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The Agricultural Marker Stars in Yemeni Folklore

Abstract
This study focuses on a traditional star calendar still used in Yemen to define the seasons and timing of agricultural activities. Yemeni farmers refer to this calendar as the *maᶜālim al-zirāᶜa*, the "agricultural markers." Modern almanacs depict this as a system of twenty-eight distinct star periods, and relate these to the lunar zodiac, the well-known astronomical model of the twenty-eight lunar stations. This association appears to be relatively recent, since a variety of other systems for the Yemeni "agricultural markers" are recorded in historical texts and in ethnographic research. The purpose of this study is to describe how the "agricultural markers" system is supposed to work and compare the contemporary version with one recorded in a seventeenth-century Yemeni text. A glossary of these markers is appended to the article.

Key words: ethnoastronomy — agriculture — Yemen — zodiac — star calendar — weather

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IN Arab tradition there is a fairly substantial literature on star names and weather lore, especially for the Arabian Peninsula.[1] Pre-Islamic poetry and early Islamic sources discuss terminology and provide some descriptive information on the activities of pastoralists and farmers, both of which had the vast, clear night sky to survey the movements of the stars and planets. Although most of this information has been filtered through the hands of scholars over the centuries, it is still possible to reconstruct aspects of practical star calendars by utilizing earlier texts and the findings of contemporary ethnographic research. This is especially true for the largely agricultural land of Yemen at the southwestern corner of the peninsula.

This study focuses on a traditional star calendar used in highland Yemen to define the seasons and the timing of agricultural activities. Yemenis refer to this calendar as the *maᶜālim al-zirāᶜa*, the "agricultural markers."[2] In its contemporary form as a star calendar of twenty-eight distinct periods it is often placed on modern calendars published in Yemen.[3] These star periods are linked to the well-known *manāzil al-qamar*, the "lunar stations" of Arab astronomy. Despite the fact that most Yemenis now know of this system of reckoning and many refer to it, the twenty-eight marker system appears to be a relatively recent variant of what must have been numerous locally relevant star lists. The purpose of this study is to describe how the agricultural markers function and to compare the contemporary system with a different version recorded in a text attributed to ᶜAbd al-Qādir ibn Muḥammad al-Hattār, who is believed to have lived in the seventeenth century.

Yemen has a long and rich agricultural tradition, no doubt the most important on the peninsula.[4] Because of the wide variation in Yemen's geography and environment, there is no one system of agriculture that characterizes the country as a whole. In the coastal region, or Tihāma, the main form of cultivation in the past was based on the seasonal flood flow (*sayl*) in the major wadis descending from the mountains.

These floods resulted from the two major rain periods in Yemen, one during early spring and the other during late summer. In the rugged mountains of the Sarāt chain, extending south from the ᶜAsīr region of Saudi Arabia, the predominant form of farming was carried out on terraces literally carved into the slopes. In the broad central plains wider fields could be exploited, including gardens watered from hand-dug wells. Although springs were of local importance in the highlands, most of the agriculture depended on rainfall; in areas where rainfall was barely sufficient, special techniques were used to harvest the runoff from nearby slopes and channel this to fields in need of extra moisture.

Until the relatively recent introduction of tubewells, the rhythm of agriculture in Yemen revolved around rain. Needless to say, the climate differed from one region to another depending upon such factors as elevation, wind patterns, regional impact from the monsoon systems, and normal annual variations in rainfall. Yet in each part of the country the focus of the farmers' attention was on the coming of the rains. In the absence of published almanacs or televised weather forecasts, which the country now has, it was natural that each locality would devise a local seasonal reckoning system of practical value.

There were several ways to divide up the natural seasons of a particular locality, but the simplest was use of a natural sky clock established by the local farmers through repeated observation of star positions and movements. Even those who were ignorant of formal astronomical knowledge, a science of great importance in the courts of medieval Yemen, could create such simple clocks to define the seasonal round for a particular location.

The Twenty-Eight Agricultural Markers

One of the earliest recorded listings of the twenty-eight marker system comes from an almanac poem of al-Ḥasan ibn Jābir al-ᶜAffārī, who died in 1710 [A. H. 1122] (Varisco 1989a). Although the listing itself is probably older than this, it has not been documented in the rich Yemeni corpus of medieval astronomical and agricultural texts (most of which stem from the Rasulid era of the thirteenth to fifteenth centuries). The Rasulid sources preserve so much Yemeni agricultural lore that it would be surprising for such a systematic reckoning system to have been ignored. While the Rasulid texts mention a number of the individual agricultural-marker stars, there is no indication that these were related one-on-one to the twenty-eight lunar stations. Thus the listing mentioned by Ḥasan al-ᶜAffārī must postdate the fifteenth century. It is difficult to say when the present system of twenty-eight markers was

fixed, but the list does not appear in extant texts before the seventeenth century.

Although there are minor differences in the recorded lists of this twenty-eight marker system, the common theme is a direct link to the Arab astronomical calendar of the lunar stations. The lunar stations represent an Islamic rendering of the earlier Indian concept of a lunar zodiac, the twenty-eight asterisms through which the moon was said to pass in its lunation or monthly orbit around the earth (VARISCO 1991a). The concept of the lunar zodiac, like that of the solar zodiac, was thus a scholarly construct from abroad—neither zodiac rose out of the indigenous folklore of pastoralists and farmers on the Arabian Peninsula. Although the lunar stations could be used for telling time either on a given night or for a period of twenty-seven or twenty-eight days, its primary reference in the literature was astrological. While such esoterica inspired scholars, they held little observational value for those trying to define an expected period of rain or special weather.

Early Islamic scholars combined the Indian lunar zodiac with indigenous Arab folklore on certain stars used to mark seasons and rainfall. The linkage between the formal lunar stations and the twenty-eight markers is illustrated in figure 1, as noted by al-Wāsiʿī, a well-known Yemeni historian at the beginning of this century.

The lunar stations were well known to Yemeni scholars throughout the Islamic period, but, as noted above, the lunar zodiac is largely impractical as an observational tool for defining seasons. There are far more obvious ways for observing stars, as is widely recorded in the literature on Arab folklore. Nevertheless, certain of the stations involve significant stars that make convenient markers throughout the region, so it is not surprising that there are scattered references in medieval Yemeni sources to particular stars of the contemporary twenty-eight marker system. For example, the Yemeni term *ṣawāb* refers to stars in *Pegasus* that also represent the lunar stations of *al-fargh al-muqaddam* and *al-fargh al-muʾakhkhar*. As early as the ninth century, the Yemeni savant Abū Muḥammad al-Ḥasan AL-HAMDANI (893?–945?; cf. 1884, 191) noted that the asterism of *ṣawāb* marked a period in February (*Shubāṭ*) as the sun entered the zodiacal sign of *Pisces* (*ḥūt*). The term *ṣawāb* is not recorded outside of Yemeni dialect, although the Square of Pegasus was an important asterism in Arab ethnoastronomy. Other important marker stars, such as Sirius (*ʿalib*) and Canopus (*suhayl*), are among the brightest in the sky, although neither are zodiacal stars and thus not among the lunar stations. These two bright marker stars are mentioned in the medieval Rasulid texts, but not as part of a larger system of twenty-eight markers.

FIGURE 1

THE AGRICULTURAL MARKER STARS AND THE LUNAR STATIONS
(AL-WASIʿI 1947)

	Station	Identification[5]	Marker Star
1.	*sharaṭān*	*βγ Arietis*	*simāk*[6]
2.	*buṭayn*	*εδρ Arietis*	*ghurūb kāma*
3.	*thurayyā*	*Pleiades*	*ghurūb al-thawr*
4.	*dabarān*	*α Tauri*	*ṭulūʿ kāma*
5.	*haqʿa*	*λφ¹φ² Orionis*	*ṭulūʿ al-thawr*
6.	*hanʿa*	*γξ Geminorum*	*ṭulūʿ al-ẓulm*
7.	*dhirāʿ*	*αβ Geminorum*	*ṭulūʿ al-ẓulm*
8.	*nathra*	*εγδ Cancri*	*kharīf ʿalib*
9.	*ṭarf*	*κ Cancri, λ Leonis*	*suhayl*
10.	*jabha*	*ζγηα Leonis*	*al-rawābiʿ al-ūlā*
11.	*zubra*	*δθ Leonis*	*al-rawābiʿ al-thānīya*
12.	*ṣarfa*	*β Leonis*	*khāmis ʿallān*
13.	*ʿawwā*	*βηγδε Virginis*	*sādis ʿallān*
14.	*simāk*	*α Virginis*	*sābiʿ ʿallān*
15.	*ghafr*	*ικλ Virginis*	*fāriʿ*
16.	*zubānā*	*αβ Librae*	*rabīʿ kāma*
17.	*iklīl*	*βδπ Scorpii*	*thawr*
18.	*qalb*	*α Scorpii*	*najmayn*
19.	*shawla*	*λυ Scorpii*	*ẓulm*
20.	*naʿāʾim*	*σφτζγδεη Sagittarii*	*qalb*
21.	*balda*	*(vacant space)*	*suhayl*
22.	*saʿd al-dhābiḥ*	*αβ Capricorni*	*al-rawābiʿ al-ūlā*
23.	*saʿd bulaʿ*	*με Aquarii*	*al-rawābiʿ al-thānīya*
24.	*saʿd al-suʿūd*	*c¹ Capricorni, βξ Aquarii*	*khāmis al-ṣawāb*
25.	*saʿd al-akhbīya*	*γπζη Aquarii*	*sādis al-ṣawāb*
26.	*al-fargh al-muqaddam*	*αβ Pegasi*	*sābiʿ al-ṣawāb*
27.	*al-fargh al-muʾakhkhar*	*γ Pegasi, a Andromedae*	*al-ẓāfir al-awwal*
28.	*baṭn al-ḥūt*	*β Andromedae*	*al-ẓāfir al-thānī*

A comparison of the lunar stations and the agricultural markers reveals that the main feature the two sets have in common is the total number of asterisms or periods, in both cases twenty-eight. The lunar stations represent the order of stars along the moon's path, with the moon lying in one of the twenty-eight stations each day of its orbit around the earth. After about $27^1/_3$ days the moon begins its course again through the same set of stars. Since the plane of the moon's orbit differs only about five degrees from that of the sun, these lunar stations are in fact derived from the zodiacal constellations (*burūj*). As mentioned above, some of the zodiacal stars are found among the agricultural markers, but only when they form convenient markers, as in the case of the Pleiades. There is no one-to-one correspondence between the stars of the two systems: the lunar stations constitute a

sequential round of stars defining the plane of the moon's orbit, but no such internal consistency exists among the agricultural markers. Some of the markers represent evening risings of stars, some are dawn risings, and others are settings. There is in fact no rationale for placing these twenty-eight markers in one system except to form a clone of the lunar station grid.

Each of the lunar stations defines a period of about thirteen days when plotted against the sun; this was the definition of the so-called *nawʾ* (plural, *anwāʾ*) calendar in Arab astronomy (cf. VARISCO 1991a). According to the classical rendition of the *anwāʾ* system, approximately every thirteen days a new station is said to rise with the sun in the east at the same time that an opposite asterism sets in the west. These stations that rise with the sun (as opposed to those that simultaneously set) are generally referred to by Yemeni scholars as *manāzil al-shams*. Since the asterisms noted in the system are not evenly spaced along the orbit of either the moon or the sun, this is an approximate system. An individual does not naturally observe, as a meaningful period, a particular asterism rising in the east or setting in the west for thirteen days; as a seasonal calendar, the twenty-eight asterisms of the lunar stations are useful only as an arbitrary grid in which the year is divided into twenty-eight thirteen-day periods rather than fifty-two seven-day periods.

The arbitrary nature of the system is also evident for the Yemeni agricultural markers as listed in the twenty-eight marker system. The asterisms referred to as the markers rise or set, as the case may be, at about the times indicated, but the length of a marker period as thirteen days was not determined by observation—it merely constitutes an extension of the lunar stations grid. In no sense do the twenty-eight agricultural markers stand alone from the formal astronomical system of the lunar stations. The names of the markers indicate a mixture of local star names and well-known star terms long established in Arabic.

As a whole, the twenty-eight marker sequence is not relevant for observation at any particular locality in Yemen. Theoretically, the twenty-eight thirteen-day periods represented by the marker stars are equivalent to a year of 365 days.[7] A published calendar will indicate the days elapsed in each star period, but no farmer could distinguish this by observation. Indeed, without such a published calendar in hand most Yemeni farmers would be unable to list the full complement of twenty-eight marker stars. Parts of the system do have practical value, though, as is evidenced by the limited ethnographic documentation of star calendars in Yemen (DOSTAL 1983, 279; MAARSE and IDRISS 1988, 38–39; MESSICK 1978, 439; VARISCO 1985, 62–63).[8] These parts

include practical star calendars that are still known in specific regions; a number of these local sequences were included in the formal system.

An interesting example of the problems involved in adapting local star lore to a formal astronomical grid is found in the sequence of marker stars from *al-rawābiᶜ al-ūlā* to *sābiᶜ ᶜallān*.[9] The word *ᶜallān*, derived from the pre-Islamic Himyaritic month name for September, survives in al-Ahjur of the central highlands as a term for the late summer or early autumn rains. In the marker system *ᶜallān* covers the risings in late fall of three stars of the *Ursa Major* (*banāt naᶜsh*) constellation. In Arabic taxonomy, these are the three "daughters" that accompany the funeral bier, or square of stars referred to here as *rawābiᶜ*. The rising of the seven main stars of *Ursa Major* in the late summer and early fall is of great importance in Yemeni agriculture, so much so that the names of the stars may be given to crops. Although the stars of *ᶜallān* rise in the same general season, it is not the case that the individual stars rise at the intervals demanded in the marker system.[10]

The distinction between the setting (*ghurūb*) and rising (*ṭulūᶜ*) of the Pleiades (*kāma*) in spring requires explanation. The Pleiades star cluster, called *thurayyā* in Classical Arabic, figures much in Arab folklore on the seasons. The first marker is a reference to the disappearance of the Pleiades from the night sky (the cluster appears to be absent from the sky because it is obscured from view at this time by the rays of the rising sun). In Arab folklore it was commonly thought that the Pleiades disappear from view for about forty days; in the Gulf, for example, this period is often called *arbaᶜānīyat* or *mirbiᶜānīyat*, literally "forty" (AL-SAᶜĪDĀN 1981, 1: 60, 148). The reference to the *ṭulūᶜ* (rising) of the Pleiades is to its dramatic dawn rising, the functional significance of *thurayyā* in the seasonal *anwāᵓ* calendar. This is again an arbitrary fit, since the marker for the rising of the Pleiades differs in the system by one position from the station.

There is a totally separate star calendar in Yemen involving the Pleiades and the moon.[11] This is a system that focuses on the conjunction of the star cluster with the moon. This should not be confused with the Pleiades as a lunar station, because the intent is not to define the sequence of stars along the moon's course—the reference here is actually to the normal lunar calendar based on the phases of the moon. The rationale for the system is that the Pleiades align with the new moon once a year in May at the time that the star cluster disappears from view in the sky. In each preceding lunar month the conjunction is said to occur two days later than the start of the lunar month or new moon. Thus, the month before the conjunction in May, the conjunction occurs three days after the new moon; the month before

this the new moon is five days before the conjunction, and so on for a period of about nine months. The basis for this reckoning is the simple fact that the length of the lunation (from conjunction to conjunction with the same star) is about 27 $^1/_3$ days, or almost two days shorter than the average lunar month as based on the phases.

As an arbitrary calendar of the seasons, with a loose fit between specific stars and the general time of year, the twenty-eight marker stars can be used as an almanac. The almanac poem of al-ᶜAffārī (VARISCO 1989a) provides relevant seasonal information for each period, although this is linked to the station rather than to the associated marker. Most of this information is from the scholarly almanac tradition rather than documented Yemeni lore. However, in the circular almanac chart of AL-SIRĀJĪ (1959) the information for each station and period combines general almanac lore with specific regional information on weather and agriculture in Yemen. In both cases the authors did not set out to document how specific Yemenis actually defined the seasons, but rather merged folklore into the arbitrary grid of the twenty-eight stations and markers. The result is a relatively recent scholarly attempt to harmonize what was no doubt a mass of conflicting and fragmentary information into a coherent frame. This is far removed from the practical star calendars in use throughout Yemen over the long course of its history.

ALTERNATIVE MARKER SYSTEMS

The twenty-eight marker system is not the only documented variant of the agricultural markers in Yemen. In addition to local variants described in the ethnographic literature, there is a comprehensive seasonal calendar of markers recorded in a text by ᶜAbd al-Qādir ibn Muḥammad al-Hattār, who is thought to have lived in the seventeenth century.[12] This system is shown in figure 2.

A roughly similar sequence of periods is included in a late copy of the Rasulid almanac of Abū al-ᶜUqūl[13] and the seventeenth century almanac of Ibn Jaḥḥāf.[14] As is readily apparent from the periods listed in al-Hattār's version, this listing bears little resemblance to the twenty-eight lunar stations, although certain of the same asterisms do appear in both listings. The basic division of the year is according to season, of which five are formally distinguished here. The first season listed corresponds to the start of spring at about the time of the vernal equinox. This is referred to as the forty days of *ṣayf*, a term used in Yemen to denote spring, not the summer of the four-season model in astronomy. The use of a forty-day period is common in the almanac tradition and in ethnographic contexts. This particular forty-day

FIGURE 2

THE AGRICULTURAL MARKERS ACCORDING TO ᶜABD AL-QĀDIR AL-HATTĀR[15]

Forty [days] of early spring (*arbāᶜīn al-ṣayf*): from 23 *Ādhār*
al-farᶜ al-awwal: 10 days, 23 *Ādhār* until 1 *Nīsān*
al-farᶜ al-thānī: 10 days, 2–12 *Nīsān*
al-k-th-b (?): 7 days, 13–19 *Nīsān*
al-salmānī al-awwal: 7 days, 20–27[16] *Nīsān*
al-salmānī al-thānī: 6 days, until 2 *Ayyār*
After this are three days that the experts say are intended for cultivation (*tilām*),[17] but these three days are omitted in some areas.

Stars of *jaḥr* [hot and dry part of summer]:
shurūq: 7 days, 6–12 *Ayyār*
al-shurūq al-thānīya: 7 days, 13–19 *Ayyār*
thawr: 7 days, 20–26 *Ayyār*
jadī: 7 days, 27 *Ayyār* until 2 *Ḥazīrān*
sarb: 7 days, 3–9 *Ḥazīrān*
bayn: 7 days, 10–16 *Ḥazīrān*, this is the setting (*ghurūb*) of *sarb*
ᶜalībīya 7 days, 17–23 *Ḥazīrān*, this is the first day in which the sun returns from the north (*al-quṭb al-shāmī*)
ᶜalib 7 days, 24–30 *Ḥazīrān*
asad: 7 days, 1–7 *Tammūz*
suhayl: 14 days, the first seven being from 8–14 *Tammūz* and the latter seven from 15–21 *Tammūz*
After this are three days of *naqāda* from *jaḥr* and *kharīf*; because the weak crop is distinguished or marked (*yuntaqidu*) from the good crop.

Forty [days] of late summer (*kharīf*), which are called the forty [days] of water (*māᵓ*):
al-faṣl al-awwal: 10 days, 25 *Tammūz* until 4 *Āb*
al-rubᶜ al-thānī: 10 days, 5–14 *Āb*
al-rubᶜ al-thālith 10 days, 15–24 *Āb*
al-faṣl al-rābiᶜ: 10 days, 25 *Āb* until 2 *Aylūl*
al-khāmis: 14 days, 3–16 *Aylūl*
al-sādis: 10 days, 17–26 *Aylūl*
al-sābiᶜ: 10 days, 27 *Aylūl* until 6 *Tishrīn al-awwal*

Stars of autumn (*shitāᵓ*):
al-ṣawāb al-awwal: 7 days, 7–13 *Tishrīn al-awwal*
al-ṣawāb al-thānī: 7 days, 14–20 *Tishrīn al-awwal*
al-ṣawāb al-thālith: 7 days, 21–27 *Tishrīn al-awwal*
al-farᶜ al-awwal: 7 days, 28 *Tishrīn al-awwal* until 3 *Tishrīn al-thānī*
al-farᶜ al-thānī: 7 days, 4–10 *Tishrīn al-thānī*
thawr: 7 days, 11–17 *Tishrīn al-thānī*
Setting (*maghīb*) of the Pleiades:[18] 18–24 *Tishrīn al-thānī*
suhayl al-shitāᵓ: 14 days, the first seven being from 25 *Tishrīn al-thānī* until 1 *Kānūn al-awwal* and the second seven from 2–8 *Kānūn al-awwal*
bayn of winter: 14 days, the first seven being from 9–15 *Kānūn al-awwal* and the second seven from 16–22 *Kānūn al-awwal*; on
22 *Kānūn al-awwal* the sun returns from the north (*al-quṭb al-shimālī*)

Season of late winter (*rabīᶜ*): 14 stars
awwal: 7 days, 23–29 *Kānūn al-awwal*
thānī: 7 days, 30 *Kānūn al-awwal* until 5 *Kānūn al-thānī*
thālith: 7 days, 6–12 *Kānūn al-thānī*
rābiᶜ: 7 days, 13–19 *Kānūn al-thānī*
khāmis: 7 days, 20–26 *Kānūn al-thānī*
sādis: 7 days, 27 *Kānūn al-thānī* until 2 *Shubāṭ*
sābiᶜ: 7 days, 3–9 *Shubāṭ*
shamsīya: 7 days, 10–16 *Shubāṭ*
ṣarāṣir and *qarāqir*: 3 days, 17–19 *Shubāṭ*
al-ẓāfir al-awwal: 6 days, 20–25 *Shubāṭ*
ayyām al-ᶜajūz: 26 *Shubāṭ* until 4 *Ādhār*; this is the last intensity of the cold
al-ẓāfir al-thānī: 7 days, 5–11 *Ādhār*
al-ṣawāb al-awwal: 7 days, 12–17 *Ādhār*
al-ṣawāb al-akhir: 5 days, 18–22 *Ādhār*

period is divided into two ten-day periods, two one-week periods, and one six-day period. The later reference to six days for *al-salmānī al-thānī* clearly consists of an arbitrary drop of a day to make a total of forty for the season.

The second season is referred to as the stars of *jaḥr*, a Yemeni term for the hot and generally dry period at the start of summer. This consists of ten units. The first nine of these are each a week in duration, and the last (*suhayl*) is two weeks. Throughout Yemen the dawn rising of the star Canopus (*suhayl*) marks the onset of the summer rains and is thus one of the most important markers in the whole cycle. Included in this season is the midsummer rising of Sirius, a marker of intense summer heat throughout much of the peninsula.

The period of rain is known as the forty days of *kharīf*, a term used in Yemen for the late summer rains rather than for the autumn of the four-season model. Al-Hattār adds that this time is called the forty days of water (*māᵓ*), due to the expected rainfall. The season begins with a period called the first (*awwal*), a reference in this case to the dawn rising of the first of the seven stars of *Ursa Major*, which is known as *banāt naᶜsh* in Arab astronomy. There are in fact seven periods, from the first star through the seventh. Each of these lasts for ten days except for the fifth (*khāmis*), which is listed for two weeks. The forty days would literally apply to the first through the fourth stars of *Ursa Major*, since the entire sequence of seven stars runs a total of seventy-four days here. This implies that a season is missing in the listing. This season is *ᶜallān*, which covers the risings of the fifth, sixth, and seventh stars of *Ursa Major*.[19]

Following the late summer rains and the early fall agricultural activities come the stars of *shitāᵓ*, a term used in Yemen for the dry

autumn rather than for the winter of the four-season model. This consists of eleven weeks and ends with the winter solstice on 22 *Kānūn al-awwal* (December) in al-Hattār's reckoning. The final period of fourteen divisions is *rabīᶜ*, which covers winter and ends at the vernal equinox on 23 *Ādhār* (March). The early spring rains occur in this period.

This alternative scheme of the agricultural markers is presented as a star calendar equivalent to a solar year. The scholar al-Hattār sets up the system within the general astronomical framework of equinoxes and solstices, events of little significance to Yemeni farmers. Within this framework three types of units are distinguished. First are ten-day periods, which are natural divisions for a defined forty-day span. This ten-day period also reflects a common method of time division in earlier Arab agricultural texts, which is simply a division of the month into three units.[20] Next are week periods, either as a single unit of seven days or a double unit of fourteen days. A day or two may be dropped from a week unit in order to provide a fit within the overall number of days in the season. The third type of unit is a short in-between span of three days, which al-Hattār places at the end of *ṣayf* and *jaḥr* and within *rabīᶜ*. With these three units as building blocks, the system is more or less arbitrarily adjusted to equal a complete year.

Most of the periods delineated in this alternative system are in reference to a star or asterism, although no attempt is made to link these stars to the lunar stations. A few of the references are not to stars but to weather periods, such as *ayyām al-ᶜajūz* (the days of the old woman) in late winter or the rain period of *shamsīya*.[21] These "days of the old woman" are mentioned in the earliest almanacs and much of the early Arab weather lore. However, Yemeni farmers appear to know of this period only from the scholarly tradition.

One of the problems arising from the system as presented by al-Hattār is how to interpret the seven units of *kharīf* and the first seven units of *rabīᶜ*. As noted above, the seven units in the late summer period of *kharīf* are based on the risings of the seven major stars in *Ursa Major*. Are the seven units in winter also based on the same stars? The evening risings of these non-zodiacal stars occur in January and early February, whereas the stars are at midheaven somewhat earlier, as noted in Rasulid sources (VARISCO, in press). However, there is no evidence, either in the medieval sources or in contemporary ethnography, that these positions were relevant to Yemeni farmers.

The twenty-eight marker system also includes a winter sequence attributed to the stars of *ṣawāb* (*Pegasus*). Confusion appears to have

arisen in the two versions between the references to *Ursa Major* and *Pegasus*, perhaps because in both cases a readily recognizable square of stars is involved. The confusion is not due to mistaking the stars in the sky, but rather to the fact that the designated markers are based on an arbitrary fit rather than on observation. It is possible that the first seven units in the *rabīᶜ* of al-Hattār's scheme exist mainly to balance the seven units in *kharīf* at the opposite part of the seasonal round. This balancing of periods in opposite seasons is quite common in Arab folklore.

Concluding Remarks

Both the twenty-eight marker system and the system of al-Hattār are scholarly products based on elements of practical star lore. The twenty-eight marker system is a merging of local star names onto the grid of the formal lunar zodiac widely known in Arab astronomy and astrology. The sequence of markers elaborated by al-Hattār is also an adaptation of local star names, but this time into the framework of a 365-day solar year.

Due to the wide circulation of printed calendars and almanacs (a relatively recent phenomenon in Yemen), most Yemenis now accept the twenty-eight agricultural markers as the major seasonal calendar in their heritage; few people in Yemen today have any familiarity with the alternative system given by al-Hattār, although variants are found in handwritten texts. Since much of the local star lore has disappeared in the last several generations, the formal twenty-eight marker system represents a surviving tradition. Unfortunately, this alone does not prove that it functions as an observational calendar or that it ever worked as a system. It is possible to find in both calendars parts of actual star sequences used by Yemeni farmers, but the system as a whole has little or no observational worth. The result in both systems is a generalization from specific sequences to arrive at a general sequence without specific applicability in any given context. It is an interesting intellectual exercise, but the information is far too general to be of value to either farmers or pastoralists in the field.

If neither the twenty-eight marker system nor that of al-Hattār represents a practical star calendar for Yemeni farmers, what value do they have? Beyond this, how does a calendar that is unusable for observation replace practical systems and become the major seasonal calendar in published texts? The first conclusion about both calendars is that they were intended primarily for other scholars and not as practical almanacs for farmers. This is not to say that the compilers did not discern practical value in such calendars. In the twenty-eight

marker system, for example, it is only possible to plot the timing of the markers day-by-day in relation to the lunar stations. While this timing cannot be determined by actual observation, the calendar can serve as a functional reckoning grid for someone who knows the days in the solar calendar. It is important to remember that the almanac compilers, such as al-Hattār, were not trying to do ethnography or to document folklore for its own sake: the point was to fit local folklore into a more general and widely distributed framework. Ultimately, this is the rationale for the general acceptance of any calendar.

During fieldwork among highland farmers in the central highland valley of al-Ahjur in 1978, I was told that everyone followed the official calendar version of the twenty-eight markers. A local expert on star lore referred me to the text of AL-WĀSIʿĪ (1947) rather than his own faulty memory. When I read the list in al-Wāsiʿī, which is shown above in figure 1, I discovered that the local star calendar used by the starlore expert was actually quite different (cf. VARISCO 1985, 63). The local version in al-Ahjur, shown below in figure 3, only covers spring through early autumn. These are the months for cultivation of sorghum, the main crop in the traditional system. Each marker represents a period of about two weeks. While the sequence is in the same general order as in the twenty-eight marker system, the two names of *thābir* and *sāf* are unique to the local system. In this local variant the star *simāk* is important as a marker at the end of April, almost a month later than in the version recorded by al-Wāsiʿī. While virtually all the local farmers said the local star sequence was important, only a few admitted that they bothered to observe it anymore.[22]

No farmer I knew could identify the full complement of twenty-eight marker stars, many of which would not have been relevant for the al-Ahjur valley. Today informants will refer to the thirteen-day marker periods noted on their printed calendars, but only as an arbitrary system similar to the lunar or solar months; no one can observe that it is the first day of a particular marker star. The concept is in fact abstract, since it is devoid of context in a specific location. Just as it is impossible to define a single agricultural system for the country as a whole, so it would be unwise to assume that any particular star calendar in Yemen could have had practical value for observation in a wide region. The local calendar for al-Ahjur, for example, assumed that one would be observing the stars from a horizon cluttered by nearby mountains. Thus the dawn rising of Canopus (*suhayl*) would not be observable on the same day as in an area with an open horizon. The easily observed summer rising of Canopus marked the possible coming of the rains in many parts of Yemen, but the timing of this observa-

FIGURE 3

THE AGRICULTURAL MARKER STARS IN AL-AHJUR, YEMEN[23]

Season of *ṣayf* (spring)
ẓāfir al-awwal (began ca. 1 April 1979)
ẓāfir al-thānī
simāk
thābir
thawr
suqūṭ
ṭulūᶜ
sāf
Season of *jaḥr* (hot and dry period between rains)
ṣulm
ᶜalib[24]
Season of *kharīf* (summer rains)
suhayl
rawābiᶜ awwala (*ūlā*)
rawābiᶜ ākhira
Season of *ᶜallān* (autumn)
khāmis ᶜallān
sādis ᶜallān
sābiᶜ ᶜallān

tion would vary as much as the exact location of the rain itself.

The vast majority of folklore on the seasons, including how stars were used to tell time, has disappeared from Yemen's heritage without a trace. All that remains are the fragments of information recorded by scholars in the past and the faltering memories of the few old men who still remember the old ways (though they rarely depend on them today). The debate is largely over the terms for the stars and what should be done at the rising or setting of particular stellar bodies. Proverbs and sayings may be memorized, but these can quickly become divorced from reality when no one uses the stars involved. The problem is that the observation of stars is no longer necessary for marking the seasons in any given locality. Why bother when there is a calendar on the wall and the date flashes from an inexpensive wrist watch?

Yemenis from all walks of life now treat the twenty-eight marker system as a traditional star calendar, yet few realize that it is an arbitrary scholarly construct that was not used in a practical sense before printed almanacs. I once visited a World Bank-funded regional development office in Yemen and was surprised to find a technical expert, who was from Egypt, preparing a calendar for suggested farm activities according to the twenty-eight marker stars. The idea was to place these activities within a calendar that the local people could readily

understand. The expert assumed that since this system was published on Yemen calendars, it was the local star calendar that farmers used. Unfortunately, his painstaking efforts to pinpoint the day in the marker period on which to begin a certain activity were largely in vain. No one would understand what time was indicated, except in a very general sense, without consulting a published calendar. Modern farming systems in Yemen do not depend on a particular star calendar but are oriented towards time as reckoned in the solar calendar, now widely used in the country. The twenty-eight marker system, as presented in the calendar year, serves as a bridge with the folklore of the past, but it is very much a bridge rather than a functioning traditional calendar.

The decline in use of indigenous folklore on stars and seasons is an obvious loss to the cultural heritage of the country and region. However, its value is largely an academic issue given recent socioeconomic changes in rural Yemen. There is an inherent danger in any scholarly attempt to reconstruct the history of a star calendar from the fragments of information available, because so little is known about how such calendars were actually used. Part of the problem is that we have a tendency to think that what survives must have been widespread and well known in the past. Yet it may be that the writing down of a calendar defining the essence of the agricultural markers as known in Yemen today inevitably compromises the practical value of the calendar for observation. The evolution of the Yemeni marker stars, which has only been sketched in the broadest terms here, ultimately tells us more about the thinking of scholars who recorded the information than farmers who felt a practical need to observe the stars and tell time. For the latter the historian of astronomy has no choice but to rely on the findings of ethnoastronomy.

Glossary of Yemeni Markers[25]

al-ᶜajūz, ayyām

"The days of the old woman." In Arab folklore this is a common name for a period of seven days at the end of February (*Shubāṭ*) and the beginning of March (*Ādhār*). It does not appear to be an indigenous usage in Yemen, although it was probably known through contact with other traditions and literature.

ᶜalib

Highland Yemeni term for Sirius (*al-shiᶜrā al-ᶜabūr*), the brightest star in the sky. This is usually considered the dominant star of the hot and

dry season of *jaḥr*. Al-Hattār places it from VI: 24–30. However, al-Malik al-Ashraf in his thirteenth-century almanac called it one of the markers (*ᶜalāmāt*) of abundant rain in Yemen. In the twenty-eight marker system there is both a summer and winter period of *ᶜalib*. Note that this is marked as *ᶜilb* in some Yemeni texts and pronounced *ᶜulab* near Dhamār (MAARSE and IDRISS 1988, 61).

ᶜalībīya

The period immediately before the rising of Sirius. Al-Hattār places it from VI: 17–23. GLASER (1885, 93) reported this as a sixty-day period.

ᶜallān

Autumn rain season. This term is derived from the pre-Islamic Himyaritic month name of *Dhū ᶜallān* for September. In the twenty-eight marker system this represents three autumn star periods: *khāmis* (fifth), *sādis* (sixth), and *sābiᶜ* (seventh). This reference is clearly to three stars of *banāt naᶜsh* (ε ζ λ *Ursae Majoris*). Al-Hattār does not mention *ᶜallān*, but does refer to the fifth, sixth, and seventh stars in autumn (*kharīf*).

asad

This is the name for the zodiacal constellation of *Leonis*. It is added as a seven-day period between Sirius (*ᶜalib*) and Canopus (*suhayl*) by al-Hattār; this falls from VII: 1–7, which is before the zodiacal month of *asad*.

bayn

Literally, "between." This is a seven-day period from VI: 10–16 in the hot and dry season of *jaḥr* and a fourteen-day period from XII: 9–22 in winter, according to al-Hattār. A similar usage dates back to the Rasulid era when *baynī* referred to a variety of sorghum sown in January and harvested in late March. Al-Malik al-Afḍal (SERJEANT 1974, 48) claimed that the variety was called in this way because it was sown "between" the third and seventh stars of *Ursae Majoris*. The Rasulid dates do not correspond with the marker system as elaborated by al-Hattār.

farᶜ

In the twenty-eight-marker system this is equivalent to *simāk* (probably Spica). Al-Hattār places two *farᶜ* in spring (*ṣayf*) from III: 23 until IV: 12 (i.e., for twenty days) and two in winter from X: 28 until XI:

10 (i.e., 14 days). In Arab astronomy *furūᶜ al-jawzāᶜ* refers to an asterism in *Orion*.

fāriᶜ

This is a variant of *farᶜ*, noted above. In the twenty-eight marker system this refers to the marker associated with the rising of the station *ghafr* in late September.

jadī

The reference in the scheme of al-Hattār is to a period of seven days, from V: 27 until VI: 2. *Jadī* can refer to Polaris or *Capricornus*, neither of which seems appropriate in this context.

kāma

This is a Yemeni term for the Pleiades, also known in Yemen as *thurayyā*. It is sometimes referred to as *kīma* (MESSICK 1978, 440). The term is a variant of the Hebrew and Amharic. A distinction is made in the twenty-eight marker system between the evening rising of the Pleiades in autumn and the disappearance and subsequent dawn rising of the Pleiades in spring.

k-th-b

The rendering and meaning of this term is unclear. In the system of al-Hattār this is a period of seven days, IV: 13–19.

najmayn

Literally, "two stars." This is the period after *thawr* in spring, according to the twenty-eight marker system. IBN QUTAYBA (1956, 86) noted that this term was used in pre-Islamic Arabia for Aldebaran and a nearby star or for any significant pair of stars. Perhaps this is related to the term *kulaybayn* (the two dogs) in the Arabian Gulf.

naqāda

In al-Hattār this is a three-day period, VII: 22–24, so-called because it marks (*yuntaqidu*) the weak and poor crop from the strong and successful crop. The reference here is to the long-standing tradition regarding the rising of Sirius and a fertility rite for knowing if a crop will be successful or not (cf. AL-QAZWĪNĪ 1849 for 5 *Tammūz*).

qalb

Probably *α Scorpii*; this is a lunar station which sets at dawn in late May. There is also *qalb al-asad*, a star in *Leonis*.

qarāqir

The term *qurr* refers to intense cold in Classical Arabic. This usage parallels that of *ṣarāṣir*, discussed below.

rawābiᶜ

In the twenty-eight marker system this is divided into *al-rawābiᶜ al-ūlā* and *al-rawābiᶜ al-akhira*. Variants include *al-rabīᶜ* and *al-rābiᶜīn*. In the autumn, the first *rawābiᶜ* includes $\alpha\beta$ *Ursae Majoris* and the second refers to $\gamma\delta$ *Ursae Majoris*. The *rawābiᶜ* of January may refer to the evening rising of these same stars.

salmānī

Al-Hattār distinguishes a first and second star period by this name in late April and early May. This same term is used in the central highland region of al-Ahjur for a star in the spring. It is a period of six days in April near Dhamār (MAARSE and IDRISS 1988, 38).

ṣarāṣir

The term *ṣirr* is used in the Quran (surah ᶜImrān, 117) for a cold and icy wind. The variant *ṣarṣar* is used for cold winds in Classical Arabic (AL-ḤIMYARĪ 1980, 230). The usage parallels *qarāqir*.

sarb

Al-Hattār mentions this as a seven-day period in early June. It appears to be equivalent to *ṣulm*. The origin of the term is not clear; however, AL-THAᶜĀLIBĪ (n.d. 143–44) noted that *sirb* refers to a group of gazelles, women, or sandgrouse. Cf. *ṣulm* below.

ṣawāb

The term *ṣawāb* has a long history in Yemeni dialect. The savant AL-HAMDĀNĪ (1884, 191) mentioned this as a star at the time of the zodiacal sign of *Pisces*. Al-Malik al-Ashraf (in VARISCO, in press) defined this as a square of four stars rising in the path of Canopus and opposite the position of *Ursa Major*. This fits an identification of the Square of Pegasus, which includes the lunar stations of *al-fargh al-muqaddam* and *al-fargh al-muᵒakhkhar*. Al-Malik al-Ashraf and other Rasulid sources place the setting of the first *ṣawāb* on II: 9 and the second on II: 15; these marked the first appearance of spring rain in Yemen. In the twenty-eight marker system the stars of *ṣawāb* parallel those of *ᶜallān* (*Ursa Major*), while al-Hattār distinguishes three weekly periods of *ṣawāb*.

shamshīya

This is a classical term for a warm period of rain (Ibn Kunāsa in AL-MARZŪQĪ (1914, 1: 200). It is similar to the usage of *ramaḍ* or *ramaḍī* in some Arab almanacs.

shurūq

This term literally refers to a "setting." Al-Hattār cites two weeks of these periods at the start of the hot *jaḥr* season. The reference is probably to the disappearance of the Pleiades from the sky in early May, as implied by *ghurūb kāma* in the twenty-eight marker system.

simāk

This is a variant for *farᶜ* in the list of al-Ḥaydara (in SERJEANT 1954) and AL-WĀSIᶜĪ (1947). In al-Ahjur of the central highlands, a first and second *simāk* are distinguished in the spring. The reference is probably to the April setting of the lunar station *simāk* (*α Virginis* or Spica), which is *al-simāk al-aᶜzal* in Arab astronomy. As such, this would be a scholarly addition and not based on observation.

suhayl

Canopus (*α Carinae*). The rising of this important southern star in July has long been a marker of the late summer rains in Yemen. In the twenty-eight marker system a winter period of *suhayl* is also distinguished at the end of December. Al-Hattār makes a similar distinction with each period lasting two weeks.

ṣulm

In the twenty-eight marker system this star has a morning rising in the summer and an evening rising in the winter. I am convinced that this is a corruption of the term *ẓulm*, discussed below. The almanac of Abū alᶜ-Uqūl equates *ṣulm* with *sarb*. ROSSI (1953, 354) notes a variant of *aṣlām*.

thawr

This is the classical term for the zodiacal constellation of *Taurus*. The reference here is to one or more stars in *Taurus*, perhaps Aldebaran. The Rasulid almanacs consistently record a rain period of *thawr* on V: 19. Al-Hattār begins his seven-day period of *thawr* on V: 20. In the twenty-eight marker system there is both a spring and late autumn period.

thurayyā

This is the classical term for the Pleiades. Al-Hattār refers to the evening rising of the Pleiades in late November. The usage of *maghīb* in al-Hattār's text is in reference to the dawn setting which occurs at the same time as the evening rising. The use of the Pleiades as a marker star should not be confused with the Pleiades calendar based on the conjunction of the new moon and this asterism.

ẓāfir

This term is noted by al-Malik al-Ashraf as equivalent to *sāʾiqān*, a Yemeni term for the classical *muḥlifān* ($\alpha\beta$ *Centauri*). In nautical astronomy these are equivalent to *ḥimārān*. Al-Hattār separates the first and second *ẓāfir* with the seven days of the old woman (*ayyām al-ʿajūz*) in late winter.

ẓulm

The identification of this star is not clear, but I think the best fit is α *Orionis*. One Rasulid almanac equates the term *ẓalīm* (sic!) with *mankib Jabbār*, or the shoulder of Orion. This usage should not be confused with classical references of *ẓalīm* to stars in *Eridani*, *Pisces* or *Centauri* (cf. KUNITZSCH 1961, 119). Another Rasulid text indicates the rising of *ẓulm* on XI: 17. A star called *ẓalmī* is used in a central Omani star calendar (WILKINSON 1974, 47). There is some confusion between *ẓulm* and *ṣulm*, but the latter appears to be a corruption.

NOTES

1. Only a limited amount of information has been published on the folk astronomy of the Arabian Peninsula. Much of this focuses on the linguistic evidence rather than on the practical application of folk calendars. For information on the pre-Islamic sources, see VARISCO 1987, 1991a. The folk astronomy of the Arabian Gulf is discussed in VARISCO 1990.

2. The first description of this calendar in a Western source is that of GLASER (1885), which is also quoted in SERJEANT (1954, 437). Published lists of the agricultural markers include al-ʿAffārī (VARISCO 1989a, 11), al-Sirājī (1959), al-Wāsiʿī (1947, 42–59) and al-Waysī (1962, 126). Ethnographic data on the agricultural markers can be found in BEDOUCHA (1986, 8), DOSTAL (1983, 279), DE LANDBERG (1923, 2: 1092–1110), MAARSE and IDRISS (1988, 38–39), MESSICK (1978, 439), VARISCO (1985, 62–63). There are also references in collections of Yemeni proverbs and poetry, e.g., ʿINĀN (1983, 184–85). Andre Gingrich (Museum für Völkerkunde, Vienna) is also preparing a study on this system based on his ethnographic study in the northern highlands of Yemen.

3. One of the most widespread calendars in the past two decades in the north has been that published by the Ṣanʿāʾ bookstore al-Jīl al-Jadīd. Before the revolu-

tions during the 1960s in the north and south, the annual almanac of Muḥammad al-Ḥaydara mentioned the twenty-eight periods (cf. SERJEANT 1954).

4. There are a number of sources on traditional Yemeni agriculture. For sources on the medieval period, see SERJEANT 1974 and VARISCO 1989b, in press. KOPP (1981) provides a geographical survey of Yemen's agricultural regions. For more sources, see VARISCO 1991b, 171–72, note 5.

5. The identification of the stations is based on KUNITZSCH (1961). Please note that the marker star is not equivalent to the stars in the station. For the identification of the marker stars, see the Glossary.

6. According to al-Wāsiᶜī, the period of *simāk* begins on 29 *Ādhār* (March). Each successive marker period begins roughly thirteen days later.

7. One of the marker stars is given an extra day, as is also the case for the lunar stations, so that the total number will in fact equal 365.

8. I plan to address the significance of these ethnographic examples of star calendars in a future book entitled *Star Calendars of Yemen.*

9. These are equivalent to stations 10–14 in figure 1.

10. The autumn rising of each of the seven stars is documented in the Rasulid sources. Al-Malik al-Ashraf, in his thirteenth-century almanac, records the rising of the first four stars during the Julian month of *Āb* (August), the fifth at IX: 14, the sixth at IX: 21, and the seventh at IX: 30. These times are based on actual citings rather than an arbitrary fit of thirteen days.

11. There is a star calendar in Yemen based on the conjunction of the moon and the Pleiades, but this is not a formal lunar zodiac. For more information on this calendar, see GLASER 1885 and VARISCO 1989a, 13–14.

12. I have not yet been able to find a biographical reference to al-Hattār. The text, entitled *Qāᶜida fī maᶜālim al-zirāᶜa*, consists of a single page in manuscript D252 Arabo of the Ambrosiana Library in Milan, Italy. I am indebted to Prof. David A. King for bringing this manuscript to my attention.

13. Muḥammad ibn Aḥmad ibn al-Ṭabarī, known as Abū al-ᶜUqūl, flourished around the turn of the thirteenth century A.D. as a noted astronomer in the court of al-Malik al-Muᵓayyad Dāwūd. For the location of extant copies of this almanac, see VARISCO 1989b, 152.

14. Ibn Jaḥḥāf's almanac can be found in several copies, as described by KING (1983, 46–47).

15. This is a direct translation of the text, which is a listing rather than a narrative flow. Words in brackets are added for clarification. In Yemeni dialect the seasonal terms do not correspond directly to the classic four-season model; I provide the relevant seasonal term for the outside observer. Definitions of star names and periods are provided in the Glossary. Note that all dates are expressed in Julian reckoning and must be adjusted for comparison with the contemporary Gregorian calendar.

16. As numbered, the text reads "8 days"; clearly this is a transcription error.

17. In Yemeni dialect *tilām* refers to tillage and planting at the same time. The classical term *tilm*, with the sense of "furrow," has cognates in Hebrew and Amharic (RABIN 1951, 26).

18. This is the dawn setting, which is equivalent to the evening rising. It is the evening rising that figures prominently in Yemeni folklore.

19. See note 9.

20. The Rasulid texts refer to the best time to plant sorghum in the mountains as *al-ᶜashr al-mukhtāra* (the ten select [days]) in the months of *Nīsān* and *Ayyār*. The Greek texts divide the zodiacal months into three deccans, or units of ten days each.

21. Although al-Hattār refers to these as stars, they are not.

22. This may be due in part to the fact that the farmers I studied relied primarily on springs for irrigation. Farmers on rain-fed fields in the surrounding area were more dependent on direct rainfall and needed to time their activities more precisely to coincide with this. Farmers on irrigated land in al-Ahjur appeared to rely more on a local shadow-scheme reckoning system.

23. This is one variant of the local system, which most of the local farmers had forgotten by the time I arrived to do fieldwork in the valley. There are a number of inconsistencies in the system as presented.

24. Some say that part of *ᶜalib* is included in the season of *kharīf*.

25. This is a brief discussion of the major markers mentioned in the article. A complete study will appear in a future book, *Star Calendars of Yemen.*

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