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Author(s): Gene W. Heck
Source: *Journal of the Economic and Social History of the Orient*, Vol. 42, No. 3 (1999), pp. 364-395
Published by: BRILL
Stable URL: http://www.jstor.org/stable/3632396
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GOLD MINING IN ARABIA AND THE RISE OF THE ISLAMIC STATE

BY

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Abstract

The financial and economic strengths of the early Islamic state have been a source of ongoing speculation, causing some scholars to even question medieval Makkah's economic reason to exist. This article explores the role of precious metals—gold and silver—in lending vitality to the economy of Western Arabia in the formative years of the *Dār al-Islām*. Combining primary source evidence with artifacts and qualitative and quantitative analysis of mining residuals, including carbon 14 dating, it produces evidence suggesting that such metals played a far more significant role in contemporary commerce and industry than has been heretofore generally acknowledged.

The Historical Perspective

The economic dynamic that impelled the early Islamic state remains a source of current intellectual controversy. Even now, after decades of focused Western research, works continue to appear that add challenging new dimensions to scholarly debate over the incipient vitality that characterized the commerce of the fledgling Muslim empire. Most recently, Shaykh Ḥamad al-Jāsir has appended illuminating new insights into the production of precious metals in medieval Arabia in his annotated edition of al-Hamdānī's seminal work: *Kitāb al-Jawharatayn al-ʿAtīqatayn al-Māʾiʿatayn: al-Ṣafrāʾ wa al-Bayḍāʾ*. A 1991 article by Ḥusayn Ṣābir, technical advisor to the French Geological Mission to Saudi Arabia, likewise adds valuable input based on *in situ* knowledge and recent archaeological discoveries that support the evidence provided by the medieval Islamic sources.[1])

Today Arabia, which legend holds was home to the famed mines of biblical King Solomon, is experiencing a significant rebirth of this historic industrial heritage, as precious metals mining, a source of significant wealth at the time of the rise of Islam, is once again gaining attention. Currently there are 782

1) Al-Hamdānī 1987, pp. 203 ff.; Ḥ. Ṣābir 1991b, pp. 32-35.

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major known gold occurrences in the Kingdom of Saudi Arabia—in sites that usually also contain associated admixtures of silver, copper, lead, zinc, and iron ores. Of these sites, 31 are estimated to contain more than 1,000 kilograms of gold, and 99 contain gold reserves in the 100 to 999 kilogram range. Many of these deposits are extremely rich in gold content—averaging twenty to thirty-five grams per metric ton, contrasted with an average worldwide yield of about 7 grams.[2])

The Saudi Directorate General for Mineral Resources, in fact, has identified more than 800 potentially commercially viable hard mineral sites in modern Saudi Arabia. At many of the sites identified, there is clear geological evidence confirming previous mining activities. Indeed, more than 1,000 locations in Western Arabia show signs of historic mining. Carbon 14 datings from wood residuals at the smelters that supported these mining operations indicate that many of these activities dated to the classic period of Islam.[3]) Currency minting operations also may have taken place using the ore yields of these sites. Suggestive of this possibility, an Umayyad coin dating to the year 105/724, includes the phrase: "the mine of the Commander of the Faithful in the Ḥijāz." There are likewise numerous contemporary copper coins (*fulūs*) bearing the same inscription.[4])

Currently, several of these sites are under active development. Operations at Mahd al-Dhahab commenced in 1990. The production of this mine, believed to contain 1.1 million tons of ore, is projected to reach 2.5 metric tons of gold per year. The Ṣukhaybarāt mine, situated 187 miles east of al-Madīnah on the historic Arabian commercial route to Iraq, also started up in September, 1991. Its ore reserves are assessed at 8.4 million tons. Though its annual production was originally estimated at 3,300 pounds of gold, more than thirteen tons of gold already had been produced by the close of 1996—valued at nearly $155 million at then current global market prices. Mining activities at this location are expected to extend over a 13 year period, and two other medieval mines, al-ʿAmār and al-Ḥajar, are scheduled to re-commence production by the year 2000.[5])

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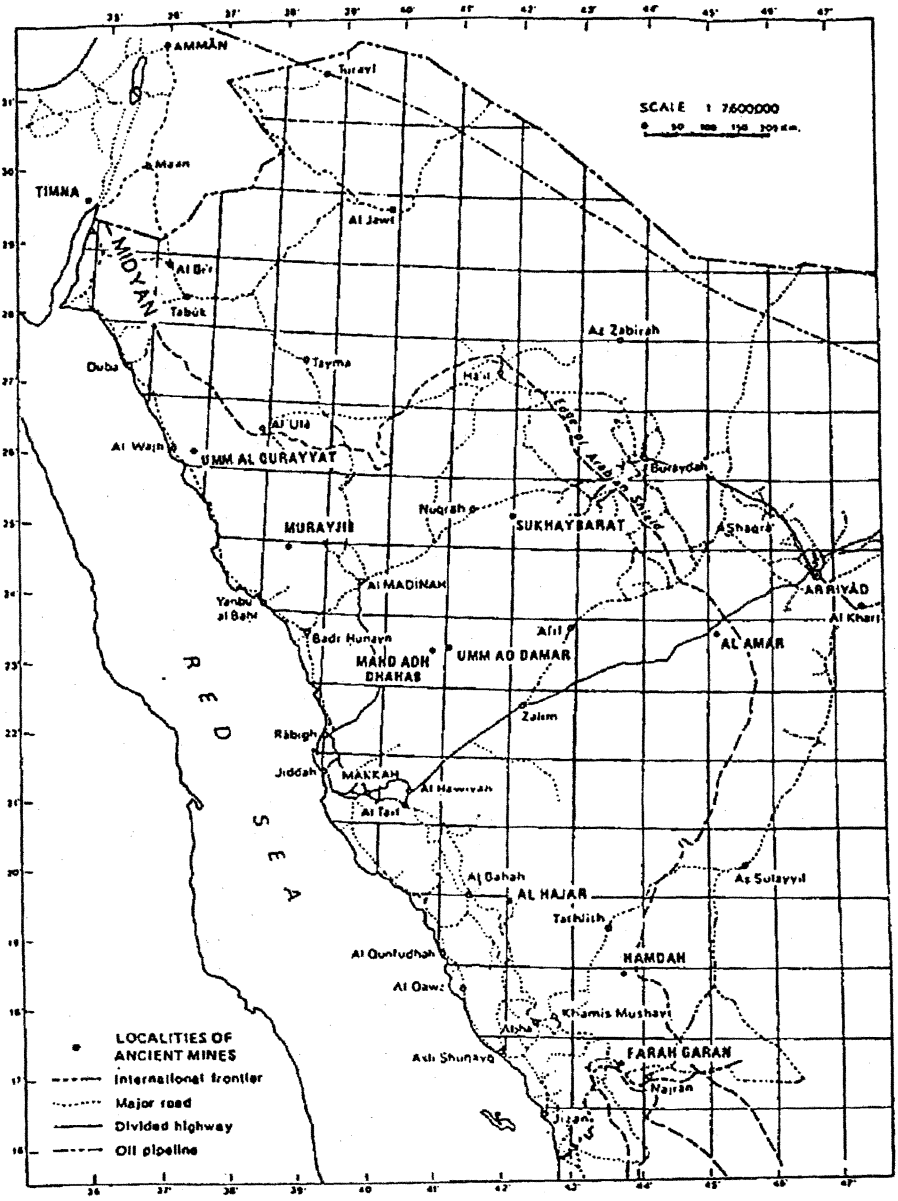
2) *Arabs News*, June 15, 1991, p. 2; *International Petroleum and Minerals Statistical Handbook—1990*, passim; Saudi Ministry of Petroleum and Mineral Resources in-house data. Official assays at Mahd al-Dhahab for instance, fix ore yields at 26-35 grams of gold, 72 grams of silver, 0.65% copper, and 2.46% zinc per metric ton.

3) Compare Watts, Griffis, and McOuat 1982, p. 2.

4) G. Miles 1948, p. 102; M. Casanova 1920, passim; S. al-Rāshid 1980, p. 128; M. Shammā 1976, pp. 106-109.

5) R. Goldsmith 1971, pp. 26 ff.; Naval Intelligence Division 1946, p. 517; *Arab News* Jiddah, Saturday, February, 19, 1990, p. 2; Watts, Griffis, et al. 1990, passim; *Arab News*, Jiddah, August 2, 1996, p. 2; Saudi Ministry of Petroleum and Mineral Resources geologic maps; on the Makkah-Baṣrah route, see al-Ḥarbī 1981, pp. 572-608; Ibn Khurradādhbih 1889, p. 128; al-Iṣfahānī 1968, p. 376; Ibn Rustah 1892, pp. 180-181; S. al-Rāshid 1980, pp. 28 ff.;

MAP A
Active Mining Sites of Medieval Arabia



Leasing licenses similarly have recently been granted to commence operations at a site known as "*al-Maṣāniʿ*," meaning "the factories"—so-called for its proliferation of medieval smelting operations—located in Wadi Ṣaʿdah, 75 miles northwest of Najrān (at 18 degrees, 8 minutes N latitude, 43 degrees, 51 minutes E longitude) on the key inland medieval commercial route connecting Makkah with Yemen. It is estimated to contain some 8.5 million tons of gold, silver, zinc, and copper ore, requiring 17 years of production employing current technologies.[6]) Development licences likewise are pending at Ḥamḍah, Jabal Sayyid, and Bulgah; and another historic mine in this region—called *al-Maʿmalah*, also meaning "factory"—is also currently under active exploration. It is located in Wādī Turabah, on al-Ṭāʾif-al-ʿAqīq road (at 21 degrees, 4 minutes N latitude; 41 degrees 20 minutes E longitude), and is believed to contain 960,000 metric tons of ore. In all, the Kingdom is estimated to possess more than 20 million tons of commercially exploitable gold ore.[7])

That Saudi Arabia should now emerge as a major hard minerals producer, however, should come as no surprise to serious students of the region's history. The ancient and medieval sources abound with references to such mining activities. The classical Greek, Roman, and Persian sources, among them Agatharchides,[8]) Pliny,[9]) Strabo,[10]) Polybius,[11]) and Diodorus Siculus,[12]) all attest to the abundance of gold and silver on the Arabian Peninsula in their eras. The latter states that Arabian gold was so pure that no smelting was necessary. Biblical Midian, a region historically legendary for its gold, was situated in the region surround-

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G.C. Miles 1948, pp. 106-109. An inscribed stone found in the residual medieval gold tailings at Mahd al-Dhahab by geologist K.S. Twichell in the 1940s reads:

"In the name of God, the Merciful, the Compassionate, ʿAbd Allāh Jaʿfar, the Imām al-Muqtadir bi-Allāh, Commander of the faithful, may God preserve him, ordered the minister al-Ḥasan ʿAlī b. ʿIsā, may God perpetuate his great work, to build a wide highway for the pilgrims of God's house, with the hope of earning a rich reward from God. This work was administered by the judge Muḥammad b. Mūsā, may God exalt him, and carried out by Abū Aḥmad b. ʿAbd al-ʿAzīz and Muṣʿab b. Jaʿfar al-Zubayrī in the year 304 (916)."

6) *Ibid.*; on the historic Ṣanʿā-Makkah inland trade route, see al-Hamdānī 1977, pp. 185-187; al-Ḥarbī 1981, pp. 643-645; Qudāmah b. Jaʿfar 1889, pp. 191-192; al-Muqaddasī 1906, pp. 111-112; al-Hamdānī 1987, p. 299, describes "maʿdin al-Hujayrah" as being in this vicinity in the area between Marīʿ and Tathlīth; "More than 1000 Mines Found," *Arab News*, Jiddah, December 5, 1996, p. 2; *Arab News*, Jiddah, February, 19, 1990, p. 2.

7) Geologic Map of al-Maʿmalah Area n.d., Directorate General of Mineral Resources, Saudi Ministry of Petroleum and Mineral Resources; *U.S. Embassy Commercial Guide* (Riyadh, 1998), passim; *Arab News* (Jiddah, 1998), p. 2.

8) Agatharchides, in Photius 1974, vol. 7, fol. 95 ff.

9) Pliny 1938-1962, vol. 6, p. 161.

10) Strabo 1917-1932, vol. 16, 4:26.

11) Polybius 1922-1927, vol. 13, p. 9.

12) Diodorus Siculus 1933-1967, vol. 19, 95:3.

ing modern Tabūk. The 4th/10th century Yemeni geographer, al-Hamdānī, indicates that the Sāsānids mined silver in the Najd and the Yemen, and even opened up an overland route through central Arabia to transport silver from the region back to Persia.[13])

Indeed, among the Arabo-Islamic sources, there are quite incredible claims of widespread precious metals availability, suggesting that they permeated medieval Ḥijāzī lifestyles. Ibn Ḥanbal, in discussing the entrepreneurial prowess of famed Companion of Prophet Muḥammad, ʿAbd al-Raḥmān b. ʿAwf, for example, asserts that it was impossible for him to lift a stone in the Ḥijāz without finding gold and silver. Others, among them al-Ṭabarī and al-Muqaddasī, indicate that precious metals were a major source of wealth and commerce for Makkan businessmen.[14]) Ibn Isḥāq openly asserts that silver was the prime economic impetus of the al-Quraysh: "*wa ḥayya ʿuẓm tijāratihim*;" whereas others such as Ibn al-Athīr suggest that gold and silver were foremost components of Arabian northbound trade.[15]) In alluding to the proliferation of precious metals in the Ḥijāz, the *Qurʾān* laments the attractiveness of gold and silver for the masses—and explicitly warns that those who hoard these metals, rather than putting them to productive use, will suffer God's everlasting wrath.[16])

Similar claims extend to documentary contentions attesting to the buoyancy of contemporary commerce. Seventy Makkan prisoners captured by Companions of the Prophet at the "Battle of Badr" reportedly ransomed themselves by paying 4,000 silver dirhams each, for a total of 280,000 dirhams. The Makkans financed their campaign against the Muslims at the "Battle of Uhud" at a cost of 50,000 gold dīnārs. Al-Wāqidī describes a Ḥijāzī commercial caravan bound for Syria wherein members of the banū Makhzūm tribe were carrying 4,000 mithqāls of gold; members of the banū ʿAbd Manāf 15,000 mithqāls of gold; and two individuals, al-Ḥārith b. ʿĀmir b. Nawfal and Umayyah b. Khalaf, were each carrying 1,000 mithqāls of gold.[17]) In another instance, Abū Baqāʾ Ḥibatallāh relates the amazement of a medieval customs official upon discovering:[18])

> A Quraysh caravan coming to Syria to trade without gold? That is not possible!

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13) Al-Hamdānī 1987, pp. 13, 87 ff.

14) Ibn Ḥanbal 1895, vol. 3, p. 271; al-Ṭabarī 1881, vol. 1, pp. 1374-1375; al-Muqaddasī 1906, pp. 101-102.

15) *Sūrat Ibn Isḥāq* 1976, no. 500; Ibn al-Athīr 1985, vol. 2, pp. 145-146.

16) *Qurʾān*, Sūrahs III:12, 85; IX:34.

17) Al-Wāqidī 1965, vol. 1, pp. 27 ff.; F. ʿAlī Riḍā 1979, pp. 160-62.

18) Abū Baqaʾ Ḥibatallāh, *Al-Manāqib al-Mazyadīyah*, British Museum, ms. add. 23, fol. 23; ibidem. 1984, vol. 1, p. 67.

He also notes that the Ghassānids transacted commerce with Ḥijāzī merchants using gold as the currency basis for their transactions.[19])

Al-Wāqidī and Zubayr ibn Bakkār, in turn, assert that Caliph ʿUmar I, prior to his caliphal appointment, had engaged in gold transactions between the Ḥijāz and Syria.[20]) Al-Wāqidī, Ibn Saʿd, Ibn Hishām, and al-Balādhurī refer to a raid conducted by Prophet Muḥammad at al-Qaradah in the Najd in Jumādā II, 3/December, 624. This attack occurred on a Makkan commercial caravan led by Umayyad chieftain Abū Sufyān travelling to Iraq on the famed Darb Zubaydah pilgrimage route, wherein Muslim troops captured over 300 mithqāls of gold and silver. This sum, though again quite large, may not be surprising. As the sources indicate that Abū Sufyān customarily carried substantial quantities of precious metal bullion with him on his trading expeditions to Syria and Iraq.[21])

Three years after al-Qaradah incident, in 6/627, Prophet Muḥammad's forces at al-ʿĪṣ once again intercepted a Syrian-bound caravan laden with silver.[22]) Al-Wāqidī and Ibn Saʿd likewise describe the seizure by the Muslim forces of 4,000 ounces of silver in booty upon their victory over dissident tribes, among them the banū Ḥawāzin and banū Thaqīf, at Ḥunayn in 8/630; whereas al-Wāqidī, al-Balādhurī, and Ibn Ḥanbal relate information on numerous silver-denominated loans contracted by Prophet Muḥammad at various times from prominent Makkan citizens.[23])

Indications of such buoyant economic activity, if accurately captured in the sources, cannot have failed to occasion a significant requirement for capital liq-

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19) Ibidem, fol. 22-23; 1984, vol. 1, p. 67: "*wa kānū yaʾkhadūna shayʾan mimmā yakūnu maʿa al-tujjār min al-dhahab.*"

20) Al-Wāqidī 1965, vol. 1, pp. 27 ff., 198; al-Zubayr b. Bakkār 1996, p. 498; Abū Baqāʾ 1984, vol. 1, p. 67.

21) Al-Wāqidī 1965, vol. 1, pp. 27 ff., 198; Ibn Saʿd n.d., vol. 2, p. 36, vol. 3, p. 45; Ibn Hishām, n.d., vol. 3, p. 50, vol. 4, p. 609; al-Balādhurī 1959, vol. 1, pp. 374, 377, 398 ff.; Saudi Arabian Ministry of Petroleum and Mineral Resources Geologic Map "Mineral Locality Map of Saudi Arabia: Metalliferous Metals," Riyadh, 1982, (place 1:GM-210) indicates that the Mahd al-Dhahab mine is located approximately 170 miles northeast of Makkah at 23 degrees, 55 minutes N latitude, 40 degrees, 50 minutes E longitude, directly on the Darb Zubaydah. Queen Zubaydah, wife of ʿAbbāsid Caliph Hārūn al-Rashīd, refurbished this route over a lengthy period between the time of her marriage to that Caliph in 165/782 and her death in 216/831. (On this construction, see al-Ḥarbī 1981, pp. 282, 288-292, 303, 312, 316, 320, 333, 352, 545-62; Yāqūt 1957, vol. 2, pp. 47, 260, vol. 3, p. 132, vol. 4, pp. 160, 334, 410, vol. 5, pp. 421-22; al-Masʿūdī 1861, vol. 8, pp. 297-298; Ibn Khallikān 1948, vol. 2, p. 70; al-Azraqī 1858, vol. 1, pp. 444-45; Ibn Jubayr 1907, p. 208; Ibn Baṭṭūṭah n.d., pp. 173-175; J. ʿAlī 1970, p. 236).

22) Ibn Hishām, n.d., vol. 4, p. 609; al-Wāqidī 1965, vol. 2, pp. 553 ff., 627; vol. 3, pp. 944 ff.; Ibn Saʿd n.d., vol. 2, p. 87; al-Balādhurī 1959, vol. 1, pp. 377, 398 ff.

23) Al-Wāqidī 1965, vol. 3, pp. 944 ff.; Ibn Saʿd n.d., vol. 2, p. 152 ff.; *Qurʾān*, op. cit., 9:35; Ibn Ḥanbal 1895, vol. 3, p. 271.

uidity and, in turn, for precious metals to mint currency. Indeed, when the Islamic caliphate began to issue massive quantities of its own high quality currency, commencing with the reign of Umayyad Caliph ʿAbd al-Malik b. Marwān (d. 86/705), the mines of Arabia were exploited to meet the mounting demand for gold bullion. The demand was readily met, as such precious metals the medieval Muslims had in abundance. It was the proliferation of gold, silver, and copper in the region, in fact, that later produced the high quality tri-metallic coinage that would power the Islamic empire's monumental 2nd/8th-3rd/9th century global trade offensive. As properties such as the prodigious banū Sulaym mine, among others, continued in operation well into the 3rd/9th century.[24])

This availability of precious metals was a critical economic consideration. For because of the relative paucity of agrarian and industrial resources in the Makkan region, its imports greatly exceeded exports at the time of the rise of Islam. This imbalance created the need for voluminous supplies of bullion, at first to trade in bulk, and later to mint currency in the form of gold dīnārs, silver dirhams, and copper fulūs, to compensate for the commodity trade deficit.[25])

At the time of the rise of Islam, bulk countertrade using gold and silver bullion (*bi-l-tibr*), denominated in weights equivalent to the Byzantine gold and Sāsānīd silver currencies circulating in the Ḥijāzī marketplaces, was the prevailing commercial practice. Ibn Saʿd indicates that on one occasion, Prophet Muḥammad dispatched Shujāʿ b. Wahb al-Asadī on a mission to al-Ḥārith b. Abī Shammar bearing one hundred mithqāls of gold. Another trade transaction involving Muḥammad resulted in the delivery of twelve "*ūqīyah*" (ounces) and one "*nashsh*" of silver, equal in currency value to 500 dirhams. Indicative of the volume of such activities, economic demand soon precipitated the need for a massive bullion weight, known as the "*qinṭār*," which equaled 4,000 dīnārs, to transact contemporary commerce.[26])

One need only survey at random some of the prices cited by chroniclers to ascertain the currency demand that, according to the medieval Arabic sources, characterized Islam's commercial "Golden Age." Al-Iṣfahānī relates that horses customarily sold for 100 dīnārs. Quality clothing was equally precious. While he was governor of al-Madīnah, ʿUmar b. ʿAbd al-ʿAzīz is said to have owned a silk gown valued at 100 dīnārs and other vestments valued at 1,000 dīnārs. ʿAbd Allāh b. ʿAbbās reportedly purchased a "*thawb*" priced at 1,000 dirhams

24) Al-Ḥarbī 1981, p. 335; al-Hamdānī 1987, p. 364.
25) ʿA. al-Sayf 1983, pp. 118 ff.
26) Al-Maqrīzī 1967, pp. 4 ff.; Ibn Hishām 1955, vol. 1, p. 240; A. ʿAwḍ Allāh 1981, pp. 146-147; Ibn Saʿd n.d., vol. 1, pp. 261-262; J. ʿAlī 1970, vol. 7, p. 416.

and vestments also valued at the same amount. One prominent Ḥijāzī, ʿAbd al-Muṭṭalib b. Hāshim, grandfather of Prophet Muḥammad, was reportedly buried in clothing embroidered with 1,000 mithqāls of gold. He also gave his wife a dowry of one hundred raṭls of gold. The estate of Abd al-Raḥmān b. ʿAwf, invested primarily in gold ingots, was valued at more that 400,000 dīnārs; whereas that of Prophet Muḥammad's chancery clerk, Zayyid b. Thābit, contained an equally prodigious amount of gold bullion.[27])

There are likewise reports in the medieval sources of slaves selling for 10,000 dirhams, 40,000 dirhams, 5,000 dīnārs, and even as much as 100,000 dirhams. Muʿāwīyah b. Abū Sufyān is said to have purchased a house in al-Madīnah from Ḥuwayṭib b. ʿAbd al-Ghazzā for 40,000 dīnārs. There are reports of other houses in the region selling for 100,000 and 200,000 dirhams respectively.[28])

The brisk commerce and velocity of capital at work in the markets of the nascent Dār al-Islām also is suggested by the size and impressive aggregate commodity values of caravans engaged in Makkan trade. Al-Wāqidī and al-Ṭabarī mention one commercial caravan containing more than 2,500 camels. Another managed by ʿAbd Allāh b. Judʿān consisted of more than 2,000 camels; yet another was composed of 1,500 camels, carrying the value of 50,000 gold dīnārs in merchandise. Indeed, one wealthy trader, Abū Uḥayḥah Saʿīd b. al-ʿAbbās, in the year 6/627, had over 30,000 gold dīnārs invested in a single Umayyad caravan led by Abū Sufyān.[29])

This proliferation of precious metals also led to burgeoning jewelry-making and decorative embellishment industries throughout the region. Al-Samhūdī indicates that there were more than three hundred jewelry smiths in the Medinese suburb of al-Zuhrah alone. Indeed, they and the goldsmiths of Fadak and Khaybar were regionally renowned for the quality of their craftsmanship. Al-Azraqī and al-Fāsī relate that in pre-Islamic times, Quraysh tribal chieftains would take great pride in embellishing the Kaʿbah with elaborate gold and silver overlay—a practice that has been perpetuated until the modern era. Doors

27) Al-Iṣfahānī Abū al-Faraj 1927-1974, vol. 1, pp. 64, 333-334, 345, vol. 9, p. 260, vol. 17, p. 175; al-Balādhurī 1938, vol. 7, p. 130; Ibn ʿImrānī 1973, p. 51; Ibn Kathīr 1966, vol. 8, pp. 70, 306, vol. 9, p. 232; Ibn al-Jawzī, 1917, vol. 2, p. 58; A. al-Sayf 1983, pp. 131-134; A. al-Sharīf 1965, pp. 232-233; E. Ashtor 1978, p. 5; S. al-Afghānī 1960, p. 108.

28) Al-Iṣfahānī Abū al-Faraj 1927-1974, vol. 6, p. 26, vol. 8, p. 343, vol. 9, p. 260, vol. 15, p. 125, vol. 17, p. 175; Ibn Ḥujjah 1959, vol. 1, p. 129; al-Yaʿqūbī 1960, vol. 2, p. 272; Ibn Kathīr 1966, vol. 8, pp. 4, 70, vol. 9, p. 232; al-Azraqī 1858, p. 457; al-Zubayr b. Bakkār 1961, vol. 1, pp. 94, 115-116, 224, 354; al-Balādhurī 1959, vol. 1, p. 399; Ibn Rustah 1892, p. 68; al-Samhūdī 1955, vol. 2, p. 514; A. al-Sayf 1983, pp. 134-136.

29) Al-Ṭabarī 1879-1901, vol. 1, p. 271; Ibn Kathīr 1966, vol. 2, p. 128; al-Wāqidī 1965, vol. 1, pp. 9, 10, 12, 27, 198, 200; A. al-Sharīf 1968, p. 47.

and window frames were a particular focus of gold leaf decoration. While it is difficult to estimate the quantity of bullion involved in this activity in historic times, some indication may be suggested by the fact that the total weight of gold in the present day twin entrance doors to the Ka'bah exceeds 286 kilograms.[30])

Accordingly, while many of the assertions advanced by the Islamic sources may be apochryphal and shrouded in the mists of Arab lore, it is the underlying body of residual physical evidence attesting to the abundant availability of precious metals on the medieval Arabian Peninsula that is the focus of the present inquiry—examining a body of compelling evidence that supports long-standing claims of a 1st/7th century Ḥijāzī regional economic buoyancy that has heretofore been largely unsubstantiated.

The Economic and Geographic Perspective

The primary medieval Arabic sources indicate that the treasury of the nascent Islamic state benefitted greatly from mining revenues starting from its inception. Al-Bakrī and al-Samhūdī assert that Prophet Muḥammad issued a formal document that granted as *qaṭā'i'* (property concessions) the Qabalīyah mines, including "ma'din al-Nuṣub," located in Jabal Quds, near al-Madīnah, to Bilāl bin al-Ḥārith al-Muzanī. Other sources relate that several other prominent mine owners customarily gave portions of the proceeds from their gold production as charitable contributions (*ṣadaqāt*) to the nascent Islamic state. Such production was subject to an official 2.5% zakāt levy, except for several mines in the northwest Ḥijāz which, al-Balādhurī states, were subject to a 20% *khums* levy. Ibn Sa'd confirms that the Qabalīyah, Juhaynah, and banū Sulaym mines all yielded great revenues for the Islamic fiscus. Indeed, the sources directly link Prophet Muḥammad's tribe, the Quraysh, to at least four of them—ma'din banū Sulaym, ma'din al-Nuqrah, ma'din Baḥrān, and a mine called "ma'din al-Birām," located near al-Ṭa'if.[31])

Many other mine sites are also noted in the sources. Ibn Khurradādhbih and Qudāmah b. Ja'far, for instance, describe a mine on a commercial route that

30) Al-Samhūdī 1955, vol. 4, p. 1230; al-Bakrī 1983, pp. 28-29; al-Azraqī 1858, vol. 1, pp. 276, 287 and al-Fāsī 1986, vol. 1, pp. 56-57, both cited in al-Quṭbī 1983, pp. 53-57; *Riyadh Daily*, April 26, 1992, p. 2.

31) Al-Bakrī 1983, pp. 28-29; Ibn al-Athīr 1989, no. 1083, pp. 456-458; Ibn Ḥajar 1910, vol. 2, pp. 217-218; Ibn Sa'd n.d., vol. 2, p. 11, vol. 3, p. 213; al-Balādhurī 1987, p. 22; Ibn Ḥazm 1983, p. 262, states of Ḥajjāj b. 'Ilāt that: "he was among the best of the Companions of the Prophet—may God bless them—who had a mine that was in the region of the banū Sulaym, and it was a gold mine."

coursed "from al-Yamāmah to al-Kharj, then to Nabʿah, then to al-Majāzah, then to the mine" (*al-maʿdin*).[32]) Al-Bakrī, and al-Masʿudī refer to another mine called "Baḥrān," owned by al-Ḥajjāj b. ʿIlāṭ al-Bahizī al-Sulamī, located in al-Furuʿ on the route from Makkah to al-Madīnah.[33]) Al-Balādhurī and al-Wāqidī suggest that this was but one of several mines that al-Ḥajjāj owned in this vicinity. Al-Wāqidī, al-Samhūdī, Ibn Saʿd, and al-Ḥarbī, in turn, describe sites on a main medieval commercial and pilgrimage route (Darb Zubaydah) running northeastward from Makkah toward Iraq known as the "Sulaym mines," and belonging to the Sulaym tribe ("*maʿādin al-dhahab alatī bi-arḍ banī Sulaym*").[34]) Actually, as Al-Wāqidī and other sources make clear, this operation also was not a single mine, but rather a series of mines dispersed through the region. There is residual evidence, in fact, of at least ten separate medieval mining sites in this immediate vicinity. Al-Ḥarbī testifies to their productivity:[35])

> *Al-maʿdin kāna bihi dhahab kathīr yustakhraj fī qadīm al-dahr wa yuḥfar ʿalayhi, fī jabal yamnah al-ṭarīq li-l-maṣ ʿad, wa ʿuẓimat fihi al-maʿūnah.*

Thus, while some could argue that the various references to mines in the lands of the banū Sulaym suggest a single site, there is powerful countervailing evidence that a significant number of proximate mines actually were in production. One of the banū Sulaym mines appears to have been located near the modern site of Qurān. Al-Iṣfahānī states that below Ublāʾ and Qurān are two mountains, and that the banū Sulaym mine was located there on al-Kūfah-Makkah road. Al-Ḥarbī and ʿArrām al-Sulamī note that there was an alternate route that passed this mine, coursing from al-Suwārqīyah southeastward to Ṣufaynah, then connecting with the main Darb Zubaydah north of Ḥādhah. Al-Samhūdī similarly describes the banū Sulaym mine as in the valley of Qurān, beside Ublāʾ, on the Najd road, about 100 miles from al-Madīnah. He notes that it is near al-Suwārqīyah, "which belonged to the banū Sulaym."[36])

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32) Ibn Khurradādhbih 1889, p. 152; Qudāmah b. Jaʿfar 1889, p. 193; see also al-Marzūqī 1914, vol. 2, p. 198.

33) Al-Bakrī 1983, p. 1021; Ibn Ḥanbal 1895, p. 430; al-Masʿūdī 1893, p. 249.

34) Al-Wāqidī 1965, vol. 2, pp. 702 ff.; al-Balādhurī 1987, p. 22; Ibn Saʿd n.d., vol. 3, p. 213; vol. 4, pp. 269 ff.; al-Ḥarbī 1981, pp. 333-335; al-Hamdanī 1977, pp. 274, 299; idem 1987, p. 88; al-Iṣfahānī 1968, p. 403; al-Bakrī 1983, vol. 1, p. 28.

35) Al-Ḥarbī 1981, p. 335.

36) Al-Ḥarbī 1981, pp. 332-336; al-Iṣfahānī 1968, pp. 177-178, 402-405; al-Samhūdī 1955, pp. 1238, 1309; al-Hamdānī 1884, pp. 183-185; 1987; fol. 24A, pp. 88, 363; ʿArrām al-Sulamī 1990, pp. 35 ff.; see also al-Wāqidī 1965, pp. 702; al-Bakrī 1983, vol. 1, p. 28; Ibn Rustah 1892, pp. 178-179; al-Muqaddasī 1906, p. 108; Ibn Khurradādhbih 1889, pp. 356 ff.; al-Balādhurī 1987, pp. 21-22. Curiously, there is indeed a Qurān at the base of a mountain range about 100 miles southeast of al-Madīnah, and 120 miles northeast of Makkah, on a medieval branch road just off the Darb Zubaydah at 23 degrees, 24 minutes N latitude, 40

Al-Iṣfahānī, on the other hand, states that north of Qurān was "Sharūrā, wherein lie the mountains of banū Sulaym." While al-Samhudī does not differentiate between the sites, al-Hamdānī indicates that this mine was distinct from "*maʿdin banī Sulaym*," and was known as "*maʿdin banī Fārān*." The sources also refer to two mountain peaks known as al-Ashʿath and ʿUnayzāt between the Sulaym mine and al-Suwārqīyah; and to a well in Ublāʾ between the mine and al-Suwārqīyah, located less than 10 miles northwest of Qurān. Al-Bakrī claims that this site was in operation in the reign of Caliph ʿUmar b. al-Khaṭṭāb (r. 13-23/634-44).[37]) (See "Site I," Maps B and C. The site described appears to be at approximately 23 degrees, 24 minutes N latitude, 40 degrees, 28 minutes E longitude.)

Thus, while various sources indicate that there was a "maʿdin banī Sulaym" in operation at the time of the rise of Islam at a site called Qurān near al-Suwārqīyah, their descriptions are not entirely consistent with the location where others believe the famed "banū Sulaym" mine actually was, and where it is commonly believed to have been today. The conflicting contentions can be readily reconciled, however, through other references in the sources indicating (i) that the mining activities of the banū Sulaym were carried out on a variety of properties, and not at just one site; and (ii) that the "banū Fārān" actually were an offshoot of the Sulaym tribe whose lineage traced through one Farān b. Balīy, as al-Bakrī asserts:[38])

> The Sulaym mine was operated by Farān bin Balīy, of a group of Balīy. They are of banū al-Akhtham bin ʿAwf bin Ḥabīb bin ʿUṣayyah bin Khufāf bin Amriʾ al-Qays bin Buhthah bin Sulaym.

The linkage of the banū Sulaym to the Qurān mine site thus can be tenuously established, albeit indirectly through the banū Farān branch of the Sulaym family.

Some 30 miles to the northeast of the Qurān site, however, lies what today is called the "*Mahd al-Dhahab*" (Cradle of Gold), a mine that definitely was a property of the banū Sulaym. Operated in classic Islamic times by the aforesaid

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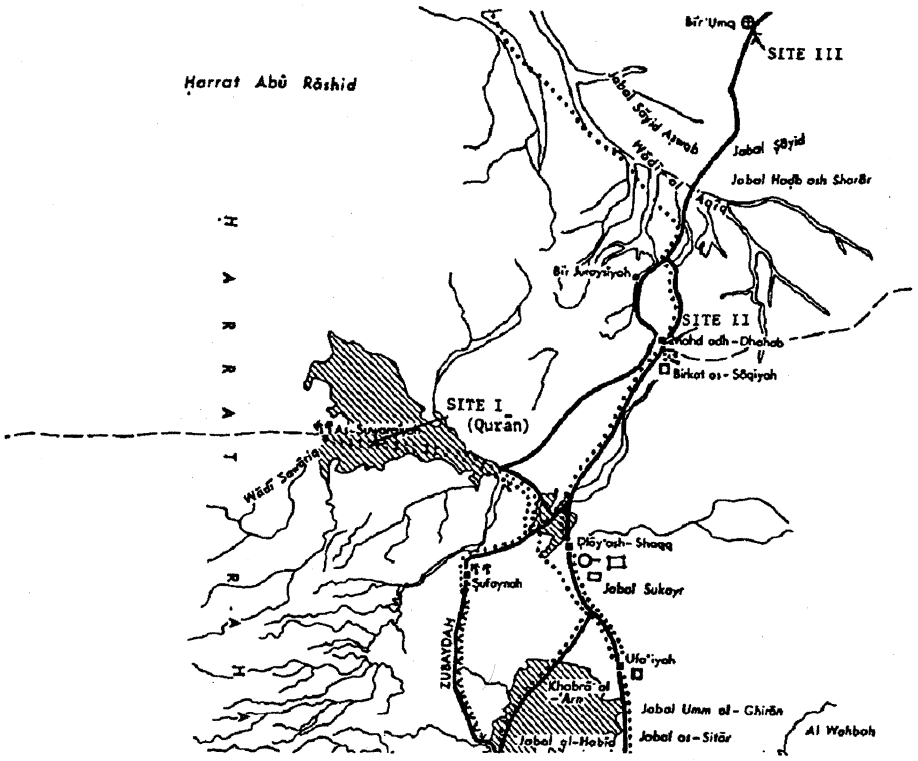
degrees, 28 minutes E longitude, indicated on Saudi Ministry of Petroleum and Mineral Resources' geologic maps. Al-Suwārqīyah appears a few kilometers to the northwest. Geologist K.S. Twitchell, who was involved in the discovery of Mahd al-Dhahab, appears to have viewed this branch road from the air, approximately thirty miles east of the present Makkah-al-Madīnah road. Since Darb Zubaydah already was in existence, this road may be the one ordered built by Caliph al-Muqtadir in 304/916. (On this, see G.C. Miles, 1953-54, pp. 482-83; Mahd al-Dhahab, as noted, is extremely close, but it does not appear to quite meet these descriptions).

37) Ibid.

38) F. ʿAlī Riḍā 1979, pp. 160-62; al-Bakrī 1983, vol. 1, pp. 28-29; al-Bakrī (p. 29), in fact, suggests that the banū Fārān had two mining sites.

MAP B
Active Mining Sites of Medieval Arabia

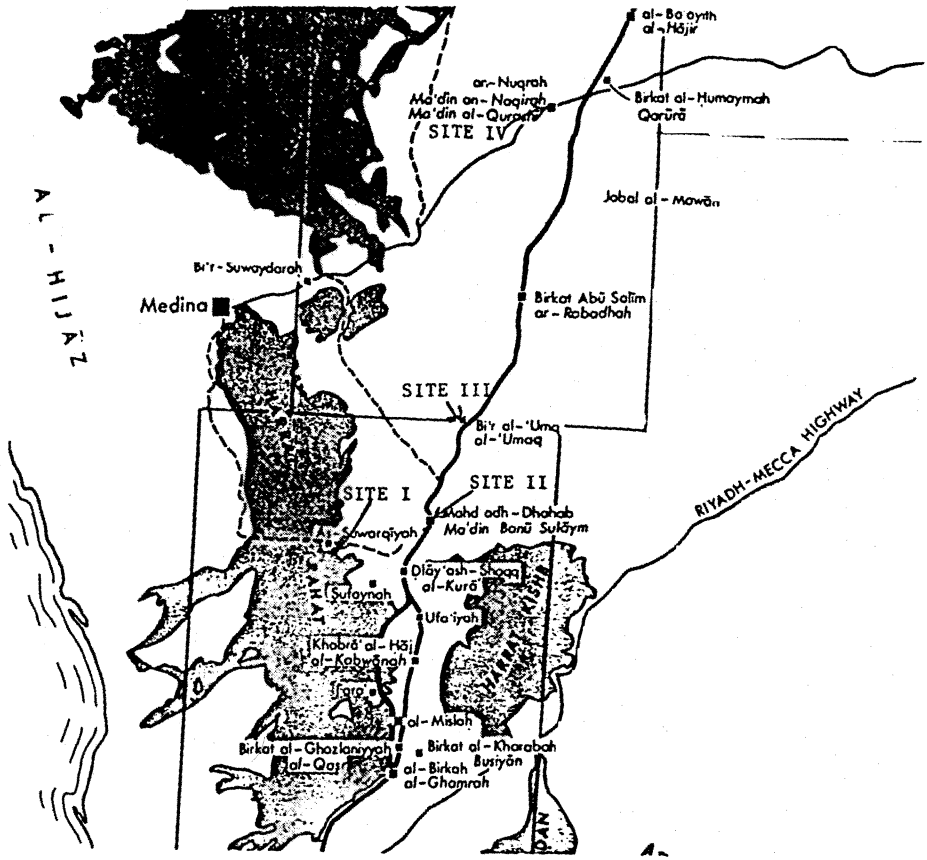


SITE I: Ma'din banī Farān at Qurān, 23 degrees, 24 minutes N latitude; 40 degrees, 28 minutes E longitude

SITE II: Ma'din Mahd al-Dhahab, 23 degrees, 55 minutes N latitude; 40 degrees, 50 minutes E longitude

SITE III: Ma'din banī al-Sharīd at Bi'r 'Umaq, 23 degrees, 58 minutes N latitude; 40 degrees, 59 minutes E longitude

MAP C
Active Mining Sites of Medieval Arabia



SITE I: Ma'din banī Farān at Qurān, 23 degrees, 24 minutes N latitude; 40 degrees, 28 minutes E longitude

SITE II: Ma'din Mahd al-Dhahab, 23 degrees, 55 minutes N latitude; 40 degrees, 50 minutes E longitude

SITE III: Ma'din banī al-Sharīd at Bi'r 'Umaq, 23 degrees, 58 minutes N latitude; 40 degrees, 59 minutes E longitude

SITE IV: Ma'din al-Nuqrah (al-Naqīrah), 25 degrees, 32 minutes N latitude; 41 degrees, 24 minutes E longitude

al-Ḥajjāj b. ʿIlāṭ al-Bahizī al-Sulamī, who had married into the Qurashī tribe, it is located approximately 170 miles northeast of Makkah and 155 miles southeast of al-Madīnah, directly on the Darb Zubaydah road. Describing this route, al-Hamdānī and al-Ḥarbī assert that from al-Mislaḥ to Ufayʿīyah is 8 miles; and from it to the lava field (*ḥarrah*) of the banū Sulaym ("which consists of 23.5 sections") is 26.5 miles, and from it to al-ʿUmaq is 22 miles. Al-Ḥarbī states that the mine itself was "26.5 miles from Ufāyʿīyah . . . in the mountains to the right of the ascending road." He also indicates that a large round well built by Queen Zubaydah was proximate to the mining site. Ibn Saʿd and Ibn al-Athīr provide evidence that the mine was in use in the reign of Caliph Abū Bakr al-Ṣiddīq (r. 11/632-13/634). It was still in operation in 128/746, when the Umayyads appointed Kuthayr b. ʿAbd Allāh as its overseer, and did not close down until well in the 3rd/9th century.[39]) (see "Site II," Maps B and C, at 23 degrees, 55 minutes N latitude; 40 degrees, 50 minutes E longitude.)

Twenty two miles to the northeast of Mahd al-Dhahab, at al-Biʾr ʿUmaq, according to al-Samhūdī, was another mine known as "*maʿdin banī al-Sharīd.*" This mine, also actively worked in the classic Islamic period, was the property of yet another offshoot of the banū Sulaym, through a linkage of Ṣakhr and Muʿawīyah, sons of ʿAmrū b. al-Ḥarīth b. al-Sharīd, and ʿUqayl b. Fuḍayl banū al-Sharīd, via banū ʿAmrū b. Yaqaḍah b. ʿUṣayyah b. Khufāf b. Amriʾ al-Qays b. Buhthah b. Sulaym.[40]) (See "Site III," Maps B and C, at 23 degrees, 58 minutes N latitude; 40 degrees, 59 minutes E longitude.)

Some 137 miles further to the northeast of Mahd al-Dhahab, moreover, lay yet another mine, known as "*maʿdin Nuqrah*" (al-Naqīrah), west of the Darb Zubaydah at the juncture where that route sub-divided, with branches diverging to Makkah and al-Madīnah. Al-Ḥarbī and Ibn Khurradādhbih indicate that the northern sector of this mine, located 26 miles northeast of al-Mugīthah, was also known as "*maʿdin al-Qurashī.*" Al-Bakrī states that it was located before Qarqarā and that it was operated by the banū ʿAbs.[41]) (See "Site IV," Map C, at 25 degrees, 32 minutes N latitude; 41 degrees, 24 minutes, E Longitude.)

Because these sites were on the traditional Ḥijāzī-Iraqī pilgrimage route, they enjoyed a direct commercial tie to Makkah. References to still other medieval

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39) Al-Ḥarbī 1981, pp. 332-336; Ibn Saʿd n.d., vol. 3, p. 213; Ibn al-Athīr 1985, vol. 2, p. 290; al-Ṭabarī 1879, vol. 7, p. 438; al-Iṣfahānī 1927-1974, vol. 23, pp. 227-228; Ibn Ḥazm 1983, p. 262; (Ibn Saʿd n.d., vol. 3, p. 213, indicates that the banū Sulaym mine was opened in the reign of Caliph Abū Bakr.).

40) Al-Samhūdī 1955, p. 1268; Ibn Ḥazm 1983, pp. 172, 196, 261; al-Bakrī 1945, vol. 1, p. 28; al-Hamdānī 1987, pp. 364, 375, 414.

41) Al-Ḥarbī 1981, pp. 321-324; Ibn Khurradādhbih 1889, pp. 128, 137; Ibn Rustah 1892, p. 176; al-Muqaddasī 1906, p. 108; al-Samhūdī 1955, p. 1309; al-Bakrī 1983, vol. 1, p. 28.

mines with links to the Makkan commonwealth also abound in the Islamic sources. Al-Hamdānī describes a mine called "*maʿdin Maḥajjat al-ʿIrāq*" ("mine of the Iraqi pilgrimage route") that lay between Ufāyʿīyah and al-ʿUmaq, in the vicinity of Mahd al-Dhahab (though this site may well be another banū Sulaym mining subsidiary, as he also suggests). He likewise speaks of two mountains near Makkah, al-ʿAyrah and al-ʿAyr, that contained operating mines. Zubayr b. Bakkār and al-Azraqī indicate that al-ʿAyrah is the mountain to the right of the approach to the pilgrimage site of al-Minā, whereas al-ʿAyr is the peak directly across from it.[42])

Al-Bakrī cites another mine known as "*maʿdin al-Nuṣub*," one of the Qabalīyah chain of mines, proximate to al-Madīnah.[43]) Other sources indicate that the "Qabalīyah" mines were located between al-Madīnah and Yanbuʿ, and that still others could be found in al-Juhaynah region.[44]) Al-Yaʿqūbī asserts that there were also gold mines at al-ʿUwaynid on the coastal route from Aylah to Makkah.[45]) Al-Hamdānī also cites major medieval mining operations at al-ʿAqīq, between Ṣaʿdah and Najrān; at Ḍankān, at the top of Wadī Dhahbān between the villages of al-Qaḥmah and Ḥalīn al-Suflā, on the Ṣanʿā -Makkah inland commercial route; as well as at Bīshah. Al-Iṣfahānī, in turn, indicates that the prime occupation of the inhabitants of Wādī al-Qūrā was exploiting the prodigious gold, silver, and copper mines located in that region.[46])

Other medieval mines were located in Central Arabia, outside of the Makkans' direct sphere of influence. They included "*Ḥillayit*" (al-Najādī), which al-Bakrī and al-Samhūdī both call the most productive mine on earth;[47]) "*al-Aḥsan*," a gold and silver mine situated between al-Qaṣīm and al-Yamāmah, operated by the banū Kilāb;[48]) and "*Abraq Khutrab*," a silver mine near al-Ḍarīyah pastoral reserve, east of Wādī Jarīr and south of Wādī al-Rumah.[49]) The sources

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42) Al-Hamdānī 1987, pp. 88, 265, 363, 394; idem 1884, p. 299; idem 1977, p. 299; Zubayr Ibn Bakkār, cited in al-Fāsī 1986, vol. 4, p. 14; al-Samhūdī (1955, vol. 4, p. 1269), on the other hand, asserts that a "Jabal 'Ayr" was located near al-Madīnah, east of al-ʿAqīq.

43) Yāqīt, in his description of "al-Nuṣub," 1957, vol. 5, p. 287; al-Bakrī 1983, vol. 4, p. 1309; al-Hamdānī 1987, p. 414.

44) Ibn Ḥazm 1983, p. 201; Ibn Saʿd n.d., vol. 3, p. 213; al-Balādhurī 1987, p. 22; Mālik b. Ānas 1905, vol. 2, p. 289; al-Bakrī 1983, vol. 3, pp. 1047, 1051; al-Samhūdī 1955, p. 1282.

45) Al-Yaʿqūbī 1892, p. 341.

46) Al-Hamdānī 1987, pp. 86-88; idem 1884, p. 329; al-Iṣfahānī 1968, pp. 259, 397-398.

47) Al-Bakrī 1983, vol. 1, p. 268, vol. 3, pp. 875-876, 1021; al-Samhūdī 1955, vol. 3, p. 1105.

48) Al-Iṣfahānī 1968, pp. 128, 152, 159; al-Hamdānī 1884, pp. 159, 291, 299; al-Ḥarbī 1981, pp. 595, 618.

49) Al-Bakrī 1983, vol. 3, p. 864; Yāqūt 1957, "Al-Aḥsan," vol. 1, p. 112.

similarly attest to the prodigious output of al-Ḥufayr, al-Ḍubayb, Shamām, and Thanīyat ibn ʿIṣām mines in al-Yamāmah.[50])

In addition to gold, silver, and copper, it appears that iron ore was also produced at several of these sites. Indeed, there are indications that at least eleven separate iron mines were in operation on the Arabian Peninsula at this time.[51]) In all, there are references to over two hundred gold, silver, copper, and iron mines in medieval Arabia cited in the sources consulted by this inquiry. Other gemstones and minerals were present in significant commercial quantities as well. The sources indicate, for instance, that emeralds, amethysts, quartz crystals, turquoise, borax, lead, the stone used in whetstones for sharpening swords and knives, and table salt also were mined in medieval Arabia and exported to surrounding regions.[52])

Fortunately for research, unlike other vestiges of desert civilization, mining leaves a lasting imprint. Consequently, evidence of medieval mining operations—in the forms of trenches, pits, deep, tortuous tunnels, and ore residuals—today exists at more than a thousand separate sites in the lava escarpments that dominate the western half of Saudi Arabia. Often, pairs of tunnels, dug adjacent and parallel, extend inward into the escarpments to depths approaching seventy meters, and to as much as eighty five meters in the case of Mahd al-Dhahab.[53])

The remnants of mining villages, stone quarries, and smelters—as well as lanterns, stone hammers, picks, shovels, millstones, grindstones, pestles, and other primitive mining instruments—also can often be found proximate to these sites. Some of these residuals are quite revealing. Tailings and slag at Mahd al-Dhahab, for example, suggest that as much as a million tons of ore may have been mined there in the early Middle Ages. Remains of wells dug adjacent to these locations to provide pure water for washing ore, as well as to meet the consumption needs of miners, likewise are in evidence. Al-Samhūdī and others explicitly refer to wells located at the sites mined by the banū Sulaym and elsewhere. In several instances, their ruins still are evident.[54])

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50) Al-Hamdānī 1977, p. 299; al-Iṣfahānī 1968, pp. 236, 382.

51) Al-Azraqī 1858, pp. 158-160; al-Iṣfahānī 1968, pp. 30, 126; Plans currently are underway to commercially develop substantial iron ore deposits found at Wādī al-Ṣawāwīn, as well as bauxite deposits at al-Zabīrah.

52) Al-Samhūdī 1955, vol. 4, p. 1218; al-Hamdānī 1977, pp. 293, 300-301; J. ʿAli 1970, vol. 7, pp. 516, 622.

53) Al-Hamdānī 1987, fol. 26b, p. 93; Ḥ. Ṣābir 1991b, p. 33.

54) Cf. al-Samhūdī 1955, p. 1309; al-Hamdānī 1987, fol. 26B, pp. 93, 365-66, 370; Ḥ. Ṣābir 1991b, pp. 33-34; J. ʿAlī 1970, vol. 7, p. 514.

The Chronological Perspective

Indeed, such ruins can be of significant value in determining the actual dates of mining operations. As the difficulty of dating past mining activities is often complicated by the nature of the industry itself. For in antiquity, as now, mining towns tended to be functional rather than cultural centers. Thus, the presence of such artifacts as exquisite pottery and other sophisticated accoutrement usually is quite rare, with only more utilitarian utensils present. Nonetheless, past smelter sites often do contain "tailings" as well as slag piles, analysis of which can be successfully employed in radiometric dating of historic workings and the evaluation of past mine production.

Among other data, such tailings—generally consisting of non-smelted waste materials with imbedded ore fragments—can provide detailed information on the composition of the ore and the nature of the mineralization. The slag, in turn, represents a geochemical amalgam consisting of compounds from ore, flux, furnace, and trace elements of the metal extracted. The chemical composition of the slag, therefore, can be of particular value to the metals geochemist, who can "fingerprint" an extracted sample through trace elements found in the original ore. It may also contain charcoal, which is the fuel medieval miners usually used in kilns for smelting the extracted ore. Such charcoal is commonly found as sealed fragments in residual fused glass and hence serves as a useful chronological dating material in Carbon-14 (C-14) dating methods.[55])

Properly employed, radiometric dating thus can be a key physiochemical method for assaying mining residium—dating its organic and biological components by measuring its C-14 radioactivity. This process is based upon the deterioration of natural carbon over time, and is predicated on the axiom that when a carbon-containing organism dies, or is otherwise destabilized by removal from its equilibrium cycle, its C-14 contents decay with a 5,570 year half-life. A precise measurement of the remaining C-14 content therefore allows the analyst to calculate the time lapse since the organism died.

A potential exogenous factor complicating the radiocarbon dating process, however, can involve the specificity of the sample itself. For among the reasons that chemically-derived age determination could yield dates later than the actual activity would be if samples were to be taken only from the top of the slag heap—which would represent the culmination of the mining activity. Another would be "bioplastic varnishing," subsequent accruals of bacteria and other mold-like organisms, which could also affect the specificity of the sample. Such spurious factors, in fact, combined with the age of the charcoal feedstock itself

55) Ḥ. Ṣābir 1991a, p. 21.

when consigned to smelting, may explain why certain C-14 dating results could indicate late ʿAbbāsid 10th-13th century mining activities, whereas medieval documentary sources might suggest a 7th-10th century actual operations date. The key to effectively using radiocarbon dating, therefore, is first to understand its limitations.

Working within these caveats, it is insightful to note that radiocarbon datings of residual charcoal in slags from Mahd al-Dhahab suggest that in *situ* gold and silver mining and smelting activities were carried out approximately 3,000 years ago—in an era exactly corresponding to the reigns of biblical Kings David and Solomon (circa 1000 B.C. to 922 B.C.)—and again from A.D. 430 to A.D. 830. Such findings comport perfectly, of course, with al-Ḥarbī's aforesaid claims that such mining activities took place in ancient times ("*al-maʿdin kāna bihi dhahab kathīr yustakhraj fī qadīm al-dahr*") and again in Islamic times, only to be halted in the 3rd/9th century because they were no longer cost-effective ("*wa aladhī ḥamalahum ʿalā tarkihi anna al-maʿūnah akthār mimā yukhraj minhu*"). Testing at a placer gold deposit at Jabal Makhiyaṭ (20 degrees, 12 minutes latitude, 43 degrees, 28 minutes longitude) suggests mining activities both in King Solomon's era and again circa A.D. 626—precisely in the lifetime of Prophet Muḥammad. Testing at the al-Nuqrah gold and copper mine, in turn, indicates that mining activities took place in the A.D. 675-835 period.[56])

Similar radiocarbon testing indicates that silver mining activities took place at al-Samrāʾ mine (at coordinates: 24 degrees, 22 minutes latitude; 44 degrees, 21 minutes longitude) in al-Dawādimī silver district in the A.D. 668-819 period; and at Jabal al-Shizm copper mine (at coordinates: 26 degrees, 27 minutes latitude; 37 degrees, 32 minutes longitude) in the A.D. 450-950 period. C-14 testing at al-Maṣānīʿ copper mine (at coordinates: 18 degrees, 08 minutes latitude, 43 degrees, 51 minutes longitude) has produced similar time frames for medieval mining operations.[57])

Arabic inscriptions dating to the classic Islamic period at many of these sites can aid in the mining dating process. Kufic inscriptions found among tailings at Mahd al-Dhahab, for example, suggest that they may extend back to the A.D. 750-1150 ʿAbbāsid era and similar writings exist at (cited in geographic order from west to east across the western half of the Arabian Peninsula):

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56) Al-Ḥarbī 1981, p. 335; L. Hilpert, et al. 1984, p. 3; R. Luce, et al. 1975, pp. 1-2; D. Schmidt 1981, p. 1; K. Ackermann 1990, p. 27; Ḥ. Ṣābir 1991a, p. 4; K.S. Twitchell 1958, pp. 247-248.

57) A.M. Al-Shanti 1974, pp. 65-105, passim; idem, 1976, p. 3; H.A. Quinn 1964, passim; R. Roberts, et al. 1975, pp. 26-27, 29; M. Donzeau 1980, pp. 27 ff., reproduced in Department of Petroleum and Mineral Resources (DGMR), 1994, pp. 62, 102.

ʿAynūnāʾ, Ghurābah, Ḥillayit (al-Najādī), al-Muwazzar, al-Ḥamḍah, al-Maṣāniʿ, al-ʿAqīq, and at numerous other excavated sites. At al-Suwārqīyah, as well as at Thanīyat ibn ʿIṣām al-Bāhilī gold mine, thirty kilometers west of al-Qawayʿīyah in the western Najd, such writings consist of personal names and prayers of repentance seeking Divine pardon and redemption as well as supplications invoking the blessings of Prophet Muḥammad. It is critical to note that inscriptions found at certain of the sites, including al-Qabalīyah, appear in unpointed Arabic script, suggesting that they may date to no later than the close of the first Islamic century.[58])

Glass, vessels, pottery, and shards present at the mining sites can also contribute to a more accurate dating process. Remnants of glass and glazed pottery at a variety of locations, among them (again cited in order from west to east): Ghurābah, Muṣaynaʿah, al-ʿAblāʾ (al-ʿAblah), Mahd al-Dhahab, al-Nuqrah, Samīrāʾ (Samīrah), al-Shumṭāʾ, al-Hujayrah, al-Samrāʾ (al-Samrah), and al-ʿAqīq mines have been dated to the A.D. 9th and 10th (A.H. 3rd and 4th) centuries. Numerous glass fragments found in al-Dawādimī silver district likewise have been determined by the Corning Museum of Glass to date to the A.D. 800 to A.D. 1300 period. Since such fragile fragments have survived, it may be assumed that they represent the culmination of mining operations at the particular location, because subsequent production activity likely would have obscured their existence. Dated medieval Islamic currency has also been found at several of the medieval sites. Two ʿAbbāsid silver dirhams struck in the years 143/760 (at al-Kūfah) and 158/778 (at Baghdad), for instance, have been found at Samīrāʾ, a medieval gold mine located northeast of Ḥillayit on the Darb Zubaydah.[59])

There are also remnants of mining villages at many of the sites that suggest medieval occupation. Among them, the mining site at al-ʿAblāʾ contains foundations of approximately 300 structures that possibly could have housed as many as 1,000 manual laborers; whereas the site at al-ʿAqīq contains at least 100 similar structures. At Mahd al-Dhahab, numerous stone dwelling ruins resembling barrack-like structures also suggest that a large work force was employed at the mine; and similar dwellings exist at Umm al-Qurayyāt, Ghurābah,

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58) K.S. Twitchell 1958, pp. 247-248; Ḥ. Ṣābir 1991a, p. 4; DGMR 1994, p. 102; al-Hamdānī 1987, pp. 347, 396, 413; S. al-Rāshid 1980, pp. 105, 241-251; ʿA. Kabāwī 1991, vol. 1, p. 69; J. Sourdel Thomine 1978, vol. 4, pp. 1119-1120; B. Moritz 1967, vol. 2, p. 587.

59) Dīnārs dating to as early as 198/813 in the caliphate of al-Maʾmūn also have been found at al-Fayd and elsewhere in the region. H.A. Quinn 1963; M. al-Shantī 1976, p. 3; T.H. Kiilsgard and A. Paupy 1994, p. 242; N.D. MacKenzie and S. Al-Ḥelwā 1980, vol. 4, pp. 37-50; J. Hester et al. 1984, vol. 8, p. 126; P. de Jesus 1982, pp. 77-78; Ḥ. Ṣābir 1991a, pp. 4, 7, 11, 17; S. al-Rāshid 1980, pp. 264-271; ʿA. Kabāwī 1991, vol. 1, p. 64.

al-Birām, Muṣayna'ah, Umm al-Damār, Turabah, Māwān, al-Nuqrah (North and South), al-Ṣafrā', al-Kawm (East and West), al-Shumṭā', al-Kāwkabah (Ashqar al-Barāqah), al-Hujayrah, al-Samrā', al-'Iṣān, Umm al-Liddām, al-Ḥufayr, al-'Awsajah (modern Abā al-Ruḥīy), and Umm al-Dabā'.[60])

Medieval Islamic sources also often may be employed to sustain the evidence suggested by physical artifacts. In addition to al-Ḥarbī's aforesaid conformity with C-14 dating results at Mahd al-Dhahab, for instance, both Ibn Sa'd and Ibn al-Athīr provide corroboration that the Treasury of Prophet Muḥammad's successor, Caliph Abū Bakr, received substantial revenues from mining operations. Ibn Sa'd states:[61])

> Much money was brought to it from ma'din al-Qabalīyah and ma'din Juhaynah, and ma'din banī Sulaym was opened in the caliphate of Abū Bakr, and he received the "*ṣadaqah*" from it and deposited it in the Treasury, and Abū Bakr distributed it to the masses . . .

Al-Balādhurī, Mālik b. Anas, al-Bakrī, al-Samhūdī, al-Ṭibrānī, and others, in turn, indicate that Prophet Muḥammad granted al-Qabalīyah mines and adjacent areas as concessions to Bilāl bin al-Ḥārith al-Muzanī on the condition that the lands be agriculturally improved; whereas al- Ḥajjāj bin 'Ilāṭ al-Bahizī, Abū Ḥuṣayn al-Sulamī, and others are reported by the medieval Islamic sources to have presented gold donations from their mines to Prophet Muḥammad. Ibn Ḥajar relates that when members of the banū Lihb brought gold ore to him from ma'din 'Aqīq Ghāmid, near Turabah, Prophet Muḥammad ruled: "Whoever finds something, it is for him; and the twenty percent tax ('*khums*') is to be levied on precious metals." Al-Hamdānī similarly attributes to Prophet Muḥammad the assertion regarding ma'din 'Aqīq 'Uqayl, in modern Wādī al-Dawāsir: "the land of the 'Uqayl has been showered with gold"—suggesting that this mine too was productive in his era.[62])

The medieval Islamic sources present evidence that mining activities took place on the Arabian Peninsula in pre-Islamic times as well. Al-Hamdānī indicates, for example, that amongst the gold mines of the Najd was "*ma'din Thanīyat ibn 'Iṣām al-Bāhilī*," chamberlain of Ghassānid King Nu'mān bin al-Mundhir (r. circa 580-602 A.D.); and asserts that thousands of Persians also

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60) J. Hester 1984, vol. 8, p. 135; F. Goldsmith 1971, pp. 26, 34; al-Hamdānī 1987, pp. 334, 351, 394, 396, 408, 420; 'A. Kabāwī 1991, vol. 1, pp. 69-70; T.H. Kiilsgard and A. Paupy 1994, p. 242; H. Ṣābir 1991a, pp. 9, 14, 17; P. de Jesus 1982, p. 63: R. Mulḥis 1930, p. 21; DGMR 1994, pp. 62-63; M. Donzeau 1980, pp. 27 ff.; R. Roberts 1975, p. 25.

61) Ibn Sa'd n.d., vol. 3, p. 213; Ibn al-Athīr 1985, vol. 2, p. 290.

62) Al-Balādhurī 1987, p. 22; Mālik b. Anas 1905, vol. 2, p. 289; al-Bakrī 1983, p. 1051; al-Samhūdī 1955, vol. 3, p. 1040; al-Ṭibrānī, cited in Yāqūt 1957, vol. 4, pp. 307-308; Ibn Ḥajar 1910, vol. 1, p. 313; vol. 4, pp. 44, 197; al-Hamdānī 1977, p. 329.

worked at the Shamām silver mine in al-Yamāmah—a practice that likely came to a halt with the Islamic conquest of the Sāsānīd empire in 16/637. He likewise indicates that "*maʿdin al-Raḍrāḍ*," which he states was better than the Shamām mine, was also operated by "Persians of the mine."[63])

Naṣr al-Iskandarī, later cited by Yaqūt and al-Ḥāzimī, asserts that "*Minḍaḥ*" was a pre-Islamic Ḥijāzī mine which had a huge pit in which water gathered. The Minḍaḥ mine also is frequently mentioned in early Arab lyrics. Pre-Islamic poetry similarly reverberates with references to specific gold and silver fineware, rings, bracelets, other jewelry, and gold and silver embossed weaponry. Coincident with the rise of Islam, the *Qurʾān* too speaks of them as esteemed precious metals. Sūrat Āli-ʿImrān, for instance, asserts:[64])

> Fair in the eyes of men is the love of things they covet;
> women and sons; heaped up hoards of gold and silver . . .

Sūrat al-Kahf promises the Righteous:

> For them will be Gardens of Eternity; beneath them, rivers will flow;
> they will be adorned therein with bracelets of gold . . .

a commitment that finds its affirmation in Sūrat al-Ḥajj:

> Allāh will admit those who believe and work righteous deeds to
> gardens beneath which rivers flow; they shall be adorned therein
> with bracelets of gold and pearls . . .

to which Sūrat al-Insān adds:

> And among them will be passed round vessels of silver and
> goblets of crystal—crystal clear, made of silver . . .

The composite of documentary and scientific evidence thus suggests that modern conventional portrayals that separate historic Arabian mining operations into two distinct chronologic periods of activity—late Bronze Age and medieval ʿAbbāsid—may well be imprecise. For many references are unquestionably pre-ʿAbbāsid and may be traced back to the era of Prophet Muḥammad and before. In addition, as noted, practically every gold, silver, and copper deposit on the Arabian Peninsula shows some evidence of previous mining activity. Roman pottery shards, for example, have been found at an ancient mining site called Wādī ʿArjah in northwest al-Ḥijāz. Several medieval mine site names—such as al-Maṣāniʿ, al-Maʿmalah, Umm al-Marū, Umm al-Damār, and al-ʿAmār likewise

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63) Al-Hamdānī 1977, pp. 13, 292-294, 299; idem 1987, fol. 24A, p. 87, fol. 25A, p. 90.

64) Naṣr al-Iskandarī, cited in Yāqūt 1957, vol. 5, p. 212; and al-Ḥāzimī 1995, vol. 2, pp. 862-863; *al-Qurān*, "Surāt Āli-ʿImrān," v. 14; "Sūrat al-Kahf," v. 31; "Sūrat al-Tawbah," v. 34; "Sūrat al-Ḥajj," v. 23; "Sūrat al-Insān," v. 15-16; W. al-Ṣamad 1981, pp. 190-194, 202 ff.; J. ʿAlī 1970, vol. 7, pp. 505 ff.

clearly suggest the existence of previous mining. Thus, it is not altogether illogical to conclude that just as modern geologists and prospectors now typically seek out historic mines as a means of finding new deposits, so did the miners of previous times, in so doing, obscuring the handiwork of their predecessors.[65])

It is not improbable either that what we now identify as 'medieval' Islamic mining actually is a sporadic continuation of early exploitation—particularly for large deposits such as al-Nuqrah—and that such mining probably took place from its inception perhaps in the third or second millenium B.C. until midway into the ʿAbbāsid era. Thus, the geographic documentary sources and *in situ* physical evidence converge in a compelling way to suggest that significant precious metals extraction and smelting operations did take place at mining sites in Western Arabia at various times before, during, and after the proclamation of Prophet Muḥammad's mission—while peaking in the commercial surge that attended the first two Islamic centuries.

Not coincidentally, many of these mines lay on or near the historic incense, spice, and pilgrim routes of the Arabian Peninsula. Mahd al-Dhahab, for instance, is situated two kilometers north of the well-travelled Darb Zubaydah pilgrimage route that linked Makkah with al-Kūfah in Iraq, as well as with other key cities of Western Asia. In addition to Mahd al-Dhahab, the Nuqrah, Ḥillayit, Samīrah, and Umm al-Damār sites were likewise located along this route. Similarly, such noted medieval mines as al-ʿAqīq and al-ʿAblāʾ were located on the Yemen-Makkah-Syrian spice route. Not only were these routes major arteries for commerce, therefore, they also afforded access to the currency base that made such commerce possible.[66])

The Operational Perspective

It appears that early medieval Arabian mining was financed with private capital. Al-Balādhurī quotes future caliph ʿUmar b. ʿAbd al-ʿAzīz's grudging assessment of a mining property that he had recently acquired: "look at what was extracted from it and what I spent on it." Ibn Ḥajar, in turn, quotes members of the banū Lihb as asserting: "We brought the Prophet of God ore from al-ʿAqīq, and he wrote us a letter stating: 'whoever finds something, it is his.'" Whereas al-Bakrī speaks of a dispute at Mahd al-Dhahab between original Sulamī investors and mine workers in the caliphal reign of ʿUmar ibn al-Khaṭṭāb.[67])

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65) Al-Hamdānī 1987, p. 320; K. Ackermann 1990, p. 20; C. Martin 1972, p. 39; ʿA. Kishnāwī, et al. 1983, vol. 7, p. 77; P. de Jesus 1982, pp. 78-79.

66) Ḥ. Ṣābir 1991b, pp. 33 ff.

67) Al-Balādhurī 1987, p. 22; Ibn Ḥajar 1910, biography 1263, vol. 4, p. 196; al-Bakrī 1983, p. 28.

Nonetheless, despite operational difficulties, and however primitive the extraction techniques, it appears that even by modern standards, mining in ancient and medieval Arabia was "big business" for the age. The evidence suggests, for instance, that an estimated 1,500,000 ounces of gold were produced from the more than one million tons of ore mined at Mahd al-Dhahab in historic times. Based on residual tailings, evidence likewise indicates that more than 1,000,000 ounces of gold were produced at al-Ḥamḍah in the early medieval era. These are economically significant findings. For they are production volumes of sufficient magnitude to have generated substantial local purchasing power throughout the medieval west Arabian Peninsula and east Mediterranean basin, stimulating regional economies to an appreciable degree.[68])

The Arabic sources reveal that medieval mining operations were often labor-intensive, at times employing as many as 1,000-2,000 workers. Existing ruins, as noted, indicate that these miners were usually housed in stone structures, often arranged in orderly barrack-like fashion. Slaves, prisoners, and servants likely comprised the bulk of the mining labor force. But there are reports of others—Jews, Persians, and even Arabs—also actively engaged in mining activities on the Arabian Peninsula. Al-Hamdānī, for instance, states that there were 200 Jews at ma'din 'Aqīq 'Uqayl in Wādī al-Dawāsir. He also indicates that there were thousands of Zoroastrians employed at ma'din Shamām, and that they had even set up two places of worship (*baytā nār*) there.[69])

Mining operations were supported by impressive public and private support infrastructure. As subsequent analysis will reveal, some mines were even deemed to be true towns (having a *minbar*). Many were at least full fledged mining villages with fortifications, and in some instances, had palaces. Certainly, commercial support infrastructure was present. Al-Ḥarbī writes that Mahd al-Dhahab contained quite substantial physical facilities to logistically support ongoing site operations—describing a palace and a mosque at the mine, as well as a circular well built by Queen Zubaydah, numerous other wells, old and new, and a square reservoir in the vicinity:[70])

> Ma'din banū Sulaym.... is for the banū Sulaym bin Manṣūr bin 'Ikrimah; and in it is a mosque and a palace; and from the mine to Ufay'īyah is sixteen and one half miles; and in it is a circular well of Zubaydah; and many wells, old and modern, having names. Two and one half miles from the well are building ruins said to be "Rayyān,"

68) K. Ackermann 1990, p. 27; R. Roberts 1975, p. 27; A. Helaby et al. 1980, p. 26.

69) Al-Hamdānī 1977, pp. 293-294, 297, 299; idem 1987, pp. 13, 370; C. Martin 1972, pp. 41-42; J. Hester 1984, pp. 128, 133.

70) Al-Ḥarbī 1981, pp. 325, 333; al-Fayrūzābādī 1969, p. 167; al-Maqrīzī 1955, p. 52; al-Ṭabarī 1879-1901, vol. 3, pt. 3, p. 741.

where (Hārūn) al-Rashīd stayed; and there were palaces
in it for his commanders and staff, and shop ruins,
and wells, and a square reservoir and a distillery,
at a mile from Rayyān."

Indeed, there are reports that Hārūn al-Rashīd, each time accompanied by more than one hundred Islamic jurisprudents (*fuqahā'*), made at least seven official visits to the Islamic holy cities of Makkah and al-Madīnah, and had palaces built at many of the official major rest stops that were co-located with mines along the Darb Zubaydah pilgrimage route to facilitate his mission.

Other sites were substantially built up as well. Speaking of "*ma'din Māwān*," al-Ḥarbī cites a palace, mosque, reservoir, and three wells within its confines—and similar references proliferate throughout the medieval Arab geographies. Al-Hamdānī asserts that "*ma'din Thanīyat ibn 'Iṣām*" contained a fortress, and al-Ḥarbī states that it too was considered to be a true town (having a *minbar*). Yāqūt writes that "ma'din 'Aqīq 'Uqayl" had a governate; whereas al-Ḥāzimī states that "*ma'din Khazabah*" also had a governor: "*wa bihā amīran wa minbaran.*" Al-Iṣfahānī reveals that there was a market at "*ma'din al- Qashrā'*" and that there were merchants at "*ma'din al-'Iṣān*" as well as at "*ma'din al-'Awsajah.*" He describes "*ma'din al-'Aḥsan*" as a village with a citadel and a mine; and "*ma'din 'Arāqīb*" as a mine and a huge village. He likewise claims that "*ma'din Ḥillayit*" was both "a mine and a village." Yaqūt, citing the authority of Abū Miswar, describes a market at "*ma'din al-Nuqrah.*" Al-Ḥarbī asserts that "*ma'din al-Nuqrah*" had a mosque and a palace, two reservoirs, and wells. Thus, both the physical and spiritual needs of the mining community were met with on-site services.[71])

As for the mining itself, medieval Arabian gold was found in various forms. Al-Hamdānī states that gold nuggets as large as six ounces were not uncommon, and that pure grains of gold were often interlaced with the earthen ore brought up from the mining pits. Al-Ḥarbī, in describing operations at the banū Sulaym facilities, speaks of "the earth being mixed with gold." Upon removing stones from the ore mix, this "gold dust" (placer gold) was extracted by washing it in wooden troughs especially designed to separate out dirt and other residuals. After this process, the resulting particulate mix could be refined further by first manually sifting it in a dish; then immersing it in quicksilver to consume residual pollutants; and finally boiling off the quicksilver, leaving the purified gold intact.[72])

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71) Al-Hamdānī 1977, pp. 293-294, 299; al-Ḥarbī 1981, pp. 322, 618; al-Iṣfahānī 1968, pp. 107-108, 159, 199, 368, 370-371, 382; Yāqūt 1957, vol. 4, pp. 138-139; vol. 5, p. 299; al-Ḥāzimī 1995, p. 214.

72) Al-Hamdānī 1987, fols. 26B, 27A, pp. 93-94; al-Ḥarbī 1981, p. 335, D.M. Dunlop

But often, the desired gold and silver existed in the form of microscopic particles compounded with other minerals such as copper, zinc, iron, and lead sulfides (gossans), which required more complex refining techniques. Al-Hamdānī describes the requisite refining process in detail—indicating that medieval mining engineers operating on the Arabian Peninsula smelted the ore through a combustion process employing kilns (*tanānīr*) made of stone-reinforced baked clay. It is apparent from the remnants of those kilns that have been preserved that they were almond-shaped and approximately sixty centimeters both in height and base—and were vented to accommodate one or two sets of leather bellows. Separating the gold from the other minerals contained in the raw ore was accomplished by placing within the kilns measured portions of both firewood and raw ore—pre-pulverized by hammers, millstones, and pestles—as well as clay and mineral salts that accelerated the refining operation. Charcoal, usually produced from mimosa, acacia, or juniper wood, was the primary feedstock used in the smelting process.[73])

The composite was then ignited, and the covered kilns fanned with the bellows for approximately one hour. Because silver, mineral sulfides, and other salts within the ore dissolved at temperatures well below the 1,063 degree centigrade melting point of gold, they would separate outward from the central mass, leaving the purified gold to settle into small pots placed in the base of the kiln. Once the smelting operation was complete, the pots would be removed with tongs and allowed to cool, after which, the pure ore was removed.[74])

While the refining of silver was similar to that of gold, the method of smelting copper ore was technically somewhat different. It involved first pulverizing the mined ore into fragments through impact-crushing and grinding, followed by smelting to separate the copper from the ore. The latter process was carried out in a clay kiln, which was charged with a mixture of crushed ore, flux (usually sea shells, calcite, hematite, and quartz), and charcoal. As heat built up in the kiln, the firing was intensified by a blow pipe worked by bellows. The molten copper then sank to the bottom and the residual copper gangue at the surface flowed out through a hole punched near the base of the kiln into a small bowl

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1957, p. 45; 293-294; J. ʿAlī 1970, vol. 7, p. 512; the Kingdom has once again begun to process this "gold dust," extracting a quite remarkable average of 72 grams of gold per metric ton of earthen ore.

73) Al-Hamdānī 1987, fol. 26B, p. 93, fols. 30A and 30B, pp. 99-101, fols. 56A and 56B, pp. 148-149, p. 371; al-Iṣfahānī 1968, p. 381; Ḥ. Ṣābir 1991b, p. 35; D.M. Dunlop 1957, pp. 46-48; medieval techniques for silver refining described by al-Hamdānī are analogous to those described for gold.

74) Al-Hamdānī 1987, fol. 26B, p. 93, fols. 56A and 57B, p. 148; Ḥ Ṣābir 1991b, p. 35; D.M. Dunlop 1957, pp. 46-48.

placed further down. The kiln was then broken and the copper and slag extracted.[75])

Conclusions

From the wealth of evidence presented in the medieval primary sources, it is clear that the role of precious minerals in stimulating the economy of the medieval Ḥijāz has been greatly underestimated in many modern analyses. Indeed, the synthesis of the documentary data with recent archaeological discoveries strongly indicates that ore production from the gold, silver, and copper mines of the Arabian Peninsula contributed greatly to the commercial expansion that characterized Islam's dynamic first two centuries. So much so, in fact, that in response to Patricia Crone's cogent inquiry regarding early medieval Makkah's economic reason to exist; to wit:[76])

> The Meccans cannot be said to have exported silver and gold at all ... Meccan trade thus cannot be identified as a trade in gold,

it may be asserted that, without question, it was gold and silver used as currency and the dynamic commerce that these twin precious metals underwrote.

The archaeological evidence depicting the economic impact of precious metals on the economy of medieval Arabia thus is persuasive—so persuasive, in fact, that it may now invoke the need to reexamine other conventional interpretations of early Near Eastern history based on the emerging data that ongoing exploration of the Arabian Peninsula has to offer. For the range of tools at the disposal of modern historians of the Peninsula has expanded greatly in the past decade, making possible greater economic understanding based on dramatic new evidence that the artifacts of the region are beginning to provide.[77])

Source Analysis

Unlike many works of Islamic history, in setting its scenarios, the present analysis relies heavily upon medieval Arabic geographies which generally tend to be more empirical than other more traditional Islamic sources. Such sources not only include the well known, predominantly 3rd/9th and 4th/10th century geographers contained in the *Bibliotheca Geographorum Arabicorum*—Ibn Khurradādhbih, Ibn Rustah, al-Masʿūdī, al-Muqaddasī, Qudāmah Ibn Jaʿfar,

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75) Ḥ. Ṣābir 1991a, p. 16.

76) P. Crone 1987, pp. 87-95 passim, pp. 87 and 95 quoted.

77) Including satellite remote sensing infra-red photography techniques that have recently led to the rediscovery of ancient trading cities on the Peninsula.

al-Yaʿqūbī et al.—but also both earlier and later geographers/historians such as al-Balādhurī, Yāqūt, al-Fayrūzābādī, and the native Ḥijāzī ʿArrām al-Sulamī. It has also extensively explored the findings of geographers devoted primarily to capturing the topographical essence of the medieval Arabian Peninsula; in addition to still others, such as al-Hamdānī and Naṣr al-Iskandarī, who are focused more narrowly on describing contemporary mining operations.

In the former category are the works of such chroniclers as the 3rd/9th century al-Ḥarbī's *Kitāb al-Manāsik wa Amākin Ṭuruq al-Ḥajj wa Maʿālim al-Jazīrah*;* the 3rd/9th century al-Iṣfahānī's *Bilād al-ʿArab*; the 4th/10th century al-Hamdānī's *Ṣifat Jazīrat al-ʿArab*; the 5th/11th century al-Bakrī's *Muʿjam mā Ustaʿjam min Asmāʾ al-Bilād wa al-Mawāḍiʿ*; the 6th/10th century al-Ḥāzimī's *Kitāb al-Amākin* and the 10th/16th century al-Samhūdī's *Wafāʾ al-Wafāʾ bi-Akhbār Dār al-Muṣṭafā*. Al-Hamdānī likewise wrote a major treatise devoted exclusively to regional mining called *Kitāb al-Jawharatayn al-ʿAtīqatayn al-Maʾiʿatayn: al-Ṣafrāʾ wa al-Bayḍāʾ*, edited and published by Shaykh Ḥamad al-Jāsir in 1987; whereas much of Nasr al-Iskandarī's commentary on mining appears in al-Jāsir's 1995 edition of al-Ḥāzimī's *Kitāb al-Amākin*. The lexicons of al-Zabīdī, *Tāj al-ʿUrūs*, and Ibn Manẓūr, *Lisān al-ʿArab*, and al-Fayrūzābādī's *Al-Maghānim al-Muṭābah* fi *Maʿālim Ṭābah* likewise have been useful in defining explicit mine sites.

BIBLIOGRAPHY

Primary Sources

Abū ʿAlī al-Hajarī
1992 *Al-Taʿliqāt wa al-Nawādir*, Ḥ. al-Jāsir ed. (Riyadh: Dār al-Yamāmah).
Abū Baqāʾ, Ḥibatallāh
1984 *Al-Manāqib al-Mazyadāyah*, British Museum, London, ms. add. 23; (Amman: Maktabat al-Risālah al-Ḥadīthah).
ʿArrām al-Sulamī
1990 *Kitāb Asmāʾ Jibāl Tihāmah wa Sukkānihā* (Beirut: Dār al-Kutub al-ʿIlmīyah).
Al-Azraqī
1858 *Akhbār Makkah wa mā Jāʾa fihā min al-Āthār*, F. Wüstenfeld ed. (Leipzig)
Al-Bakrī
1983 *Kitāb Muʿjam mā Ustaʿjam min Asmāʾ al-Bilād wa al-Mawāḍiʿ*, 4 vols. (Beirut: ʿĀlam al-Kutub).
Al-Balādhurī
1938 *Ansāb al-Ashrāf* vol. 7, M Schloessinger ed. (Jerusalem: Hebrew University Press).

*) It must be noted that a certain controversy exists as to whether the true author of *Kitāb al-Manāsik wa Amākin Ṭuruq al-Ḥajj wa Maʿālim al-Jazīrah* is al-Ḥarbī or a contemporary, Muḥammad bin Khalaf bin Ḥayyān Waqiʿ, author of *Akhbār al-Quḍāh*, cited below.

1959 *Ansāb al-Ashrāf* vol. 1, M. Ḥamīdullāh ed. (Cairo: Dār al-Maʿārif).
1987 *Futūḥ al-Buldān* (Beirut: Muʾassasat-al-Maʿārif).

Diodorus Siculus
1933-67 *Bibliotheca Historica*, C.H. Oldfather ed. (London: W. Heinemann).

Al-Fāsī
1986 *Al-ʿIqd al-Thamīn fī Tāʾrīkh al-Bilād al-Amīn*, 8 vols. (Beirut: Muʾassat al-Risālah).

Al-Fayrūzābādī
1969 *Al-Maghānim al-Muṭābah fī Maʿālim Ṭābah*, Ḥ. al-Jāsir ed. (Riyadh: Dār al-Yamāmah).

Al-Hamdānī
1884 *Ṣifat Jazīrat al-ʿArab*, D.M. Müller ed. (Amsterdam, 1884).
1977 *Ṣifat Jazīrat al-ʿArab*, M. Al-Akwaʿ ed. (Riyadh: Dār al-Yamāmah).
1987 *Kitāb al-Jawharatayn al-ʿAtīqatayn al-Māʾiʿatayn: al-Ṣafrāʾ wa al-Bayḍāʾ*, Ḥ. al-Jāsir ed. (Riyadh: Dār al-Yamāmah).

Al-Ḥarbī
1981 *Kitāb al-Manāsik wa Amākin Ṭuruq al-Ḥajj wa Maʿālim al-Jazīrah*, Ḥ. al-Jāsir ed. (Riyadh: Dār al-Yamāmah).

Al-Ḥāzimī
1995 *Kitāb al-Amākin*, Ḥ. al-Jāsir ed. (Riyadh: Dār al-Yamāmah).

Ibn al-Athīr
1985 *Al-Kāmil fī al-Tāʾrīkh* (Beirut: Dār al-Kitāb al-ʿArabī).
1989 *Usd al-Ghābah fi Maʿrifat al-Ṣaḥābah* (Beirut: Dār al-Fikr).

Ibn Baṭṭūṭah
Riḥlat Ibn Baṭṭūṭah (Beirut: Dār al-Ṣādr).

Ibn Ḥajar
1910 *Al-Iṣābah fī Tamyīz al-Ṣaḥābah* (Cairo: Maṭbaʿat al-Sharīfah).

Ibn Ḥanbal
1895 *Al-Musnad* (Cairo: Maṭbaʿat al-Saʿādah).

Ibn Ḥazm
1983 *Jamharat Ansāb al-ʿArab* (Beirut: Dār al-Kutub al-ʿIlmīyah).

Ibn Hishām
1955 *Kitāb Sūrat al-Nabī*, 2 vols., M. al-Saqqā ed. (Cairo: Maktabat Muṣṭafā al-Bābī al-Ḥalabī).
n.d. *Al-Sīrah al-Nabawīyah* (Beirut: Dār al-Maʿrifah).

Ibn Ḥujjah
1959 *Thamrat al-Awrāq* (Cairo: Maktabat al-Khānbay).

Ibn ʿImrānī
1973 *An-Anbāʾ fī Tāʾrīkh al-Khulafāʾ* (Leiden: E.J. Brill).

Ibn Isḥāq
1976 *Sūrat Ibn Isḥāq*, M. Ḥamīdullāh ed. (Rabat: Maʿhad al-Dirāsāt wa al-Abḥāth li-l-Taʿrīb).

Ibn al-Jawzī
1917 *Ṣifat al-Ṣafwah* (Hyderabad: Majlis Dāʾirat al-Maʿārif al-ʿUthmānīyah).

Ibn Jubayr
1907 *Riḥlat Ibn Jubayr* (Leiden: E.J. Brill).

Ibn Kathīr
1966 *Al-Bidāyah wa al-Nihāyah* (Riyadh: Maktabat al-Naṣr).

Ibn Khallikān
1948 *Wafāyāt al-Aʿyān* (Cairo: Maktabat al-Nahḍah al-Miṣrīyah).

Ibn Khurradādhbih
1889 *Kitāb al-Masālik wa al-Mamālik*, M.J. de Goeje ed. (Leiden: E.J. Brill).

Ibn Rustah
1892 *Kitāb al-Aʿlāq al-Nafīsah*, M.J. de Goeje ed. (Leiden: E.J. Brill).

Ibn Sa'd
n.d. *Kitāb al-Ṭabāqāt al-Kubrā*, A. 'Abbās ed. (Beirut: Dār al-Ṣādr).
Al-Iṣfahānī, Abū al-Faraj
1927-1974 *Kitāb al-Aghānī*, 24 vols. (Cairo).
Al-Iṣfahānī, al-Ḥasan b. 'Abd Allāh
1968 *Bilād al-'Arab*, Ḥ. al-Jāsir ed. (Riyadh: Dār al-Yamāmah).
Mālik b. Ānas
1905 *Al-Mudawwanah* (Cairo: Maṭba'at al-Sa'ādah).
Al-Maqrīzī
1955 *Al-Dhahab al-Masbūk fī Dhikr man Ḥajja min al-Khulafā' wa al-Mulūk* (Cairo: Maktabat al-Khānbay).
1967 *Shudhūr al-'Uqūd fī Dhikr al-Nuqūd*, M. al-'Ulūm ed. (Najaf: al-Maktabah al-Ḥaydrīyah).
Al-Marzūqī
1914 *Kitāb al-Azminah wa al-Amkinah*, 2 vols. (Hyderabad:Maṭba'at Majlis Dā'irat al-Ma'ārif).
Al-Mas'ūdī
1861-1930 *Murūj al-Dhahab wa Ma'ādin al-Jawhar*, Barbier de Meynard ed. (Paris).
1893 *Kitāb al-Tanbīh wa al-Ishrāf*, M.J. de Goeje ed. (Leiden: E.J. Brill).
Al-Muqaddasī
1906 *Aḥsan al-Taqāsīm fī Ma'rifat al-Aqālīm*, M.J. de Goeje ed. (Leiden: E.J. Brill).
Photius
1974 *Bibliothèque*, vol. 7, R. Henry ed. (Paris: Societe d'edition les Belles lettres).
Pliny
1938-62 *Natural History*, 10 vols., A.H. Rackham ed. (Cambridge: Harvard University Press).
Polybius
1922-27 *The Histories*, 6 vols., W.R. Paton ed. (London: W. Heinemann).
Qudāmah b. Ja'far
1889 *Kitāb al-Kharāj*, M.J. de Goeje ed. (Leiden: E.J. Brill).
Al-Quṭbī
1983 *I'lām al-'Ulamā' bi-Binā' al-Masjid al-Ḥarām* (Riyadh: Dār al-Rifā'ī).
Al-Samhūdī
1955 *Wafā' al-Wafā' bi-Akhbār Dār al-Muṣṭafā* (Beirut: Dār al-Kutub al-'Ilmīyah).
Strabo
1917-32 *Geography*, 8 vols., H.L. Jones ed. (London: W. Heinemann).
Al-Ṭabarī
1879-1901 *Tā'rīkh al-Rusul wa al-Mulūk*, M.J. de Goeje ed. (Leiden: E.J. Brill).
Wakī'
1947-1950 *Akhbār al-Quḍāh* (Cairo: al-Maktabah al-Tijārīyah al-Kubrā).
Al-Wāqidī
1965 *Kitāb Maghāzī Rasūl Allāh*, M. Jones ed. (London: Oxford University Press)
Al-Ya'qūbī
1892 *Kitāb al-Buldān*, M.J. de Goeje ed. (Leiden: E.J. Brill).
1960 *Tā'rīkh al-Ya'qūbī* (Beirut: Dār al-Ṣādr).
Yāqīt
1957 *Mu'jam al-Buldān* (Beirut: Dār al-Ṣādr).
Al-Zubayr b. Bakkār
1961 *Jamharat Nasab Quraysh wa Akhbāruhā*, M. Shākir ed. (Cairo: Maktabat Dār al-'Arabīyah).
1996 *Al-Akhbār al-Muwaffaqīyāt*, S. al-'Ānī ed. (Beirut: 'Ālam al-Kutub).

Secondary Sources

Ackermann, K.
1990 "Arabian Gold Exploration, Ancient and Modern." *Journal of the Saudi Arabian Natural History Society* 3:1:18-31.
Al-Afghānī, S.
1960 *Aswāq al-'Arab fī al-Jāhilīyah wa al-Islām* (Damascus: Dār al-Fikr).
'Alī, J.
1970 *Al-Mufaṣṣal fī Tā'rīkh al-'Arab qabl al-Islām* (Beirut: Dār al-'Ilm li-l-Malāyīn).
'Alī Riḍā, F.
1979 *Umm al-Qurā* (Beirut: Maktabat al-Ma'ārif).
Arabian Shield Development Company
1987 *Annual Report to Stockholders* (Dallas).
Ashtor, E.
1978 *A Social and Economic History of the Near East in the Middle Ages* (London: Variorum).
'Awḍ Allāh, A.
1981 *Makkah fī 'Aṣr mā qabl al-Islām* (Riyadh: Dā'irat al-Malik 'Abd al-'Azīz).
Bookstrom, A.
1992 *Ḥamḍah Gold Prospect: Results of Geological and Geochemical Exploration for Gold in Bedrock and Overburden*, Directorate General for Mineral Resources (DGMR) Technical Report USGS-TR-92-6.
Bosch, P.
1989 *Ḥamḍah Ancient Gold Mines, Kingdom of Saudi Arabia*, U.S. Geological Survey (USGS), USGS-OF-10-7.
Casanova, M.
1920 "Une Mine d'Or au Ḥidjāz." *Bulletin de la section de géographie* 35:24-33.
Clegg, I.H.
1983 *Metal Zoning in the Kutām Copper Deposit* (17/43) Open File Report DGMR-OF-04-15.
Cottard F. and G. Abdulhay
1987-89 *Al-Ḥajar Gold Deposit: Results of Exploration and Prefeasibility Studies*, DGMR Open File Report BRGM-OF-09-14.
Crone, P.
1987 *Meccan Trade and the Rise of Islam* (Princeton: Princeton University Press).
Donzeau, M.
1980 *Geologic Study of the Jabal ash-Shizm Prospect*, BRGM Technical Record 80 JED 5, (Jiddah) reproduced in DGMR. *Mineral Resources of Saudi Arabia*, Special Publication SP-2 (Jiddah: DGMR).
Dunlop, D.M.
1957 "Sources of Gold and Silver in Islam According to al-Hamdānī." *Studia Islamica* 8:29-49.
Al-Fotawi, B.A.
1989 *A Brief Review of the Mines and Mineral Occurrences of the Arabian Peninsula*, DGMR-OF-09-18 (Jiddah: DGMR).
Goldsmith, R.
1971 *Mineral Resources of the Southern Ḥijāz Quadrangle*, DGMR Bulletin No. 5 (Jiddah: DGMR).
Helaby, A.M. and R.G. Worl.
1980 *Exploration and Evaluation of the Ḥajrah-Ḥamḍah Group of Ancient Gold Mines*, USGS Technical Record 3 (Jiddah: DGMR).
Hester, J.
1984 "Preliminary Report on the Third Phase of Ancient Mining Survey:

Southwest Province." 8:2:115-137. *Aṭlāl: The Journal of Saudi Arabian Archaeology* 8:115-137.

Hilpert, L.
1984 *Geology of Mine Hill and Underground Workings, Mahd al-Dhahab Mine, Kingdom of Saudi Arabia*, Technical Record, USGS-TR-03-2 (Jiddah: DGMR).

de Jesus, P.
1982 "Preliminary Report of Mining Survey, 1981 (1401)." *Aṭlāl: The Journal of Saudi Arabian Archaeology* 6:63-79.

Kabāwī, ʿA.
1991 *Dirāsāt fī Āthār al-Mamlakah al-ʿArabīyah al-Saʿūdīyah* (Riyadh: al-Ḥaras al-Waṭanī).

Kiilsgard, T.H.
1968 *Evaluation of a Diamond Drilling Program at the Samrah Mine Near Ad-Dawādimī*, USGS Technical Letter TL-106 (Jiddah: DGMR).

Kiilsgard, T.H. and A. Paupy
1994 "Ad-Dawādimī Silver District." In *Mineral Resources of Saudi Arabia* Directorate General of Mineral Resources (Jiddah: DGMR).

Kishnāwī, A.
1983 "Preliminary Report on the Mining Survey: Northwest Ḥijāz—1982." *Aṭlāl: The Journal of Saudi Arabian Archaeology* 7:76-83.

Luce, R.
1975 *Geology and Ore Deposits of the Mahd al-Dhahab District*, USGS Saudi Arabian Project Report 195 (Jiddah: DGMR).

MacKenzie, N.D., and S. Al-Helwa
1980 "Darb Zubaydah Architectural Documentation Program, pt. II." *Aṭlāl: The Journal of Saudi Arabian Archaeology* 4:37-67.

Martin, C.
1972 *Mining in Ancient Arabia* (Jiddah: DGMR).

Miles, G.
1948 "Some Early Arab Dīnārs." *Museum Notes* (New York: American Numismatic Society) 3:93-114.
1953-54 "'Ali b. 'Isa's Pilgrim Road: an Inscription of the Year 304 (916-917)." *Bulletin de l'Institut Egyptien* 36:477-487.

Moritz, B.
1967 "Al-Maʿādin fī al-Bilād al-ʿArabīyah al-Qadīmah." *Majallat al-ʿArab*, 2:580-595.

Mulḥis, R.
1930 *Muʿjam al-Buldān al-ʿArabīyah: Baḥth al-Maʿādin* (Riyadh: Dār al-Shibl).

Naval Intelligence Division, KSA
1946 *Western Arabia and the Red Sea* (Jiddah: Saudi Arabian Ministry of Defense).

Quinn H.A.
1963 *Samrah* (24/44C), Open File Report DGMR-202 (Jiddah: DGMR).
1964 *Ad-Dawādimī Silver Area*, DGMR Special Report 238 (Jiddah: DGMR).

Al-Rāshid, S.
1980 *Darb Zubaydah* (Riyadh: King Saud University Libraries).

Roberts, R., et al.
1975 *Mineral Deposits in Western Saudi Arabia*, USGS Saudi Arabian Project Report 201 (Jiddah: DGMR).

Ṣābir, Ḥ.
1991a *Ancient Mining and Its Impact on Modern Mineral Exploration in Saudi Arabia* (Jiddah: DMGR).

1991b "Al-Istighlāl al-Qadīm li-l Dhahab wa al-Nuḥās wa al-Fiḍḍah fī al-Mamlakah." Samarec (Jiddah: Ministry of Petroleum and Mineral Resources).

Al-Ṣamad, W.
1981 *Al-Ṣinā'āt wa al-Ḥiraf 'inda al-'Arab fī al-'Aṣr al-Jāhilī* (Beirut: al-Mu'assasah al-Jāmi'īyah li-l-Dirāsāt wa al-Nashr wa al-Tawzī').

Saudi Directorate General for Mineral Resources (DGMR)
n.d. "Geologic Map of al-Ma'malah Area." (Jiddah).
1994 *Mineral Resources in Saudi Arabia* (Jiddah: DGMR).

Al-Sayf, A.
1983 *Al-Ḥayāh al-Iqtiṣādīyah wa al-Ijtimā'iyah fī al-Najd wa al-Ḥijāz fī al-'Aṣr al-Umawī* (Riyadh: Mu'assasat al-Risālah).

Schmidt, D.
1981 *Gold Placer and Quaternary Stratigraphy of the Jabal Mokhyat Area.* USGS Technical Record 19 (Jiddah: DGMR).

Shalabī, A.
1969 *Al-Siyāsah wa al-Iqtiṣād fī al-Tafkīr al-Islāmī* (Cairo: Maktabah al-Nahḍah al-Miṣrīyah).

Shammā, S.
1976 "Al-Madīnah: Ma'din Amīr al-Mu'minīn." *Al-Maskūkāt* 7: 106-109.

Al-Shanti, A.M.
1974 "The Silver Mineralization in the Eastern Part of the Arabian Shield." In *The Second Arab Conference for Mineral Resources, Conference Documents, Background Papers* (Jiddah: DMGR), pp. 65-105.
1976 *Mineralization of ad-Dawādimī District*, DGMR Resources Bulletin 14 (Jiddah: DMGR).

Al-Sharīf, A.
1965 *Makkah wa al-Madīnah fī al-Jāhilīyah wa 'Aṣr al-Rasūl* (Cairo: Dār al-Fikr al-'Arabī).
1968 *Dūr al-Ḥijāz fī al-Ḥayāh al-Siyāsiyah al-'Āmah fī al-Qarnay al-Awwal wa al-Thānī li-l-Hijrah* (Cairo: Dār al-Fikr al-'Arabī).

Sourdel Thomine, J.
1978 "Khaṭṭ." *Encyclopaedia of Islam* (new ed.), vol. 4 (Leiden: E.J. Brill).

Twitchell, K.S.
1958 *Saudi Arabia: with an Account of the Development of Its Natural Resources* (New York: Greenwood Press).

Watts, Griffis, and McOuat (Inc.).
1982 *Al-Masane Mining Project: Kingdom of Saudi Arabia* (Toronto: Watts, Griffis and McOuat).

Worl, R.G.
1979 *The Jabal Ishmās and Wādī Tathlīth Gold Belt*, USGS Project Report 264 (Jiddah: DGMR).