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Source: *Chymia*, Vol. 9 (1964), pp. 27-31
Published by: University of California Press
Stable URL: http://www.jstor.org/stable/27757229
Accessed: 27-12-2015 23:43 UTC

# SOME BLACK INKS IN EARLY MEDIAEVAL JEWISH LITERATURE†

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ALTHOUGH ink was well known to the Egyptians and Chinese in early times, it was not until the later Arabic period that the manufacture of ink became highly elaborated. This holds particularly true for those products used expressly for illuminative purposes.[1]

In this article, the black ink of early Jewish literature of the Bible and Talmud is discussed in relation to the Arabic materials of over five hundred years later. It is certain that the early Muslims of the seventh and eighth centuries knew the Bible and Talmud well enough to have borrowed all that they considered worthwhile. This held true not only for the religious content, for the Arabs were also well aware of the primarily technological passages particularly in the Talmud.

In the case of ink preparation and use, the Talmud has much to say. This is due, no doubt, to the fact that at a very early date, the Bible was put in writing in a scroll form. There is also evidence that other books were known, and that there were many Jewish writers in Biblical and Mishnaic times.[2]

A very common writing medium of the Jews in Biblical and later times was *deyō*.[3] It was first mentioned in the Bible[4] and often in Talmudic literature.[5] The term refers not to a liquid ink but to soot, which, like other pigments, is dissolved or suspended in a fluid vehicle.

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† The author is indebted to the National Institutes of Health (R.G. 7391) which made it possible to carry out these studies.

1 Some of these formulas have already been discussed in M. Levey, "Early Muslim Chemistry: Its Debt to Ancient Babylonia," *Chymia,* 6, 20–26, from a manuscript by ibn Bādīs (c. 1025), a North African ruler.

2 *Cf.* Joel Müller, *Masechet Soferim,* Leipzig, 1878.

3 For etymology, *cf.* W. Nowack under ink in *Jewish Encyclopedia,* Vol. 6, p. 585. It is related to Ar. *dawāt* and Aram. *dīhā.*

4 Jeremiah 36:18.

5 *Sabb.* 133b; *Aboth* 4:20.

That it was a black soot is without doubt since it was used to write in Torah scrolls. Almost all of these have a black script.[6]

Soot from olive oil was the best for the preparation of fine soot. To bring it into a mass which would stick together, it was mixed with a resin like that of balsam.[7] It was also put in a glass flask with olive oil in the sun to dry.[8]

The soot ink was prepared also from different kinds of soot. For example, resin or pitch was burned, or the resinous wood of the pine was used. Often this material was falsified with the soot of the baker's oven. For use, the soot was generally mixed with gum.[9]

Sometimes, writing was done with blood, milk, or the juice of the flax stem. The latter two were considered to be sympathetic inks. Sympathetic inks such as these, mulberry juice, and red must were not prefered by religious people. In ibn Badis, the sympathetic inks were made of yoghurt, sal ammoniac, milk, and white alum. To make them visible for reading, ashes of paper, gallnut solution, and boxthorn were used as well as heat when necessary. Carbon soot was obtained from many more diverse sources in the botanical kingdom [10] such as gallnut burned until it is carbonized, sandarac, barley, and others.

In Talmudic times, an attempt was made to improve the *deyō* by adding chalcanthum, blue vitriol. Its purpose was to make the writing more permanent. However, its use soon ran into an unpredicted difficulty, namely that a passage in the Talmud demanded that for any ink used erasure must be possible.[11] As a result, tradition prevented its widespread use by religious people.[12]

In the third century A.D., in the Persian schools of the Jews, the meaning of the word chalcanthum was not always known. The scholar, Samuel Yarchina'ah of Nehardea agreed with Pliny that *khartā dūsqafā,* or *kalkantōs,* is atramentum sutorium or shoemaker's black.

6 Only one Torah manuscript of the many in museums has a color in it of other than black. This is the one in the Ambrosian Library in Milan in which may be found a red ink. It is of Samaritan origin. *Cf. Sabb.* 1:5.

7 Leopold Löw, *Graphische Requisiten und Erzeugnisse bei den Juden,* Leipzig, 1870, Vol. 1, p. 146; *cf.* also S. Krauss, *Talmudische Archäologie,* Frankfürt/M, 1912, Vol. 3, chap. 11.

8 *Sabb* 18a; L. Blau., "Zur Einleitung in die heilige Schrift," *Jahresberichte der Landesrabbinerschule zu Budapest,* **17**, 152 (1894).

9 A very common gum was Aram. *kūmūs,* "resin of acacia."

10 Ibin Bādīs, p. 8 ff.

11 *Jer. Sota* 2:5.

12 *Cf. Erubim* 96b; *Sanhedrin* 86a; *Meg.* 2:2; *Sabb.* 104a; *Gitt.* 19a.

*Khartā* is also the name of a place.[13] In Babylonia, the shoemaker's vitriol is green vitriol, ferrous sulfate. The confusion in Muslim times, of blue vitriol with green vitriol was due, no doubt, to the fact that the vitriols, as with almost all other chemicals used in the ancient and mediaeval periods, were impure. The methods of preparation of al-Razī attest to this. For example, qalqant (blue vitriol) was preparing in the following way: [14]

> Dissolve vitriol and then dissolve this in water. Purify it. Throw on it copper filings until it is green. Purify it. Put it in a copper vessel. Dissolve it after you have put a half dirham of sal ammoniac into ten dirhams of it.
>
> It is better when vitriol is dissolved that it be purified and put into a copper vessel and dissolved after a half dirham of ammonium chloride has been put into ten dirhams of it until solid.
>
> Another type. Take yellow vitriol, cook it, and purify it. Add the same quantities of verdigris and vitriol. Leave it some days until it is dissolved and is green. Purify it. Let it become solid.

Blue vitriol is a common substance in the manufacture of Arabic inks.[15]

Later, copper vitriol was permitted to be used for holy books when it was decided that it was iron vitriol which the old texts forbade. It was Jacob ben Meir, grandson of the famous Raschi, who found this legitimacy for blue vitriol in ink. This change was better accepted later as a result of the contact of Arabic speaking Jewish scholars with Arabic chemistry and technology in the West and the East.

Gallnut and vitriol inks were not described in the Mishnah, which was canonized about 200 A.D., at the latest. It is believed that this type of ink came from Egypt to Palestine in the third century A.D. This type of blue-black ink was highly developed in a much earlier period especially for papyrus. Ibn Bādīs describes the preparation of many different types of tannin ink. The tannin was obtained in North Africa mainly from the gallnuts of the terebinth and tamarisk. The vitriol with which it was used came from Egypt, Cyprus, and Persia. The gum most often used by the Arabs was gum arabic. Sometimes, egg glair was added.[16]

[13] *Sabb.* 19b; *Erub.* 19a.

[14] J. Ruska, ed. of al-Razī's *"Sirr al-asrār," Quellen u. Studien zur Geschichte der Naturwissenschaften und der Medizin,* **6**, 88 (1937).

[15] *Cf.* ibn Bādīs *passim.*

[16] *Cf.* M. Levey, "Chemical Technology in Mediaeval Arabic Bookbinding," *Trans. American Philosophical Society* **52**, part 4 (1962).

Jewish theology of the mediaeval period presented tremendous resistance to the use of tannin inks in holy books. Just as it had opposed parchment and blue vitriol for the Torah, it worked hard to maintain the status quo of tradition in the use of other inks. In France and Germany, the break was made earlier. In the former, Jacob ben Meir gave the following recipe:

> Soak bark of a tree in water until it gives up its juice. Then it is boiled until it becomes viscous. Then the liquid evaporates to leave it dry.[17]

The tree mentioned is probably the *Pinus picea, abies* L., bashm, "good odor." It is indigenous to Europe and North Asia. Instead of the bark, the *kuṣim* or needles may be used.

After Jacob Tam, tannin inks came into general use in Europe for writing of the Torah.[18]

It is of interest that the *deyō* question was not only alive in Europe but also in the East in the twelfth century. To clarify this, three questions were put to the great Maimonides who was then living in Egypt. The three questions asked of him were:

1. Is the Talmudic *deyō* the same as the Arabic *ḥibr*?[19]
2. If it is not, what are the ingredients of the Talmudic *deyō*?
3. Should one understand *ḥibr* as a preparation made from gall-nuts and chalcanthum?

Maimonides's answers to the first and third questions were brief. *Deyō* and ḥibr are not identical. The Talmud states that *deya* is a writing material which may be erased. This is not true for *ḥibr,* however, whose ingredients are gum and chalcanthum. As far as the *deyō* is concerned, two types are possible, one which is temporary and another more lasting. Maimonides gave the recipe for the temporary *deyō* which may be erased:

> Take powdered charcoal of the skins of pressed grapes, oil soot, for example from olive oil, pitch, colophony, and gum ammoniac.[20] It is all mixed with the charcoal powder, then kneaded with gum arabic[21] and honey. It is made into thin sheets. When these sheets are dissolved in water, a beautiful writing fluid is obtained which may be erased. In two to three years, it becomes faint and then disappears without a trace.

[17] *Cf.* Sabb. 23a; Gitt. 19a.
[18] L. Löw, *Graphische Requisiten* . . . , p. 154.
[19] *Ḥibr* in Arabic is a tannin ink while Arabic *midād* is a soot ink.
[20] *washaq* in Arabic and Aramaic.
[21] *samaq* in Aramaic; *ṣamgh* in Arabic.

Maimonides himself advocated the use of gallnut and vitriol ink so that the Torah writing would persist. He also recommended that a weight be set on the written part to flatten it so that it would shine and it would not be possible to wipe it off.[22]

The Talmud refers to gum arabic as an additive to writing fluids. Gum arabic is a gum of the acacia tree known in Egypt. This gum is also frequently found in the Talmud.[23]

[22] *Cf.* Löw, *ibid.*, p. 159.
[23] Gum arabic in Aramaic is *kūmā*; in Arabic it is *ṣamgh ᶜarbī*.