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R. C. STEINER, Hydrogen Sulfide: New Light on Ancient Malodors, Biblical Toponyms, and Comparative Semitic from a Medieval Scroll



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## Hydrogen Sulfide: New Light on Ancient Malodors, Biblical Toponyms, and Comparative Semitic from a Medieval Scroll

Richard C. STEINER

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It has always been assumed that there is no need for students of ancient Hebrew—let alone students of Proto-Canaanite—to concern themselves with post-talmudic Hebrew<sup>1</sup>. That assumption, however, is shown to be incorrect by a remarkable Hebrew scroll from Byzantium dated to ca. 1000. The scroll is one of two *rotuli* from the Cairo Genizah containing a commentary on Ezekiel and Minor Prophets, written in Hebrew with Judeo-Greek glosses. The commentary is attributed in a colophon to a Byzantine Jew named Reuel.

In Reuel's comment on Ezek 8:16, we find two occurrences of a previously unknown Hebrew verb: מצריטים. The first occurrence of the verb in the comment is followed immediately by a phrase meaning “wind that they would expel from their bottom(s)”. That phrase makes the meaning of מצריטים crystal clear: “passing gas”<sup>2</sup>. The root of this verb has regular cognates with the same

<sup>1</sup>Tannaitic Hebrew, by contrast, has long been recognized as a vital resource for ancient Hebrew lexicography. For literature going back to the tenth century, see my “A Colloquialism in Jer. 5:13 from the Ancestor of Mishnaic Hebrew”, *JSS* 37 (1992) 11–26; and add now Moshe Bar-Asher, “Mishnaic Hebrew: An Introductory Survey”, in: Steven T. Katz (ed.), *The Late Roman – Rabbinic Period* (CHJ 4; Cambridge 2006) 371–72; Aaron J. Koller, “The Social and Geographic Origins of Mishnaic Hebrew”, in: Elitzur A. Bar-Asher Siegal and Aaron J. Koller (eds.), *Studies in Mishnaic Hebrew and Related Fields: Proceedings of the Yale Symposium on Mishnaic Hebrew, May 2014* (Jerusalem 2017) 149–173; Edward M. Cook, “Language Contact and the Genesis of Mishnaic Hebrew” (Edward Ullendorff Lectures in Semitic Philology 4; Cambridge 2017) and idem, “On Some Supposed Archaisms in Mishnaic Hebrew”, *Maarav* 22 (2018) 11–20. (I am indebted to Koller for the last two references.) Nevertheless, there are scholars who deny even that. See, for example, John Lübbe, “An Old Testament Dictionary of Semantic Domains”, *ZAH* 9 (1996) 55: “The primary source of the project is obviously the Old Testament, but non Biblical sources are also consulted. For the Hebrew section, the inscriptions and the Dead Sea Scrolls are pertinent. The inclusion of Mishnaic sources would not be helpful due to the lateness of this phase of Hebrew”.

<sup>2</sup>The word and its meaning were pointed out to me at the end of 1994 by Israel M. Ta-Shma ל"ד, based on his study of the original scroll at the National Library of Israel. I discussed it (among other linguistic aspects of the scroll) in a lecture to the Academy of the Hebrew Language (Jerusalem) on March 13, 1995. A revised version of the lecture was published as “Linguistic Aspects of the Commentary to Ezekiel and the Minor Prophets in the Hebrew Scrolls from Byzantium” (in Hebrew), *Lēšonēnu* 59 (1995–1996) 39–56 (see esp. 54–56). The entire commentary was subsequently published in Nicholas de Lange, *Greek Jewish Texts from*

meaning<sup>3</sup> in a number of Semitic languages: Aramaic (Syriac) ‘-r-ṭ (D-stem) = Arabic ḍ-r-ṭ = Modern South Arabian (Ḥarsusi, Mehri, Šheri, Socotri) ḏ-r-ṭ<sup>4</sup> = Akkadian ṣ-r-ṭ<sup>5</sup>. These cognates exhibit the Semitic phonological correspondence that is most distinctive, viz., Hebrew ṣ = Aramaic ‘ = Arabic ḍ = Modern South Arabian ḏ = Akkadian ṣ—the same correspondence that is exhibited by the words for “earth”, “rib”, “egg”, and many others<sup>6</sup>. It is clear, therefore, that Proto-Semitic had a root \*ṣ-r-ṭ with the meaning “pass gas”—a verb that deserves to be added to the excellent lexicon of Proto-Semitic published in recent years<sup>7</sup>. Until now, it was possible to assume that this verb had been lost in Proto-Canaanite. That is a second assumption shown to be incorrect by our scroll.

It appears that Reuel found the form מצריטים in an ancient Palestinian midrash<sup>8</sup>. Fragments of the midrash appear in a number of ancient Rabbinic works, but not one of them preserves this verb. The fragment in the Babylonian Talmud, for example, replaces מצריטים with a form similar in sound and meaning: מתרזזין. The root ת-ר-ז has the meaning “burst, erupt” in Syriac and Hebrew; it is used several times in Jewish sources of the colon bursting open and forcefully expelling excrement or gas<sup>9</sup>. It may be derived from Akk. *tezû*, “excrete” (< *zû* “excrement”)<sup>10</sup>. The manuscript evidence suggests that

*the Cairo Genizah* (Tübingen 1996) 165–294. The relevant passage, in Hebrew with English translation, appears there on pp. 174–77 lines 88–94. For a revised edition and discussion of the passage, see now my “A Lost Hebrew Verb and the Lost Tribes of Israel in a Lost Biblical Commentary from Byzantium”, in: Yitzhak Berger and Chaim Milikowsky (eds.), *In the Dwelling of a Sage Lie Precious Treasures: Essays in Jewish Studies in Honor of Shmayer Z. Leiman* (New York 2020) 15–24.

<sup>3</sup>The Arabic, Šheri (Jibbāli), and Mehri cognates appear to have a slightly narrower meaning: “pass gas audibly”; see Edward W. Lane, *An Arabic-English Lexicon* (London 1863) 1786; T. M. Johnstone, *Jibbāli Lexicon* (Oxford 1981) 327 and idem, *Mehri Lexicon and English-Mehri Word-List* (London 1987) 478. In two of the languages, there is a contrasting root with the meaning “pass gas silently”: Arabic *f-s-w* (Lane, *Lexicon*, 2399) and Šheri *š-f-f* (Johnstone, *Jibbāli*, 260). If *f-s-w* is derived from \**f-š-w*, it may be related to *š-f-f*.

<sup>4</sup>T. M. Johnstone, *Ḥarsūsi Lexicon* (London 1977) 152; see also n. 3 above.

<sup>5</sup>The Akkadian, Syriac, and Arabic cognates were pointed out already by Benno Landsberger, “Lexikalisches Archiv”, ZA 41 (1933) 222.

<sup>6</sup>See, for example, my *The Case for Fricative-Laterals in Proto-Semitic* (New Haven 1977) 29–31.

<sup>7</sup>Alexander Militarev and Leonid Kogan, *Semitic Etymological Dictionary* (2 vols.; Münster 2000–2005); cf. Leonid Kogan, “Proto-Semitic Lexicon”, in: Stefan Weninger (ed.), *The Semitic Languages: An International Handbook* (Berlin 2012) 179–258. In the latter, it could be added to p. 227 § 6.5.7. “Excrement, dung”, in the former, to p. 247 of vol. 1, after No. 275.

<sup>8</sup>See my “Lost Hebrew Verb”, 18–24.

<sup>9</sup>Judah Ibn Bal’am cites a comment by Hananel b. Hushiel as proof that ת-ר-ז can refer to emanation of gas(es) from below; see my “The Byzantine Biblical Commentaries from the Genizah: Rabbanite vs. Karaite”, in: M. Bar-Asher, et al. (eds.), *שיי לשרה יפה* (Jerusalem 2007) 261\* nn. 80–81.

<sup>10</sup>See Landsberger, “Lexikalisches Archiv”, 222–23; CAD T 378 s.v. *tezû*, where the itera-

the replacement took place before the Talmud was reduced to writing. The midrashic fragment appears there in three places (*b. Qiddushin* 72b, *Yoma* 77a, and *Sukkah* 53b), and מתריזין is the reading of every known witness in all three places, including the citations of Rashi and David Qimhi in their commentaries on Ezekiel<sup>11</sup>.

### Dissimilated Reflexes of \*š-r-t

As noted above, the root ט-ר-צ is not attested in Hebrew—or any other Canaanite dialect—outside of Reuel’s commentary. However, a similar root, ת-ר-צ, is found in two Transjordanian toponyms preserved in the Bible: צָרְתָן (1 Kgs 7:46) and צָרַת הַשְּׁחָר (Josh 13:19). This root calls to mind the Akkadian reflex of \*š-r-t, viz., š-r-t. In that language, the third radical of the latter, an unemphatic /t/, is the product of a regular rule of dissimilation<sup>12</sup>. I suggest that ת-ר-צ, too, was a dissimilated reflex of \*š-r-t, used in either Hebrew or a Transjordanian Canaanite dialect<sup>13</sup>. The existence of the pair ת-ר-צ ~ ט-ר-צ < \*š-r-t is made plausible by the existence of a phonologically similar pair in Hebrew derived from \*š-b-t. The root ט-ב-צ “hold out” is attested in Ruth 2:14, while ת-ב-צ “hold firmly” is seen most clearly in MH צָבַת, “tongs”<sup>14</sup>.

tive form *it-te-né-es-ši* is rendered “he discharges wind(?)”. If Aram. ת-ר-ת is a back-formation from *tezû* with the *-tan-* infix, we are dealing with Aram. *r < n*; cf. Aram. ט-מ-ר, “hide in the ground”, ב-ה-ר, “test”, and ר-ט-ש, “abandon”, used in the targums to render Heb. ט-מ-ן, ב-ה-ר, and ג-ט-ש, respectively. Two of these examples are mentioned already by Theodor Nöldeke, *Neue Beiträge zur semitischen Sprachwissenschaft* (Strassburg 1910) 139–40. Nöldeke (*ibid.*, 137–39) also mentions בר, “son”, and תרין, “two”, but, according to some, these two are much earlier; see my “Vowel Syncope and Syllable Repair Processes in Proto-Semitic Construct Forms: A New Reconstruction Based on the Law of Diminishing Conditioning”, in: Rebecca Hasselbach and Na’ama Pat-El (eds.), *Language and Nature: Papers Presented to John Huehnergard on the Occasion of his 60th Birthday* (Chicago 2012) 383–84. Even so, they are relevant if we are dealing with a “persistent” (albeit sporadic) change, possibly triggered by the alternations בר ~ בנין, “sons”, and תנין ~ תרין, “second”.

<sup>11</sup>For Genizah fragments and numerous other talmudic manuscripts of this midrash, see the Friedberg Genizah Project (mainly in the Hachi Garsinan site). For the witnesses to Rashi’s citation, see my “Linguistic Aspects”, 55 n. 73.

<sup>12</sup>Frederick W. Geers, “The treatment of emphatics in Akkadian”, *JNES* 4 (1945) 65–67, with Akkadian š-r-t and š-b-t mentioned on p. 66. My thanks to Aaron Koller for reminding me of this discussion.

<sup>13</sup>For one type of dissimilation of emphatics in Northwest Semitic, see Stephen A. Kaufman, *The Akkadian Influences on Aramaic* (Chicago 1974) 121–22; and W. Randall Garr, *Dialect Geography of Syria-Palestine, 1000–586 B.C.E.* (Philadelphia 1985) 44–45.

<sup>14</sup>In Ruth 2:16 and in m. Menahot 10:9, the noun צבת refers to a bunch of grain stalks, cut but not yet tied into a sheaf. Many scholars (e.g., HALAT 938 s.v.) derive this noun from the root meaning “hold firmly”, because the harvester grasps a handful (or armful) of standing grain with one hand (or arm) before using the other hand to cut it with a sickle; cf. Ps 129:7. For the parallel histories of \*š-r-t and \*š-b-t in Akkadian, see n. 12 above.

In 2 Chr 4:17, which parallels 1 Kgs 7:46, the toponym that corresponds to  $\text{צָרְדָּתָה}$  is  $\text{צָרְדָּתָה}$ .<sup>15</sup> This correspondence raises the possibility that we are dealing with not one but *two* dissimilated reflexes of  $*\text{ṣ-r-t}$ , yielding a triad of related roots:  $\text{צ-ר-ד}$  ~  $\text{צ-ר-ת}$  ~  $\text{ט-ר-צ}$ . In support of this reconstruction, we might point to (1) Akkadian  $\text{ṣ-r-d}$ ,<sup>16</sup> a second reflex of  $*\text{ṣ-r-t}$ ; (2) the Hebrew root-triad  $\text{ז-ל-ע}$  ~  $\text{ע-ל-ם}$  ~  $\text{ע-ל-ץ}$ , all meaning “rejoice, exult”; and (3) the Hebrew root-pair  $\text{ק-ע-ז}$  ~  $\text{ק-ע-צ}$ , both meaning “cry out”. A root  $\text{צ-ר-ד}$  is attested in Mishnaic Hebrew<sup>17</sup>, as well, but it is not clear that it is related to the roots discussed here.

For the suggestions presented above to be convincing, it must be demonstrated that  $\text{צָרְדָּתָה/צָרְדָּתָה}$  and  $\text{צָרְתָה הַשָּׁחַר}$  have something in common with each other and with  $\text{מִצְרִיטִים}$ . In the following sections, I shall argue that there is something common to all of them: the smell of hydrogen sulfide.

### Hydrogen Sulfide and the Ancient Nose

Hydrogen sulfide ( $\text{H}_2\text{S}$ ) is a flammable, colorless gas occurring naturally in volcanoes, hot sulfur springs, swamps, crude petroleum, and natural gas. It is also associated with municipal sewers, smelting plants, and tanneries<sup>18</sup>. At low concentrations,  $\text{H}_2\text{S}$  is a respiratory irritant; at high concentrations, it is very toxic to humans and animals, causing respiratory failure or arrest leading quickly to death<sup>19</sup>. It is reported that “during the 1920’s and the early thirties, there were many cases of poisoning among tanners (some fatal) mainly caused by hydrogen sulfide”<sup>20</sup>. Even sulfur springs, touted since Antiquity as sources of healing, have poisoned people who bathed in them<sup>21</sup>. Suffice it to say that the doctors most familiar with  $\text{H}_2\text{S}$  are toxicologists.

<sup>15</sup> Cf.  $\text{צָרִידָה}$  mentioned in Rabbinic literature as the home town of an early rabbi, e.g., m. Sotah 9:9 <http://kaufmann.mtak.hu/en/ms50-large/ms50-122v-large.htm> and m. Ediyot 8:4 <http://kaufmann.mtak.hu/en/ms50-large/ms50-165v-large.htm>.

<sup>16</sup> See CAD § 107 s.v. *ṣarātu*.

<sup>17</sup> See Marcus Jastrow, *Dictionary of Targumim, Talmud and Midrashic Literature* (London 1903) 1299–1300; and Ma’agarim s.v.  $\text{צָרָד}$ .

<sup>18</sup> *Toxicological Profile for Hydrogen Sulfide and Carbonyl Sulfide* (U.S. Department of Health and Human Services, Public Health Service, Agency for Toxic Substances and Disease Registry, November 2016) 1–2, 13, and passim. <https://www.atsdr.cdc.gov/toxprofiles/tp114.pdf>.

<sup>19</sup> *Ibid.*, 27–32; Lawrence K. Wang, Clint Williford, and Wei-Yin Chen, “Desulfurization and Emissions Control”, in: L. K. Wang et al. (eds.), *Handbook of Environmental Engineering, Volume 2: Advanced Air and Noise Pollution Control*, (Totowa, New Jersey 2005) 37, 38; and Sydney Miner, “Air Pollution Aspects of Hydrogen Sulfide” (Bethesda, Maryland 1969) 1–7, 66. <https://nepis.epa.gov/Exe/ZyPDF.cgi/9100805J.PDF?Dockey=9100805J.PDF>

<sup>20</sup> Miner, “Air Pollution”, 40.

<sup>21</sup> Hale Daldal, et al., “Hydrogen Sulfide Toxicity in a Thermal Spring: a Fatal Outcome”,

H<sub>2</sub>S also occurs in the human body, where it is produced by bacteria—in both the mouth and the gastrointestinal tract—during the digestion of protein. It is only during the past two decades that the vital role of this gas in preserving health and prolonging life has begun to come to light<sup>22</sup>.

Hydrogen sulfide is, perhaps, best known for its odor, usually described as the smell of rotten eggs. When odors considered offensive today are studied in the laboratory, the culprit often turns out to be hydrogen sulfide. A clinical study of halitosis (bad breath) found that subjective evaluation (sensory rating) of the intensity of mouth odor offensiveness was correlated with the concentration of H<sub>2</sub>S and other volatile sulfur compounds in mouth air, as measured by a gas chromatograph<sup>23</sup>. In a different study, H<sub>2</sub>S was identified as the gas most responsible for the unpleasant odor of human flatulence<sup>24</sup>. Similarly, an experiment with dog flatulence found that the “severity of malodor was highly correlated with hydrogen sulfide concentration”<sup>25</sup>. Outside of the laboratory, we can only speculate about correlations. Since we have already seen that tanneries produce enough H<sub>2</sub>S to kill humans, it seems reasonable to conjecture that that gas is at least partly responsible for the “nauseating, overpowering smell” emanating from the tanneries in Marrakesh<sup>26</sup>. We need not belabor the point further. Suffice it to say that, to the *modern* nose, at least, the smell of H<sub>2</sub>S is quite disagreeable.

*Clinical Toxicology* 48 (2010) 755–56; T. Bassindale and M. Hosking, “Deaths in Rotorua’s Geothermal Hot Pools: Hydrogen Sulphide Poisoning”, *Forensic Science International* 207 (2011) e28–e29; and <https://www.deseret.com/2000/12/13/19543960/stinky-springs-set-to-reopen-despite-warnings-of-risks>. For the role played by deadly fumes from sulfurous waters in ancient Roman religion, see at nn. 38–40 below.

<sup>22</sup> See, for example, Rui Wang, “Physiological Implications of Hydrogen Sulfide: A Whiff Exploration that Blossomed”, *Physiological Reviews* 92 (2012) 791–896. <https://journals.physiology.org/doi/pdf/10.1152/physrev.00017.2011>; Yueqin Zheng et al., “Toward Hydrogen Sulfide Based Therapeutics: Critical Drug Delivery and Developability Issues”, *Medicinal Research Reviews* 38 (2018) 57–100; and Valentina Citi, et al., “Anti-Inflammatory and Antiviral Roles of Hydrogen Sulfide: Rationale for Considering H<sub>2</sub>S Donors in COVID-19 Therapy”, *British Journal of Pharmacology* 177 (2020) 4931–4941. <https://doi/10.1111/bph.15230>.

<sup>23</sup> Hollandra P. Niles and Abdul Gaffar, “Relationship between Sensory and Instrumental Evaluations of Mouth Odor”, *Journal of the Society of Cosmetic Chemists* 44 (1993) 101–107.

<sup>24</sup> F. L. Suarez, et al., “Identification of Gases Responsible for the Odour of Human Flatus and Evaluation of a Device Purported to Reduce this Odour”, *Gut* 43 (1998) 100, 103. <https://gut.bmj.com/content/gutjnl/43/1/100.full.pdf>. See also David R. Linden, “Hydrogen Sulfide Signaling in the Gastrointestinal Tract”, *Antioxidants & Redox Signaling* 20 (2014) 818–30. <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3910452/>.

<sup>25</sup> Stella B. Collins, et al., “Development of a Technique for the In Vivo Assessment of Flatulence in Dogs”, *American Journal of Veterinary Research* 62 (2001) 1014; cf. pp. 1017–1019. <https://www.ncbi.nlm.nih.gov/pubmed/11453473>. Cf. Ricki Lewis, “Assessing rectal gases in dogs”, *The Scientist* (2001). <https://www.the-scientist.com/research/assessing-rectal-gases-in-dogs-54757>.

<sup>26</sup> Martin Vennard, “In pictures: Marrakesh’s tanneries”, BBC News. [http://news.bbc.co.uk/2/shared/spl/hi/picture\\_gallery/06/africa\\_marrakesh0s\\_tanneries/html/1.stm](http://news.bbc.co.uk/2/shared/spl/hi/picture_gallery/06/africa_marrakesh0s_tanneries/html/1.stm).

Some have claimed that the pre-modern nose was different: “There is ... good reason to believe that the general sensory acceptance of aroma and taste was quite different in former times; many people found it hard to accept salt during the Middle Ages. The occurrence of rancid and putrid aroma was a much more natural part of the daily food, which can explain the occurrence of a number of dried and fermented fish products in the Nordic countries”<sup>27</sup>. Among the fermented fish products that the authors of this claim go on to discuss is *surströmming*, whose famously nauseating stench is attributable, in part, to H<sub>2</sub>S<sup>28</sup>.

This claim should be taken with the proverbial grain of salt. There is a considerable amount of evidence that the odor of H<sub>2</sub>S was considered offensive already in ancient times. Take, for example, the ruling by the Rabbis of the Roman period that certain classes of men could and should be compelled to grant a divorce to their wives if the latter found them to be unbearably repulsive. Among these were: (1) men with (chronic) halitosis (ריח הפה; t. Ketubbot 7:11), who exhaled H<sub>2</sub>S produced by subgingival bacteria; (2) tanners, who worked with dog feces (b. Berakhot 25a)<sup>29</sup>, a source of H<sub>2</sub>S; and (3) copper refiners, who were exposed to H<sub>2</sub>S when they smelted ore containing copper sulfide<sup>30</sup>. It is reasonable to assume that such men often reeked of H<sub>2</sub>S. Even in tiny amounts, the smell of this gas would have been difficult for even the most devoted wife to ignore, given that “the human nose is more sensitive to H<sub>2</sub>S than any gas monitoring instrument we have today: air mixtures with as little as 0.000001% H<sub>2</sub>S are associated with a rotten egg smell”<sup>31</sup>.

Copper smelting was infamous for its foul odor already in ancient Egypt. In the “Satire on the Trades” (also known as the “Teaching of Dua-Khety”), from the Middle Kingdom, the first tradesman to be singled out for derision

<sup>27</sup>Torstein Skåra, et al., “Fermented and Ripened Fish Products in the Northern European Countries”, *Journal of Ethnic Foods* 2 (2015) 19.

<https://www.sciencedirect.com/science/article/pii/S2352618115000050>.

<sup>28</sup>*Ibid.*, 21.

<sup>29</sup>Tanners were still using excrement from dogs in 1908, when the first synthetic substitute (Oropon) was patented; see *Decisions of the Commissioner of Patents and of The United States Courts in Patent and Trade-Mark and Copyright Cases* (Washington 1921) 350: “For bating hides, that is to say, for removing the lime and fatty matter from the hides after the liming process, dog manure has been used for a long time”. For ancient Jewish tanners and tanneries in Rabbinic sources, see Isaac W. Oliver, “Simon Peter Meets Simon the Tanner: The Ritual Insignificance of Tanning in Ancient Judaism”, *New Test. Stud.* 59 (2013) 50–60.

<sup>30</sup>See m. Ketubbot 7:10 according to Codex Kaufmann A 50, f. 98r (צורף הנחשת), “the refiner of copper”) and t. Ketubbot 7:11 (מצרף נחשת זה המתיר), “the refiner of copper: this refers to the smelter”). For Talmudic variants of the toseftan gloss and further discussion, see Saul Lieberman, *תוספתא כפשוטה* (New York 1967) 6:302–304.

<sup>31</sup>Abhishek Tiwary and Ian Williams, *Air Pollution: Measurement, Modelling and Mitigation* (4th ed.; Boca Raton 2019) 452.



and disgust is the “coppersmith ... at the opening of his smelting oven”, who “stinks (*ḥnš*) more than roe (lit., fish eggs; *swḥ.wt rmw.w*)”<sup>32</sup>. Many students of the text have been puzzled by the comparison with the odor of roe. Peter Seibert notes that the received text implies that the smell of fish eggs is worse (or significantly different) than the smell of fish itself, “which is simply not correct”<sup>33</sup>. As a result, various emendations (implicit and explicit) have been adopted, including a correction to “fish excrement” (*ḥs rmw.w*)<sup>34</sup>. However, there is no need for emendation if the passage is understood as alluding to the smell of H<sub>2</sub>S released by huge masses of eggs spawned by fish in the Nile that wound up decomposing on its banks. One should not forget that a single female Nile Perch (which spawns several times per year) can produce up to 16 million eggs at a time<sup>35</sup>. This explanation was suggested to me by a news report of “a revolting stench overpowering a Vancouver Island community” during “a historic year for herring spawning” resulting from “rotting herring roe eggs” on the local beach, “releasing hydrogen sulphide as they break down”<sup>36</sup>.

In the Bible, by contrast, we find the stench of the Nile and other rivers associated not with rotting fish *eggs* but with rotting fish itself (Exod 7:18, 21; Isa 50:2). Here, again, the culprit is presumably H<sub>2</sub>S, a gas that is released by putrefying fish, sometimes with fatal results<sup>37</sup>. The Hebrew root used in these examples, ש-ח-ק, “stink”, is also used of the land of Egypt covered with piles of dead frogs (Exod 8:10), as well as of human corpses lying unburied (Isa 34:3; Amos 4:10; and probably Joel 2:20). Even when the root is used figuratively, the olfactory association is not lost (Exod 5:21).

<sup>32</sup>Hellmut Brunner, *Die Lehre des Cheti, Sohnes des Duauf* (Glückstadt 1944) 22, 28; Wolfgang Helck, *Die Lehre des Dw<sup>1</sup>-Ḥtj* (Wiesbaden 1970) 1:38; Stephan Jäger, *Altägyptische Berufstypologien* (Göttingen 2004) 132–33; Stephen Quirke, *Egyptian Literature 1800 BC: Questions and Readings* (London 2004) 121; and *Thesaurus Linguae Aegyptiae*. <https://aaww.bbaw.de/tla/servlet/GetTextDetails?u=guest&f=0&l=0&db=0&tc=1047>.

<sup>33</sup>Peter Seibert, *Die Charakteristik: Untersuchungen zu einer altägyptischen Sprechsitte und ihren Ausprägungen in Folklore und Literatur* (Wiesbaden 1967) 114.

<sup>34</sup>*Ibid.*; and Helck, *Lehre*, 38.

<sup>35</sup>Richard Ogutu-Ohwayo, “Reproductive Potential of the Nile Perch, *Lates Niloticus L.* and the Establishment of the Species in Lakes Kyoga and Victoria (East Africa)”, *Hydrobiologia* 162 (1988) 193–200.

<sup>36</sup>See <https://vancouverisland.ctvnews.ca/it-s-really-bad-smell-of-decomposing-fish-eggs-overpowers-vancouver-island-town-1.3412149>. I subsequently found virtually the same explanation in Hellmut Brunner’s review of Seibert, *Charakteristik in: Bibliotheca Orientalis* 26 (1969) 71: “However, fish often lay their eggs on the shore just below the surface of the water so that, when the water level drops, they are exposed to the air and decompose. The stench of roe was, therefore, probably a typical experience for the Egyptians”.

<sup>37</sup>Sadaf Sheikh et al., “Hydrogen Sulfide Gas Poisoning in [a] Fish Garbage Room: A Report of a Fisherman”, *Journal of the Pakistan Medical Association* 67 (2017) 1097–1099. <https://pubmed.ncbi.nlm.nih.gov/2877089/>.

Another source of H<sub>2</sub>S malodor mentioned in ancient sources is hydrothermal gas, emanating from hot sulfur springs. As we shall see below, Strabo speaks of “boiling streams, stinking (δυσώδεις) from afar” and “hot springs containing asphalt and sulfur” in the vicinity of the Dead Sea. The H<sub>2</sub>S from sulfur springs played a significant role in ancient Roman religion. Servius, in his commentary on Vergil’s *Aeneid* (7.81), equates the vapor of a sacred sulfur spring mentioned there with the goddess Mefitis: *mephitis proprie est terrae putor, qui de aquis nascitur sulphuratis.... Mephitis dea odoris gravissimi....* “Mefitis is, properly speaking, the stench of the earth, arising from (lit., born of) sulfurous waters.... Mefitis is a goddess with (or: the goddess of) a most powerful odor...”<sup>38</sup>. Based on this passage, Mefitis is sometimes called the “goddess of stench”<sup>39</sup>. Servius (commenting on *Aen.* 7.563) provides a dramatic description of the valley of Ampsanctus, where the most famous of Mefitis’s sanctuaries was located:

hunc locum umbilicum Italiae chorographi dicunt.... habet aquas sulphureas, ideo graviore, quia ambitur silvis. ideo autem ibi aditus esse dicitur inferorum, quod gravis odor iuxta accedentes necat, adeo ut victimae circa hunc locum non immolarentur, sed odore perirent ad aquam adplicatae....

Geographers call this place the “navel of Italy”.... It has sulfurous waters that are more powerful (in their odor) because the place is surrounded by forests. For the same reason, the place is said to be the entrance to the underworld because the powerful odor kills those who draw near, so much so that sacrificial victims are not immolated around that place, but rather perish from the odor when brought to the water<sup>40</sup>.

Also worthy of mention is a comment in Genesis Rabba (par. 51), with parallels in later midrashim: “People smell sulfur (גפריה) and their soul recoils”. This statement needs interpretation because pure sulfur is odorless. It is possible that this refers to H<sub>2</sub>S; however, the statement is presented as a

<sup>38</sup>This translation is mine.

<sup>39</sup>See, for example, *Encyclopaedia Britannica* (3<sup>rd</sup>ed.; Edinburgh 1797) 1:633 s.v. *Ampsancti*; and Ingrid Edlund-Berry, “Hot, Cold, or Smelly: The Power of Sacred Water in Roman Religion, 400–100 B.C.E.”, in: Celia E. Schultz and Paul B. Harvey (eds.), *Religion in Republican Italy*, (Cambridge 2006) 176.

<sup>40</sup>*Ibid.*, 177–78. I have revised Edlund-Berry’s translation. For French translations of the passages cited here, see Olivier de Cazanove, “Le lieu de culte de Méfitis dans les *Ampsancti ualles*: des sources documentaires hétérogènes”, in: Olivier de Cazanove and John Scheid (eds.), *Sanctuaires et sources* (Naples 2015) 145–181. Cf. Henry Swinburne, *Travels in the Two Sicilies* (Dublin 1783) 1:129: “A most nauseous smell rising with the steam obliged us to watch the wind, and keep clear of it, to avoid suffocation”. For the toxicity of sulfur springs, see also at and in n. 21 above.

comment on the phrase שָׁרִית וְאֵשׁ, “sulfur and fire” in Gen 19:24<sup>41</sup>. Thus, the reference may be to the pungent smell of sulfur dioxide—the principal gas released by burning sulfur—rather than the putrid smell of hydrogen sulfide.

In any event, it seems clear that the odor of H<sub>2</sub>S was considered disagreeable already in ancient times. This is, perhaps, not surprising given the association of this gas with death—both as a cause of the latter and as a result. Put differently, H<sub>2</sub>S is a killer that reproduces through the putrefaction of its victims. Some have gone further, suggesting that H<sub>2</sub>S is “the root cause for multiple mass extinctions on earth”<sup>42</sup>.

### **Zarethan: A Transjordanian Town Named for the Smell of its Industrial Air Pollution**

In 1 Kgs 7:45–46, we read that the copper or bronze vessels for Solomon’s Temple were cast in the Jordan Valley, between the Transjordanian towns of Zarethan (זָרְתָן) and Succoth<sup>43</sup>. Huge furnaces from the Iron I period, used for smelting copper (Franken) or melting and casting it (Steen), were found in the excavation of Tell Deir ‘Allā<sup>44</sup>, which is identified by many with Succoth, following the Palestinian Talmud (Sheviit 9.2.38d, according to Ms. Leiden): סכות דרעלה<sup>45</sup>.

Chemical analysis of a copper ingot from the excavation revealed the presence of sulfur and copper sulfide<sup>46</sup>. The process that produced that ingot would have included a roast that released at least two sulfurous offgases: sulfur dioxide and (in smaller quantities) hydrogen sulfide (H<sub>2</sub>S)<sup>47</sup>. Today these

<sup>41</sup>This may be a hendiadys meaning “fiery sulfur” or “sulfur fire”; cf. Akk. *išāt kibrīti*, “sulfur fire”.

<sup>42</sup>Wang, “Physiological Implications”, 792; cf. 797.

<sup>43</sup>For discussion and literature, see Henry O. Thompson, “Zarethan”, in: *ABD* 6:1041–43; and add Hermann Guthe, “Zarethan und die Erzgießerei Salomos”, in: Karl Budde (ed.), *Vom Alten Testament: Karl Marti zum 70. Geburtstag gewidmet* (Giessen 1925) 96–108.

<sup>44</sup>H. J. Franken, “The Excavations at Deir ‘Allā in Jordan”, *VT* 10 (1960) 386–93; idem, *Excavations at Tell Deir ‘Alla: A Stratigraphical and Analytical Study of the Early Iron Age Pottery* (Leiden 1969) 5–7, 19–22, 34–40; idem, “Deir ‘Alla, Tell: Archaeology”, in: *ABD* 2:128 and Eveline J. van der Steen, “Tell Deir ‘Alla: The Newcomers of the Early Iron Age”, in: Margreet L. Steiner and Eveline J. van der Steen (eds.), *Sacred and Sweet: Studies on the Material Culture of Tell Deir ‘Alla and Tell Abu Sarbut* (Leuven 2008) 78–80, 87–89.

<sup>45</sup>Jo Ann H. Seely, “Succoth”, in: *ABD* 6:218; cf. Yoel Elitzur and Chaim Ben David, “Deir in Hebrew, Aramaic, and Arabic, and Toponyms of the Deir-X Type” (in Hebrew), *Cathedra* 123 (2007) 19 n. 31.

<sup>46</sup>Itzhak Roman, “Copper Ingots”, in: Benno Rothenberg (ed.), *The Ancient Metallurgy of Copper* (London 1990) 179.

<sup>47</sup>W. Rostoker, “Some Experiments in Prehistoric Copper Smelting”, *Paléorient* 3 (1975–1977) 311–15; and Krishna Parameswaran, et al., “Energy Requirements in Copper

gases are viewed as “two major sulfur-containing air pollutants ... [which] cause great environmental concern”<sup>48</sup>. H<sub>2</sub>S must have been a source of air pollution in ancient times, as well, but I have found no modern discussions of this problem<sup>49</sup>.

In short, it seems likely that the town of Zarethan got its name from the foul smell of H<sub>2</sub>S that characterized its industrial pollution. Just as the etymological meaning of ציידן (the Aramaic name for Sidon) is something like “Fishington” (or, theoretically “Huntington”<sup>50</sup>, the etymological meaning of צרתן appears to be something like “Stinkington”<sup>51</sup>.

### **Zereth-Shahar: A Transjordanian Town Named for the Smell of its Hot Sulfur Springs**

The second toponym derived from צרת השחר is צרת השחר or, to cite the full designation of the place in Josh 13:19, צרת השחר בהר העמק. We know three things about the place to which this toponym refers: (1) it belonged to the tribe of Reuben; (2) it was originally part of Moab; and (3) it was located

Extractive Metallurgy”, in: David B. George and John C. Taylor (eds.), *Copper Smelting, an Update: Proceedings of a Symposium Sponsored by the Pyrometallurgical Committee of the Metallurgical Society of AIME, at the 111th AIME Annual Meeting, Dallas, Texas, February 14–18, 1982* (New York 1981) 305.

<sup>48</sup> Wang, et al., “Desulfurization”, 36.

<sup>49</sup> See, for example, E. Borsos, et al., “Anthropogenic Air Pollution in the Ancient Times”, *Acta Climatologica et Chorologica* 36–37 (2003) 5–15. The discussion of copper smelting on pp. 12–14 deals with copper particles polluting the atmosphere, but says nothing about H<sub>2</sub>S.

<sup>50</sup> See my “On the Monophthongization of \*ay to ī in Phoenician and Northern Hebrew and the Preservation of Archaic/Dialectal Forms in the Masoretic Vocalization”, *Orientalia* 76 (2007) 74–77.

<sup>51</sup> The etymological vowel pattern and noun class of צרתן are unclear. One possibility is \*CuCCān. The spirantized /t/ does not conclusively refute this possibility, since /t/ does not always block post-vocalic spirantization. In other words, it is possible that צרתן is like צרתן, which appears to be an example of \*CuCCān, judging from (1) its pointing in the Babylonian tradition; and (2) a word play in the Babylonian Talmud; see Israel Yeivin, *The Hebrew Language Tradition as Reflected in the Babylonian Vocalization* (Jerusalem 1985) 1045 with n. 19 (in Hebrew). Another possibility is \*CāCiCān. This possibility is suggested by (1) the writing צרתן, with a ga'ya, in Josh 3:16; and (2) the (non-Tiberianized) Babylonian pointing of צרתנה (1 Kgs 4:12) with /ā/ in the first syllable rather than /u/; see *ibid.*, 1098. According to this analysis, the pattern of צרתן is the same as that of Aram. סרבן, “intransigent” (Tg. Onqelos to Num 17:25, 20:10), viz., a participial pattern plus the suffix -ān; see Gustaf Dalman, *Grammatik des Jüdisch-Palästinischen Aramäisch*, (2nd ed.; Leipzig 1905) 175. The corresponding pattern in Mishnaic Hebrew (as vocalized in reliable manuscripts) has a *holam* in the first syllable, e.g., סורבן, “intransigent” (m. Berakhot 5:3, acc. to Codex Parma 3173, f. 2r), “murderers” (m. Soṭah 9:9, acc. to Codex Kaufmann A 50, f. 122v) and דורשנים, “expounders, interpreters” (m. Soṭah 9:15, acc. to Codex Kaufmann A 50, f. 123r). For the origin of this pattern (with bibliography), see Joshua Blau, “On the Border between Mishnaic Hebrew and Aramaic (A Possible Abstract Grammatical Borrowing)”, in: Moshe Bar-Asher (ed.), *Studies in Hebrew and Jewish Languages Presented to Shelomo Morag* (Jerusalem 1996) 77 with n. 19 (in Hebrew).

בְּהַר הָעֵמֶק, which probably means that it was situated on a hill—or in the hill country—overlooking the Jordan valley<sup>52</sup>. Based on these facts, it is quite possible that Zereth-Shahar was on a hill adjacent to the eastern shore of the Dead Sea<sup>53</sup>. That shore is the site of the al-Zārā (الزَّارَا) geothermal spring area of Jordan—not to be confused with the transcription *Zereth*, where the *z* renders /s/.

Several students of these hot springs and the ones in *Mā'īn* (ماعين), ca. 5 km to the northeast<sup>54</sup>, have mentioned the odor of hydrogen sulfide that wafts from them:

The Zarqa Ma'in and Zara springs are extremely hot (45 to 64 Centigrade) and also very high in mineral salt content. They contain a substantial amount of hydrogen sulfide, which emits into the surrounding atmosphere a distinctive odor...<sup>55</sup>.

The Zara thermal spring area lies ... some 100–1000 m to the east of the Dead Sea shore.... It includes together 26 thermal springs within the Zara area. The estimated total discharge into the Dead Sea is about 17 MCM/a including the fresh water of some springs in the area. H<sub>2</sub>S is discharged with the water, and gives the area its distinctive smell<sup>56</sup>.

<sup>52</sup>J. Andrew Dearman, “The Levitical Cities of Reuben and Moabite Toponymy”, *BASOR* 276 (1989) 60; cf. Burton MacDonald, “East of the Jordan”: Territories and Sites of the Hebrew Scriptures (Boston, 2000) 137.

<sup>53</sup>Contra August Strobel and Stefan Wimmer, *Kallirrhöe* (‘Ēn ez-Zāra): Dritte Grabungskampagne des Deutschen Evangelischen Instituts für Altertumswissenschaft des Heiligen Landes und Exkursionen in Süd-Perāa (Wiesbaden 2003) 84–88, where Zereth-Shahar is identified with Bōz el-Mushelle, 8 km inland from the Jordan valley. This identification takes בְּהַר הָעֵמֶק as meaning “on the hill in the valley” (ibid., 85, 89; cf. 84), i.e., on the spur protruding into the valley (ibid., 84). However, the “valley” into which Bōz el-Mushelle protrudes is a *wādī* (Wādī el-Zarqā’-Mā’īn; ibid., 84), for which the Hebrew term is normally נַחַל, not עֵמֶק. The identification with Bōz el-Mushelle also necessitates a different etymology for צָרָה than the one proposed in the present essay. Thus, Stefan Wimmer suggests that צָרָה may be a feminine noun derived (1) from the noun צוּר, “rock”; or (2) from the adjective צָר, “narrow”, yielding the meaning “narrow place”; see his “*Šeret haš-Sahar be-har ha-‘ēmeq* (Jos 13,19)”, *BN* 103 (2000) 40. Derivation (2) is problematic because the word for “narrow place” in Hebrew is מְצָר and because the adjective צָר is derived from a geminate root and, thus, would not normally take the *-t* allomorph of the feminine ending in the absolute state; for rare examples in the *construct* state, see Steiner, “Vowel Syncope”, 380–81. Derivation (1) is also problematic. No obvious feminine forms of צוּר and its cognates in Aramaic, Ugaritic, and Sabaic are attested. (As for Arabic *طور*, cited by Wimmer [ibid., 40] as a cognate of צוּר, the evidence of Ugaritic and Sabaic confirms that it is rather a borrowing of Aramaic *טור*, as argued by Arthur Jeffery, *The Foreign Vocabulary of the Qur’ān* [Baroda, India 1938] 206–207.) Moreover, if there were a feminine form of צוּר with the *-t* allomorph, it would normally be צָרָת\* rather than צָרָה; cf. בּוּשָׁה ~ אֶשְׁמֹרֶת ~ בִּשְׁת ~ בּוּשָׁה, etc.

<sup>54</sup>Danny Ionescu, et al., “The Cyanobacterial Community of the Zerka Ma’in Hot Springs, Jordan: Morphological and Molecular Diversity and Nitrogen Fixation”, *Algological Studies* 130 (2009) 109, 110.

<sup>55</sup>Elias Salameh, “Jordan’s Curative Waters”, *Jordan Winter* 1984/1985, 27; cited in Strobel and Wimmer, *Kallirrhöe*, 54.

<sup>56</sup>Joseph Saman, “The Properties of the Curative Water and its Uses for Therapeutical

Especially at the hotter springs ... a weak to strong hydrogen sulfide smell was noticed<sup>57</sup>.

According to Strabo (*Geography*, 16.2.44), the region of the Dead Sea is fiery, as evidenced by *δυσώδεις πόρρωθεν ποταμούς ζέοντας*, “boiling streams, stinking from afar” and the oft-repeated assertions of the local inhabitants that *ἀναφυσημάτων πυρὸς καὶ θερμῶν ὑδάτων ἀσφαλτωδῶν τε καὶ θειωδῶν*, “eruptions of fire and hot springs containing asphalt and sulfur” caused the lake to burst its bounds, bringing about the destruction of cities around Sodom. We may assume that the “hot springs containing ... sulfur” are the sources of the “boiling streams, stinking from afar” that still pour into the Dead Sea<sup>58</sup>. This is invaluable testimony from an ancient source that the region of the hot sulfur springs was known for its foul odor. It is, therefore, reasonable to suppose that the first component of the toponym *צַרְתַּר הַשְּׁחָר* alludes to that smell. One may compare the hot sulfur springs in Utah named *Stinky Springs* after the smell of hydrogen sulfide gas in the water<sup>59</sup>.

According to the Masoretic text and the Vulgate, the full name of the place is *צַרְתַּר הַשְּׁחָר* = Sarathasar<sup>60</sup>. This name is reminiscent of English phrases such as *morning gas* and *early-morning flatulence*, which refer to a natural process that occurs when a person gets up in the morning, viz., release of gas (especially hydrogen sulfide) that accumulates in the rectum during sleep. This release is the subject of one of Aesop’s fables: “In his fable entitled *Lupi Infortunium*, Aesop relates how a wolf interprets his early-morning flatulence as a sign of good luck (in reality, he is to encounter nothing but calamities all day long)”<sup>61</sup>. In that fable, we find Latin *pepedit*, “he passed gas”, collocated with *diluculo*, “at dawn”<sup>62</sup>. This collocation sheds light on the phrase *צַרְתַּר*

Treatment in Jordan”, *Berichte der Geologischen Bundesanstalt* 50 (2000) 33. [https://www.zobodat.at/pdf/BerichteGeolBundesanstalt\\_50\\_0029-0037.pdf](https://www.zobodat.at/pdf/BerichteGeolBundesanstalt_50_0029-0037.pdf). (I have corrected minor errors in this passage.)

<sup>57</sup> Rafael Schäffer and Ingo Sass, “The Thermal Springs of Jordan”, *Environmental Earth Sciences* 72 (2014) 178.

<sup>58</sup> See the map published by Schäffer and Sass (“Thermal Springs”, 178 fig. 5) showing many spring-fed streams flowing down into the Dead Sea.

<sup>59</sup> See <https://www.deseret.com/2000/12/13/19543960/stinky-springs-set-to-reopen-despite-warnings-of-risks>.

<sup>60</sup> The Septuagint reads two toponyms here. According to A, they are *Σαρθ* and *Σιωρ*. It is tempting to conjecture that the transcription *Σιωρ* was influenced by *הַשְּׁחָר עַל-פְּנֵי מִצְרַיִם*, a few verses earlier (13:3); however, *Σιωρ* does not appear in that verse. Was it there in an earlier version of the translation?

<sup>61</sup> Donald McGrady, “The Sospiros of Sancho’s Donkey”, *MLN* 88 (1973) 336. For an alternate name of the fable, see the next footnote.

<sup>62</sup> *De lupo pedente*, “on the wolf that passed gas”, in: Heinrich Steinhöwel (ed.), *Esopi appologi sive mythologi cum quibusdam carminum et fabularum additionibus Sebastiani Brant* (Basel 1501) image 158: *Lupus surgens summo diluculo de cubili suo: cum se extenderet pepedit*



הַשְׁחָר because *diluculum* is semantically equivalent to הַשְׁחָר, and *pepedit* < *pēd-* “pass gas” is semantically equivalent to ט-ר-צ < ח-ר-צ, “pass gas”.

### **Medeba: A Transjordanian Region Named for the Healing Powers of its Hot Sulfur Springs**

As noted above, recent research has shown that hydrogen sulfide has therapeutic properties in addition to its toxic ones<sup>63</sup>. This finding brings modern medical science a bit closer to the ancient view of hot sulfur springs. As we have seen, the toxic nature of the gases that emanate from such springs was well known to the Romans. Nevertheless, during the Roman and Byzantine periods, there was a health spa on the eastern shore of the Dead Sea, in what today is known as the al-Zārā geothermal spring area of Jordan. The spa was named Callirrhoe, a name that appears as קלִירְהַי in many Palestinian Jewish sources and is identified by them—and by Jerome—with the place called Lasha in Gen 10:19<sup>64</sup>. Because the waters of Callirrhoe were believed to have healing powers, the physicians of Herod the Great brought him there during his final illness, in a vain attempt to cure him<sup>65</sup>.

There is one Semitic toponym that seems to allude to the therapeutic value of the hot sulfur springs east of the Dead Sea, rather than their stench: מְיַדְבָּא. The latter is the name of the major town closest to the geothermal springs known today as *Ḥammāmāt Māʿīn* (מעין < מאעין, “spring”?), ca. 27 km. away. As noted above, these springs are located ca. 5 km. northeast of the al-Zārā hot spring area. In ancient times, מְיַדְבָּא was probably also the name of the region that included both the town and the thermal springs, just as, in modern Jordan, *Mādabā* (مادبا) is the name of the governate that includes both the city of *Mādabā* and *Ḥammāmāt Māʿīn*.

*et ait...*, “The wolf arose at dawn from his resting-place; while stretching, he passed gas and said...”. <https://www.loc.gov/resource/rbc0001.2004rosen0889/?sp=158>

<sup>63</sup> See n. 22 above.

<sup>64</sup> Herbert Donner, “Kallirrhöe: Das Sanatorium Herodes’ des Großen”, *ZDPV* 79 (1963) 59–89. For more on the ancient history and archaeology of this spa, see Strobel and Wimmer, *Kallirrhöe*; and Estee Dvortjetski, *Leisure, Pleasure and Healing: Spa Culture and Medicine in Ancient Eastern Mediterranean* (Leiden 2007) 21–26, 167–97. The earlier history sketched by Dvortjetski is largely uncertain.

<sup>65</sup> See Josephus, *Antiquities* 17.6.5 §171; *ibid.*, *War* 1.33.5 §657; and Pliny the Elder, *Natural History*, 5.72: *calidus fons medicae salubritatis callirrhoe*, “a hot fountain of medicinal healthfulness, Callirrhoe”.

The name מִי־דָבָא is composed of the words מים and דבא<sup>66</sup>. The latter word, occurring in דָבָאָךְ (Deut 33:25), has been understood to mean “strength” since the time of the Greek and Aramaic versions. Ugaritic *db’at* has been understood that way, as well<sup>67</sup>. Thus, those who have taken מִי־דָבָא to mean “water of strength”<sup>68</sup> would seem to be on the right track. The blessing וְיִמְיֶךָ דָבָאָךְ in Deut 33:25 presumably means “and may your vigor last as long as your days”<sup>69</sup>. Thus, I would render מִי־דָבָא as “waters of vigor”, alluding to the belief that the hot springs east of the Dead Sea had the power to restore vigor to the old and infirm—people like Herod.

In the Mesha inscription, מִי־דָבָא appears as מהדבה. The first *h* in that form may be compared to the *h* in Ugaritic *mh* ~ *my* “water” and perhaps also the one in Arabic *miyāh* and *’amwāh* “waters”. The second *h* in מהדבה would seem to show that Moabite, like Hebrew, elided final glottal stops.

### Conclusions

The Proto-Semitic root \**ś-r-t*, with the meaning “pass gas”, is not widely known, but its existence is made certain by an excellent set of cognates: Aramaic (Syriac) *’-r-t* (D-stem) = Arabic *d-r-t* = Modern South Arabian (Harsusi, Mehri, Šheri, Socotri) *z-r-t* = Akkadian *š-r-t/š-r-d*. Moreover, the lost Canaanite cognate has now turned up in a medieval Hebrew scroll, where we find ט-ר-צ (H-stem) referring to passing gas.

The root ט-ר-צ, from which two biblical toponyms, צֶרֶת הַשָּׁהַר, “Zereth-Shahar”, and צָרְתָן, “Zarethán”, are derived, appears to be a byform or dialectal variant of ט-ר-צ produced by the dissimilation of emphatics. The existence of the pair ט-ר-צ ~ צ-ר-ט < \**ś-r-t* is made plausible by the existence of the phonologically similar pair ט-ב-צ ~ צ-ב-ט < \**ś-b-t*. Further support comes from the Akkadian cognates, *š-r-t* and *š-b-t*, both with unemphatic /t/. In both Hebrew and Akkadian, there is also a less common reflex of \**ś-r-t* with /d/ as the third radical.

<sup>66</sup> See already Marco Marini, *Arca Noe: Thesaurus linguae sanctae novus* (Venice 1593) 108a s.v. דבא and 373b s.v. מִי־דָבָא.

<sup>67</sup> See Frank M. Cross, “Ugaritic *Db’at* and Hebrew Cognates”, *VT* 2 (1952) 162–64.

<sup>68</sup> See already Alfred Jones, *The Proper Names of the Old Testament Scriptures* (London 1856) 242 s.v. Medeba.

<sup>69</sup> Cf. the French translation of LXX’s rendering in Cécile Dogniez and Marguerite Harl (eds.), *Le Pentateuque d’Alexandrie: Text grec et traduction* (Paris 2001) 857: “et aussi longue que ses jours, sa vigueur”.



In several clinical studies of odors considered offensive today, including the smell of intestinal gas, the culprit has turned out to be H<sub>2</sub>S. The smell of that gas was viewed as repulsive in a variety of contexts (halitosis, sulfur springs, tanning of hides, smelting of copper ore, rotting of fish and roe) by ancient Egyptians, Greeks, Romans, and Jews. The odor of H<sub>2</sub>S was apparently so overpowering in two Transjordanian towns that they were named for it. At צָרַת הַשֶּׁחַר (Josh 13:19), the H<sub>2</sub>S was a natural emanation from hot sulfur springs; at צָרְתָן (1 Kgs 7:46, etc.), it was an industrial pollutant that spewed forth from copper furnaces of the type discovered (together with a copper ingot) in the vicinity. In other words, our verb appears to have broadened its meaning in the Canaanite dialect group. The oldest meaning is the one found in all of the other Semitic languages, where it refers to the release of H<sub>2</sub>S of intestinal origin. In Canaanite, it came to refer to the release of H<sub>2</sub>S of both hydrothermal origin and (perhaps subsequently) metallurgical origin.

The toponym מִיֶּדְכָא, like מַהֲדָבָה in the Mesha inscription, is derived from a phrase meaning “waters of vigor”. It seems to allude to the therapeutic value of the hot sulfur springs east of the Dead Sea, rather than their stench. The belief that these springs had the power to restore vigor to the old and infirm led the physicians of Herod the Great to bring him to the spa at Callirrhoe during his final illness.

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