invalid. R. Adda stated…one should take a piece of hard leavened dough of barley meal and bake it with [the blue thread] inside; if the color improved it is valid, but if it deteriorated it is invalid…the statement 'There is no manner of testing tekhelet' refers to the test sample.*
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> (Menachot 42b-43a).

Though the Braita (Men. 42b) states that there is no manner of testing to determine if the tekhelet dye is of plant origin or of snail origin (in accord with empirical evidence)[1], the Gemara (Men. 42b-43a) does provide a chemical method of testing. The Gemara itself attempts to reconcile the contradiction stating that the import of the Braita is that there is no manner of testing whether it was dyed intentionally for tzitzit (i.e., whether the dye lot was from the test sample "ate'ima" or from the intended first dye run).

This conclusion requires explanation, for it implies that there was a chemical difference between indigo dye obtained from the plant versus that obtained from the snail. A number of solutions are offered[2]:

1) There are other chemicals which accompany the indigo molecule from the snail which make it faster to wool that those which come from the plant source. (Rock, p.17, sec. III).
2) At the time of the Tanaim (who authored the Braita which states there is no test) the two dyes were indeed identical and no test could distinguish between them. However, at the time of the Amoraim (who authored the Gemara which provides a test) the plant source was different than genuine kela ilan but was just referred to as such (since it was an alternate source of blue dye). (Rock, p.17, sec. III).
3) The dye manufacturing process in the time of the Gemara was such that they added the actual snail during the reduction process, something which wasn't done during plant source dyeing and could have effected the fastness of the dye (Dr. Sterman; acknowledged by Nobel Chemist Roald Hoffman, personal conversation).

Be that as it may, it should be clear that the proposed chemical test does not throw into question the validity of Murex tekhelet – for it clearly passes the test of remaining fast to the wool (i.e., "Lo Ipareid Hazutei"). Rather the question is: why was the plant indigo dye in the time of the Amoraim not fast to such tests.

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[1] The blue dye produced by the Murex trunculus is molecularly identical to that produced by the plant (kela ilan) and thus there is no chemical test to differentiate the sources. (see Otto Elsner and Ehud Spanier, "The Past, Present and Future of Tekhelet", *The Royal Purple and The Biblical Blue* ed. Ehud Spanier (Israel: Keter, 1987), p.175.

[2] It should be noted with reference to the actual tests that – as of this writing (Nov. 2001) – no clear understanding of the nature of the tests has been attained by modern chemists. That is to say, no one has been able to make a definitive statement as to what the tests were to accomplish chemically and how they were to do so.