

A Naked-eye Guide to the Night Sky

The Stars of July



Hercules, from Celestial Atlas by Alexander Jamieson, 1822

The Sun has turned its back on northern skies, and is headed southward on its annual migration. But even in parting, it leaves behind the simmering warmth of days - a gift that will linger well into the weeks of fall. Nights, meanwhile, are short, and there's much to be seen overhead. Stars in the west are lining up to exit, while those in the east make new acquaintance. The band of the Milky Way climbs quietly higher, unveiling by degrees the core of the galaxy we call home.

The pages that follow will introduce you to the stars alight in this month's sky. Printable maps are attached to the end of this guide - they depict the stars as seen from mid-northern latitudes in the hours shortly after sunset, and will serve reasonably well for the entire month. Viewing is best on a moonless night. You'll want a vantage point with an uncluttered horizon, away from the glare of lights. A general sense of the cardinal compass directions is also helpful. If you're not already familiar with how to read a map of the sky, there's an attachment offering some pointers - you might take a few moments to look it over before your session with the stars. Otherwise, print the charts, grab a red-filtered flashlight, and head outside for an evening under summer's darkened dome...

The Northern Sky

We'll start with a look at the northern sky. If you don't know where north is, the stars can help you find it. Begin by locating the pattern of stars known as the "Big Dipper." It's comprised of seven prominent stars, relatively equal in brightness, and probably the most widely recognized figure in the sky. End-to-end, the Dipper measures about a hand-span, viewed at arm's length with fingers splayed wide. It's visible every night of the year from any location in the Northern Hemisphere, though its orientation changes over time - hour by hour and night by night it circles the northern skies, sometimes appearing "right-side-up," and other times spilling its contents. These changes, of course, derive from Earth's rotation and its dance around the Sun. Nevertheless, face the Big Dipper and you know you're looking northish.

Now find the stars **Merak** and **Dubhe** at the end of the Dipper's bowl. The names of these stars come from Arabic, and refer to the figure of a bear - the Dipper is actually part of a larger group of stars called **Ursa Major**, the **Great Bear**. But Merak and Dubhe are also known as "the pointers," because an imaginary line drawn through them points to **Polaris**, the **North Star**. This is true no matter the hour of night or the time of year.

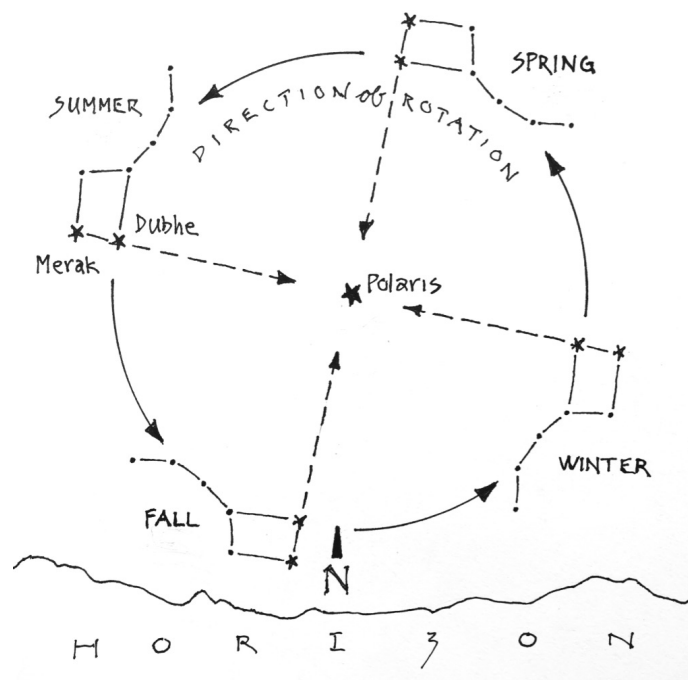


Figure 1: Finding North by the Big Dipper.

Merak and Dubhe point the way to the North Star, Polaris.

The diagram shows the approximate position of the Big Dipper, season by season, in the hours shortly after sunset.

Contrary to myth, the North Star is not especially bright, but it's the first prominent star you'll spot along that line from the pointers. From mid-northern latitudes, Polaris will be found roughly half-way between the horizon and the zenith directly overhead. It's the only star in the sky that stays put, no matter the hour or season. Face Polaris, and you're looking north - not just north-ish, but the *Real Deal*.

Once you have your bearings, it's time to pull out your star chart. Face Polaris and hold the chart in front of you like a steering wheel, with "N" at the bottom, pointing toward the ground. That "N" on the chart represents the north point on the horizon in front of you, and stars in the lower half of the chart will match those you see in the northern sky. Remember that the (+) symbol in the center of the chart represents zenith - anything above that on the chart is actually in the sky behind you.

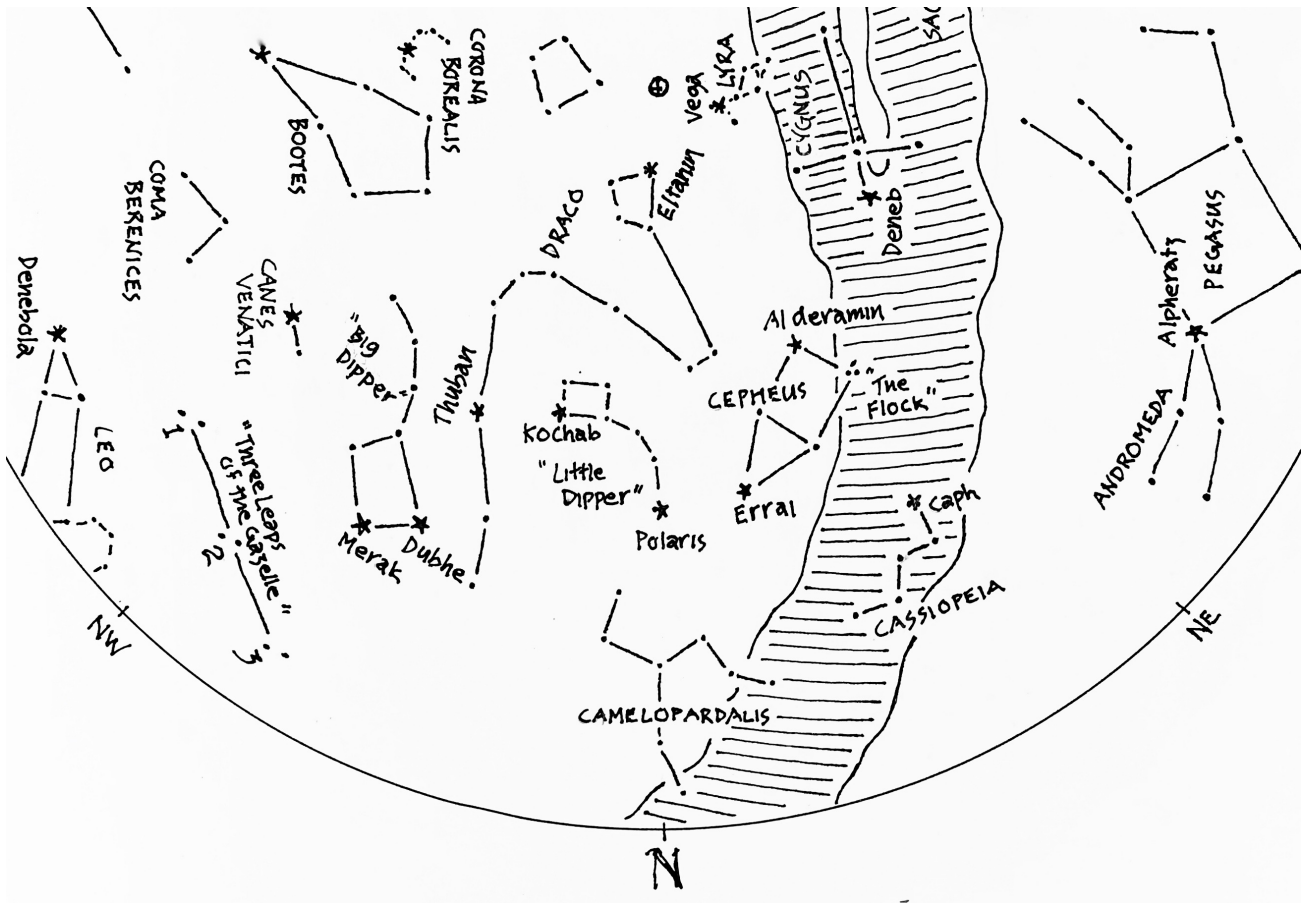


Figure 2: The Northern Skies of July

A detail from this month's star chart:
The Dippers, a King and his consort, and a Dragon lordling over all.

From Polaris, look for an arc of dim stars reaching upward to the left, ending in a small rectangle. Together these stars form the figure of the “**Little Dipper**”, the most visible part of **Ursa Minor**, the **Lesser Bear**. **Kochab**, the star at the Little Dipper’s rim and brightest in the figure, is sometimes called “the Guardian of the Pole.”

Draped over and above the Little Dipper, look for another arc of dim stars, recurving upward at the right to end at a group of four. This is the writhing figure of **Draco**, the **Dragon**. The group of four marks the dragon’s head - brightest star there is **Eltanin**, Arabic for “head of the dragon.” On these evenings of July, the Dragon’s head rears almost directly above the North Star, Polaris. Elsewhere in the Dragon, look for the star **Thuban**. Owing to a wobble in Earth’s axis, Thuban served as North Star during construction of the Egyptian pyramids. Today, of course, the pole belongs to Polaris, but fame is fleeting. Gradually the pole will drift counterclockwise through a circle of other luminaries, returning to Polaris in 26,000 years. Figure 3 illustrates the progression of the pole through the stars of the northern skies.

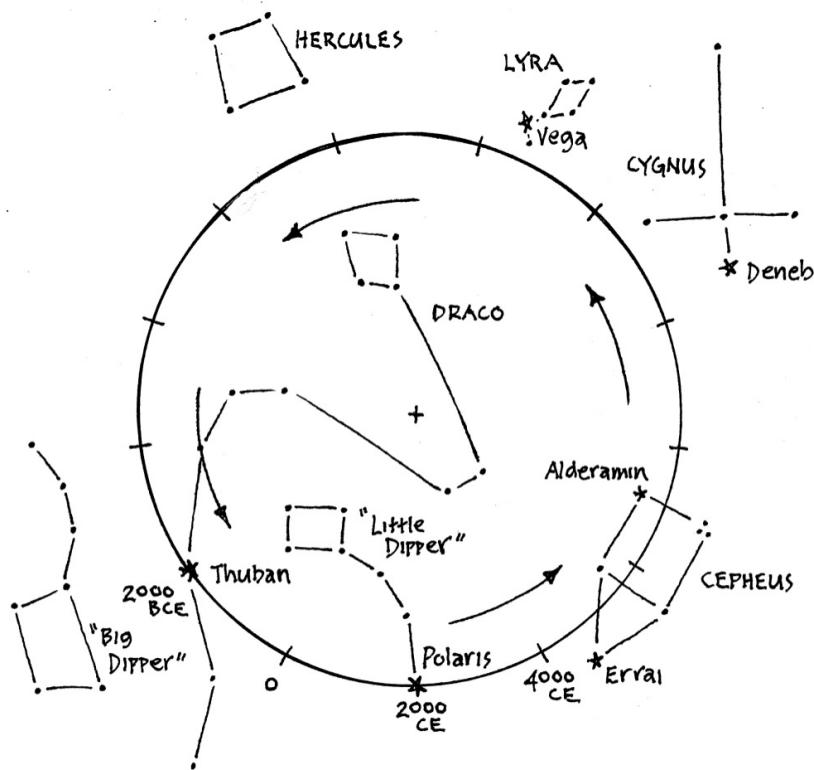


Figure 3: Migration of the North Celestial Pole

Detail showing path of the Pole through figures of the northern skies. Tic marks show the progression at intervals of 2,000 years. Center of the polar circle lies in the clutches of Draco, the Dragon.

Now, return to the pointers Merak and Dubhe, and extend a line through and past Polaris to the next star you see. This is **Errai**, one of the stars in the figure of **Cepheus, King of Aethiopia**. This group resembles the shape of a house you might have drawn as a five-year-old - except that on these evenings of July it's come unmoored from its foundation, and appears to be tumbling across the sky! In one corner of the figure you'll find a trio of dim stars known as "the flock." Long before its coronation, the King was recognized more humbly as a shepherd - in fact, Errai is Arabic for "shepherd", and the star watches dutifully over the flock of three through the hours of the night.

Below Cepheus look for the distinct zig-zag of five stars marking his consort **Cassiopeia**. You might be familiar with the tale of havoc wreaked by Cassiopeia's boasts of beauty. The star atop the figure is **Caph**, which translates to "hand" - imagine it holding a mirror, into which the Queen gazes in self-admiration.

Continuing clockwise, look below Polaris for an indistinct smattering of dim stars making the figure of **Camelopardalis**. The name is a Latin mash-up of the Greek words for "giraffe" and "leopard." If you have difficulty finding the figure, you're in good company - the Greeks deemed this portion of the sky devoid of stars. On these evenings of July, the giraffe-leopard hides quietly near the horizon, escaping the gaze of the Dragon high above.

The six figures we've identified in the northern sky are **circumpolar** - that is, stars clustered around the North Star, Polaris. You'll find that they're always visible - clock and calendar in the northern sky, turning slowly 'round the pole through the hours of the night and the seasons of the year.

The Western Sky

Shift your attention west with a quarter turn to your left. Rotate your star chart so that "W" is at the bottom, toward the ground. What you see in the bottom half of the chart will match the brightest stars in the western sky, as seen in Figure 4. Stars in the west have been making their way across the sky for several weeks, and you'll likely recognize many of them from last month's star chart. Now in July, they steer for the horizon after a season aloft, much as our own star, the Sun, seeks respite at the close of day.

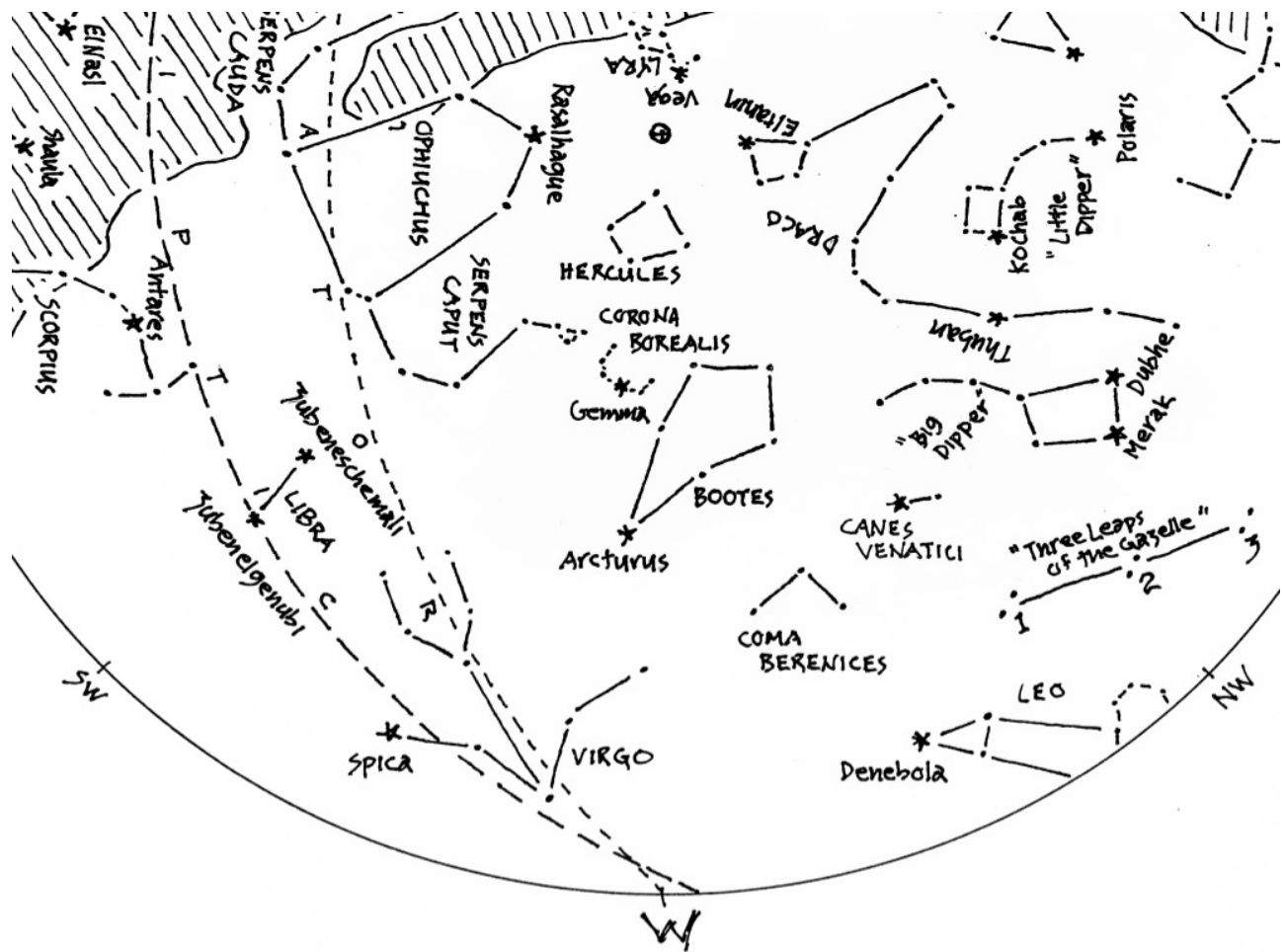


Figure 4: The Western Sky
 "Arc to Arcturus, and speed on to Spica."

Begin your survey of the western sky by finding again the Big Dipper, located now a bit to the right. We saw earlier that a line drawn through Merak and Dubhe points the way to Polaris. Conveniently, the same line drawn in the *opposite* direction leads to **Leo, the Lion**, fifth sign of the Zodiac. The Zodiac lights the path of the Sun, Moon, and planets through the months and seasons of the year. This month finds Leo slinking into the undergrowth at the horizon, but you might catch sight of bright **Denebola**, the fluff at the end of his tail, before he disappears.

Above and right of the Lion's tail, look for the **Three Leaps of the Gazelle**. You'll not spot the gazelle – not with the Lion nearby. According to a 13th century Arab astronomer, it was a swish of the Lion's tail that sent the gazelle into hiding. But the tracks remain – a rare sight indeed among the stars, and a delight if you can find them. Perhaps we'll glimpse the gazelle on another evening, grazing in the twilight overhead.

Now return to the Dipper and extend the arc of its handle *left* to arrive at the bright star Arcturus (handy reminder: "Arc to Arcturus"...). Arcturus is the third brightest star in the sky, and marks the figure of **Bootes, the Herdsman**, comfort and kin to shepherds tending flocks through the cover of night. The rest of the Herdsman can be seen in the kite-shaped group of stars above and right of red Arcturus. Sometimes known as the "bear-driver", Bootes keeps a wary eye on Ursa Major – see if you can spot the Herdsman's dogs, **Canes Venatici**, nipping at the heels of the Bear as it roots for huckleberries around the pole.

The Herdsman is a handy guide to other figures in the west. Close above, look for the lovely half-circle of stars known as **Corona Borealis, the Northern Crown**. Brightest of the bunch is aptly named: **Gemma**, truly a gem in the crown. Higher still, look for the square-ish figure of **Hercules, the Kneeling Man**. You may be familiar with his Twelve Labors of atonement. We'll leave him for now with a foot resting a foot triumphantly on the head of the Dragon, but there will be more to say about Hercules at the end of this month's guide.

Below and right of the Herdsman, look for the wispy figure of **Coma Berenices**, named for the Queen of Egypt and her beautiful hair. It's a difficult figure to find – just a blur of stars at the edge of visibility. The story of Berenice's hair was told in the star guide for June. By coincidence, the figure marks location of the north galactic pole – take a moment to imagine the Queen's golden tresses slowly winding 'round the axis of the Milky Way Galaxy. As the month wears on, the axis will sink toward the west, drawing the band of the Milky Way higher in the east – with a bit of imagination, you might even *feel* the galaxy tipping on edge in the weeks to come.

Now trace once more the arc of the Dipper's handle, past Arcturus to find **Spica** ("Arc to Arcturus and speed on to Spica"). Spica is the brightest star in the figure of **Virgo**, the **Virgin**. This figure has long been associated with the season of harvest, playing host to the Sun on the Autumnal Equinox. It was Spica's relation to the Sun, in fact, that led the Greek astronomer Hipparchus to conclude that the heavens were slowly shifting - the same shift responsible for the wandering of the North Celestial Pole discussed earlier. To the Babylonians, the Virgin was known as "the Lady of the Fields" and Spica marked a head of wheat she held in hand. Other stars in the figure are relatively dim, as we might expect of the demure young maiden.

Taken together, the bright stars Spica, Arcturus, and Denebola are sometimes known as the "Spring Triangle" - weeks ago, they and their cohorts heralded a turn toward the warming of days. This month finds them settling toward the west, clear indication of the passage of seasons as told in the stars overhead.

The Southern Sky

Position yourself to view the southern sky with another turn to the left. Rotate your star chart so "S" is at the bottom, pointing toward the ground. You'll know for sure that you're facing south if Polaris, the North Star, is directly behind you.

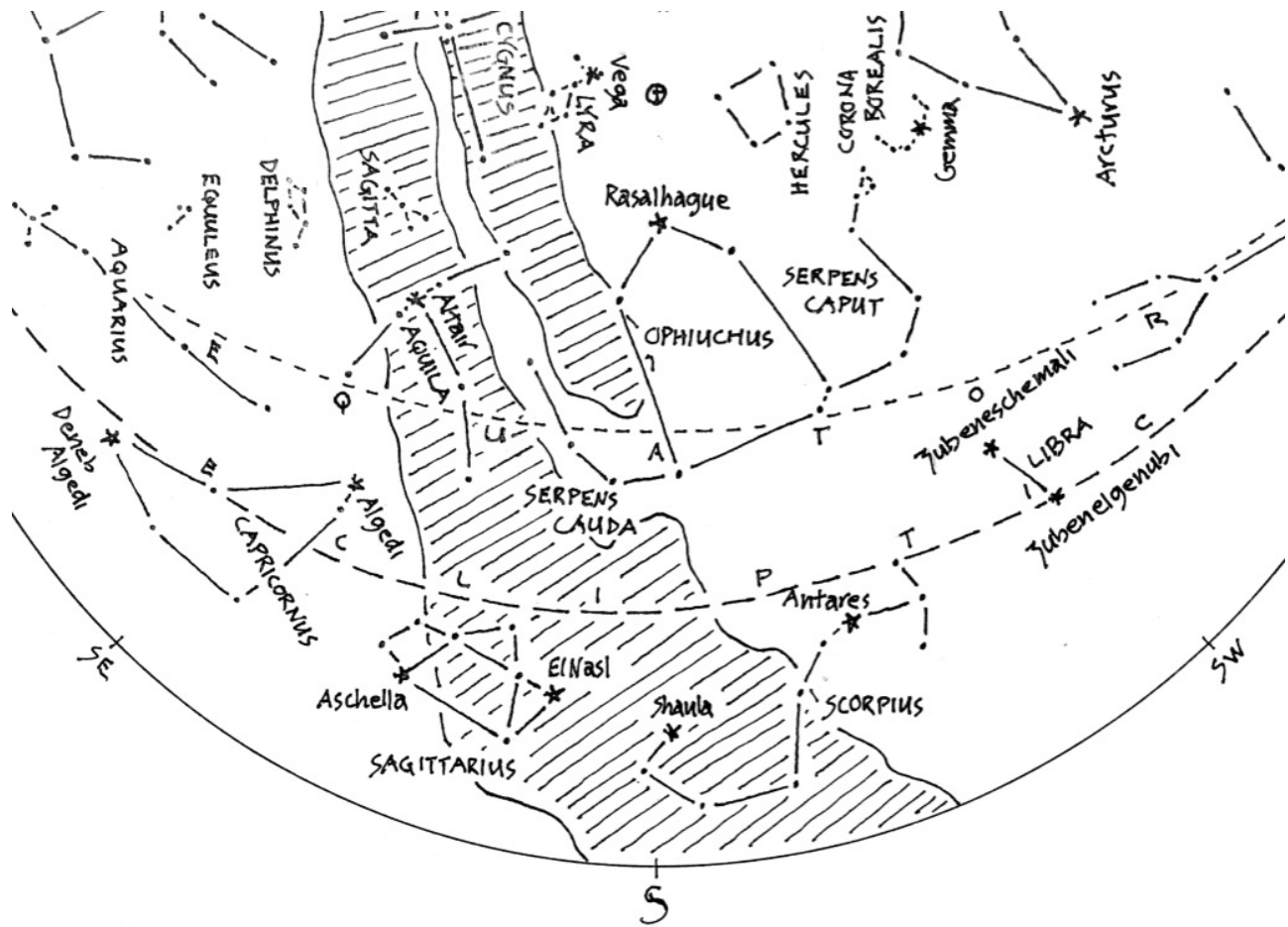


Figure 5: The Southern Sky

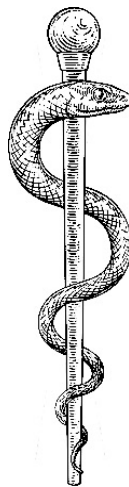
A scorpion, snakes, and (thankfully!) a doctor in the house.

You should have no trouble spotting the distinct red star **Antares** in this month's southern sky. It's the brightest star in the figure of **Scorpius**, the **Scorpion**, another sign of the Zodiac. Antares translates as "rival of Mars," owing to its reddish hue. The star sits very close to the ecliptic, so that the rivalry is easily observed when Mars passes through the neighborhood. The body of the Scorpion curves downward and left of Antares, then upward to end at **Shaula**, "the sting."

Pacific Islanders saw the figure as a fishhook, used by the trickster Maui to raise islands from the sea. But the shape of a scorpion is hard to miss - look to the right of Antares for a distinct arc of three stars marking the scorpion's head and claws.

In antiquity, the Scorpion's claws were imagined farther to the right, in a pair of prominent stars about halfway between Antares and Spica. These stars now mark the Zodiac sign of **Libra**, the **Scales**, but their names betray their origins: higher of the two is **Zunbeneschemali**, and the lower is **Zubenelgenubi** - "northern claw" and "southern claw" in Arabic. Similar in appearance, they've symbolized balance since the time of ancient Babylon - it was among these stars that the Sun found its footing on the Autumnal Equinox, before the slow drift of the heavens moved it into the sign of Virgo. Presently, the southern claw lies less than a degree from the ecliptic - with a bit of luck you might see it occulted by the passing Moon in the weeks and months ahead.

Directly above the Scorpion and the claws, look for the ample figure of **Ophiuchus**, the **Snake Handler**. This is a challenging figure to identify, owing to its capacious size and lack of bright stars. You can begin by finding **Rasalhague**, brightest in the figure, whose name translates as "head of the Serpent Bearer." From there it will take some imagination to make out a pair of arms dangling downward, grasping the writhing snake **Serpens**. The snake is divided into two: **cauda** (Latin for "tail"), and **caput** (Latin for "head"). You can spot the serpent's head twisting upward to the right, eyeing with interest the sparkling prize Gemma in the Northern Crown. The Snake Handler is another ancient figure, purported to represent Asclepius, the god of healing and medicine. The snake evokes rejuvenation with the shedding of its skin, and the Rod of Asclepius survives today as a symbol of the medical profession.



Now left of the Scorpion, look for the figure of **Sagittarius**, the Archer. **El Nasl** translates as “tip of the arrow” and **Ascella** means “armpit” – vague references to a figure drawing a bow, but you’ll likely find the figure easier to recognize as a teapot, tipping to the right with steam of the Milky Way issuing from its spout. You’ll notice that the Galaxy is especially bright in the direction of the Archer. Take a moment to trace the band of stars across the sky to the north, toward the figure of Cassiopeia behind you, and you’ll see that it dims noticeably. That view toward the north looks away from the Galaxy’s center, with fewer stars to light the sky. But southward the Galaxy brightens, testament to the multitudes of stars at its core. Come December, the Sun will join them, lodging itself among the stars of the Archer for the Winter Solstice.

The fact that the Milky Way is comprised of stars was long suspected, but only confirmed after invention of the telescope. For most of human history, it was eyed with conjecture: a bridge perhaps, or a river... or, as its name implies, a splash of spilt milk. Nothing, really, to cry over. Some traditions saw it as the Road of Souls, alight with campfires of the dead on their journey to the hereafter.

So... is it stars, or is it souls?

Either way, whether by luck or design, the Archer’s arrow points to a gathering in the southern skies of summer.

The Eastern Sky

We'll complete our circuit of the sky with a view to the east - turn again, and adjust your chart accordingly. You'll know you're facing east if Polaris, the Pole Star, is directly to your left.

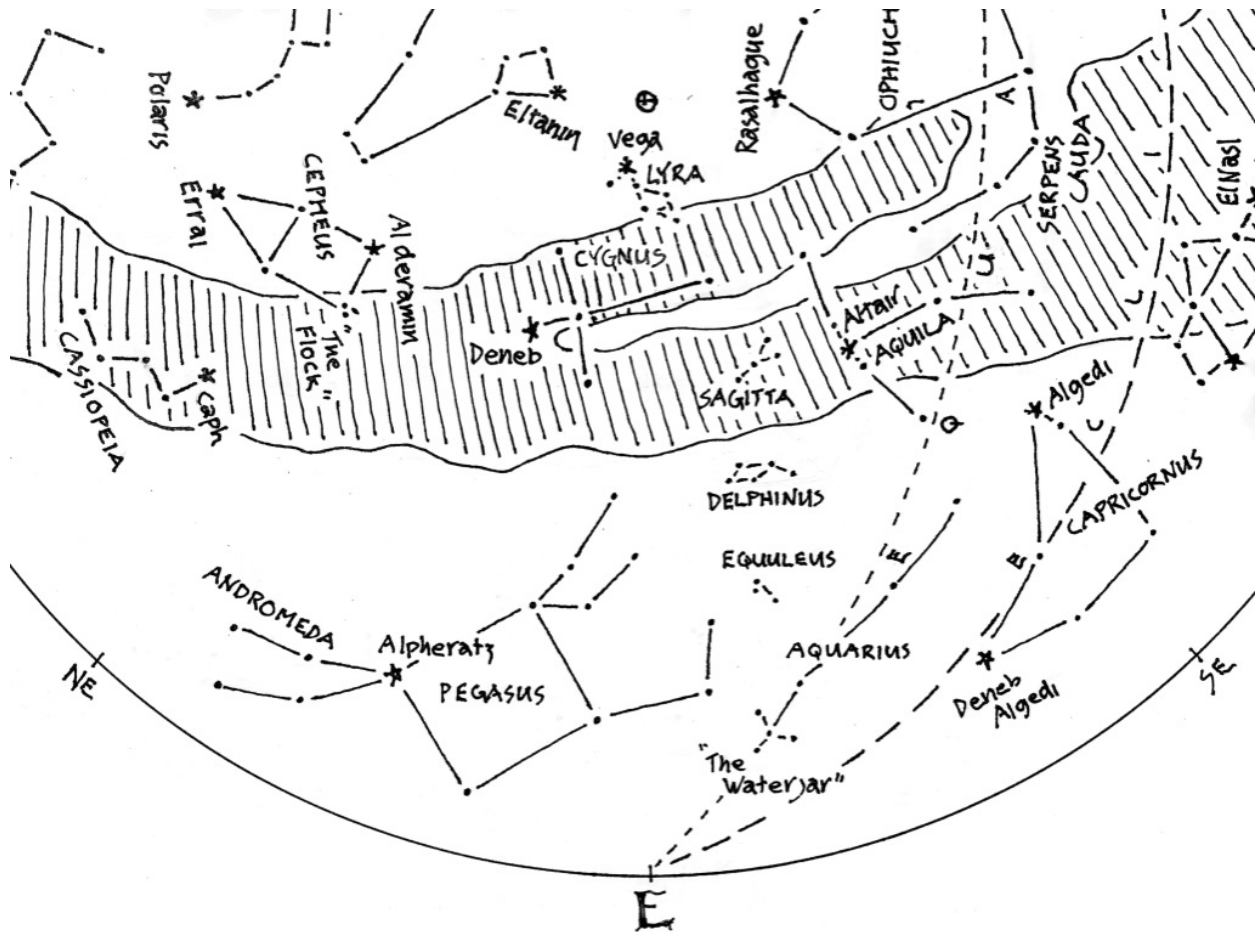


Figure 6: The Eastern Sky

The joys of summer:

Horses, birds, and the charms of beautiful music

This month's eastern sky is dominated by the distinct figure of the **Summer Triangle**. It's formed by three conspicuous stars, each the brightest in a figure of its own. First and highest of the three is **vega**, a bright blue star burning fast and hot. Watch through the hours of the night and it will pass directly overhead. vega has long been associated with birds - its name translates to "swooping eagle," though it belongs formally to the figure known as **Lyra**, the **Harp of Orpheus**. You can find the harp in a dim group of four stars dangling close by vega. Legend has it that the charm of its music compelled rivers to change

direction – reason enough, it seems, for the Sun to be hurling itself toward the Harp at the rate of twelve miles per second.

The second star of the Summer Triangle is **Deneb**, below and to the left of Vega. Deneb is Arabic for “tail,” and it marks the tail of **Cygnus**, the **Swan**. Look to the right of Deneb for the Swan’s wings and neck outstretched in full flight. The Swan is also known as “the Northern Cross,” for reasons apparent come December.

Third in the Summer Triangle is **Altair**, brightest star in the figure of **Aquila**, the **Eagle**. You’ll note that Altair is flanked by two companions, Tarazed and Alshain, marking the shoulders of the eagle’s outstretched wings. The Eagle soars from the south toward the figure of the Swan – two great birds destined for a dalliance in the skies of summer.

A number of other figures, less conspicuous than those of the Triangle, are also arrayed this month in the eastern sky. One of them is **Sagitta**, the **Arrow**, seen just to the left of Altair in the Eagle. The Arrow is easy to miss, but has made appearance on charts for over two thousand years. Next, directly beneath, look for **Delphinus**, the leaping Dolphin, guide and comfort to sailors since antiquity. Lower still, look for **Equuleus**, the **Foal**. Dim and wobbly perhaps, but known as “The First Horse” for rising ahead of the great winged **Pegasus**, now seen peeking above the horizon. More will be said about Pegasus as it climbs higher into the sky in the months ahead.

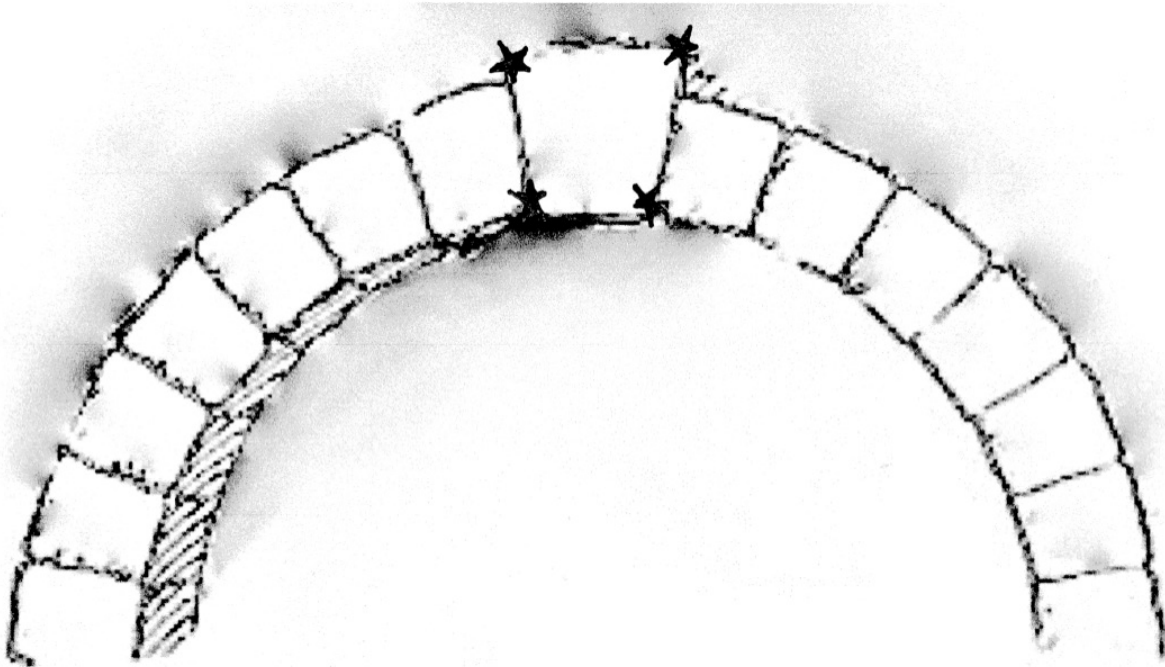
The Zodiac clings close to the horizon in these darks of summer, but you might glimpse two more signs rising in the southeast. Look for the large, dim triangle marking the sign of **Capricornus**, the **Goat-fish**, just to the left of the Archer. The strange image originates with the Sumerians. Two thousand years ago the figure hosted the Sun for the Winter Solstice, marking the southern-most reach of the ecliptic and lending its name to the Tropic of Capricorn.

Today, the Goat-fish stands at the western shore of an expanse known as the “Celestial Sea”, home to a number of watery figures whose acquaintance we’ll make in the weeks and months ahead. One among them is **Aquarius**, the **Water-Bearer**, now just clearing the eastern horizon. In antiquity, its appearance coincided with seasons of rain and floods, prompting an association with the Egyptian god of waters – evidence of the intimate connection the ancients saw between heavens and Earth through the seasons of the year.

The Sky Overhead: Zenith

We've made a complete circuit of the skies of July. Now set your chart aside, lay back on the ground, and take in the Big Picture. Stars in the west are bound for slumber, while those in the east awaken for a season aloft. Southward, the center of our Galaxy slips quietly past, while the stars of the north mark time in their circles around Polaris.

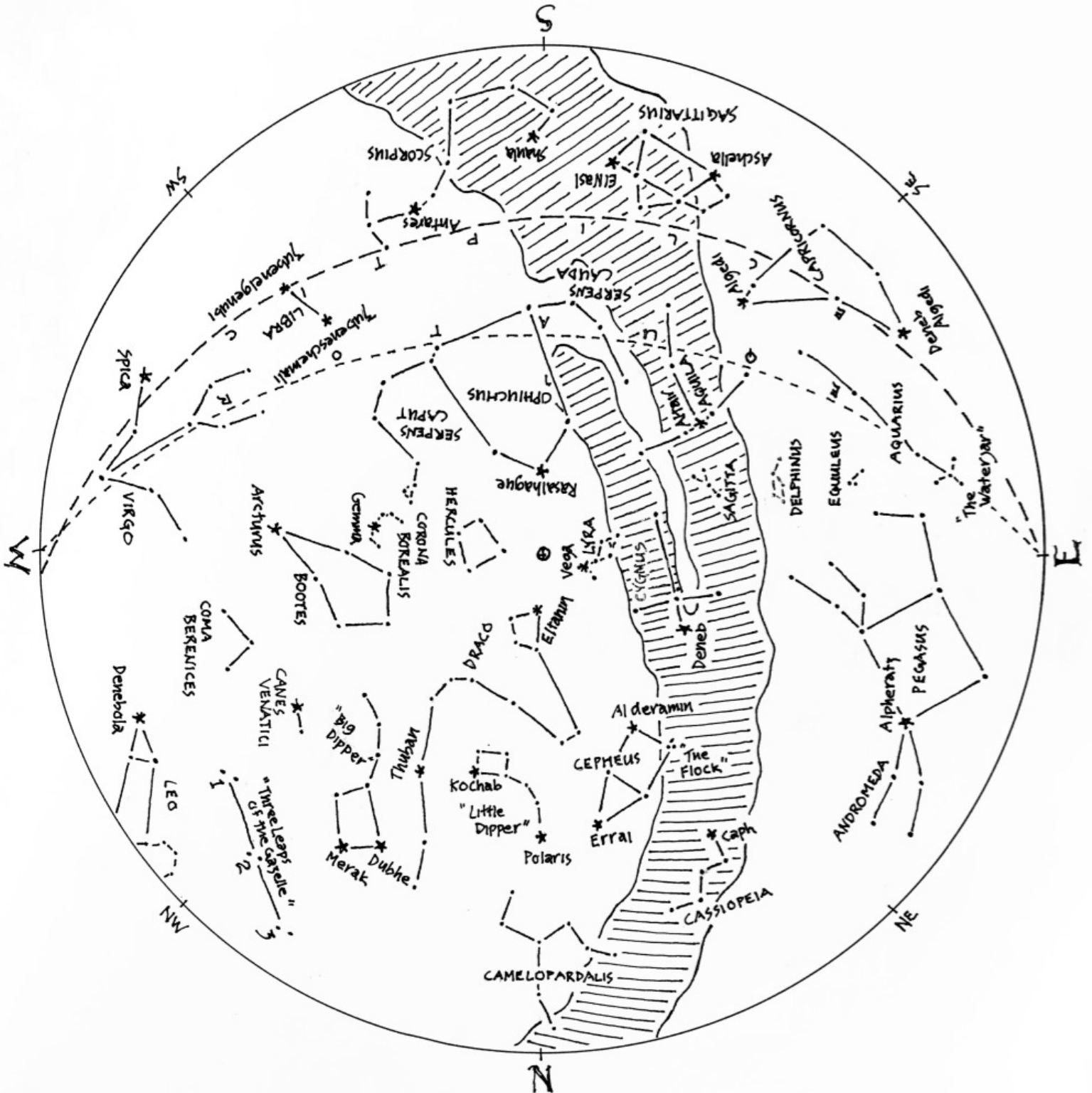
Remember that the ancients viewed the sky as a dome – a firmament of sound and solid construction gloriously adorned with the lights of stars. The model persists today as a useful construct for mapping the stars against what otherwise presents as a dimensionless void. Fitting it is, then, that the celestial stonework is capped this month by a dim but distinct wedge of four stars – the “Keystone” of Hercules, named for the stone at the apex of an arch, without which the entire structure falters. Quaint and simplistic? Perhaps. But as you lay there regarding the stars of July, it's fair to wonder: If not the keystone of Hercules, what *other* contrivance of architecture holds aloft the vault above our heads?



The Stars of July

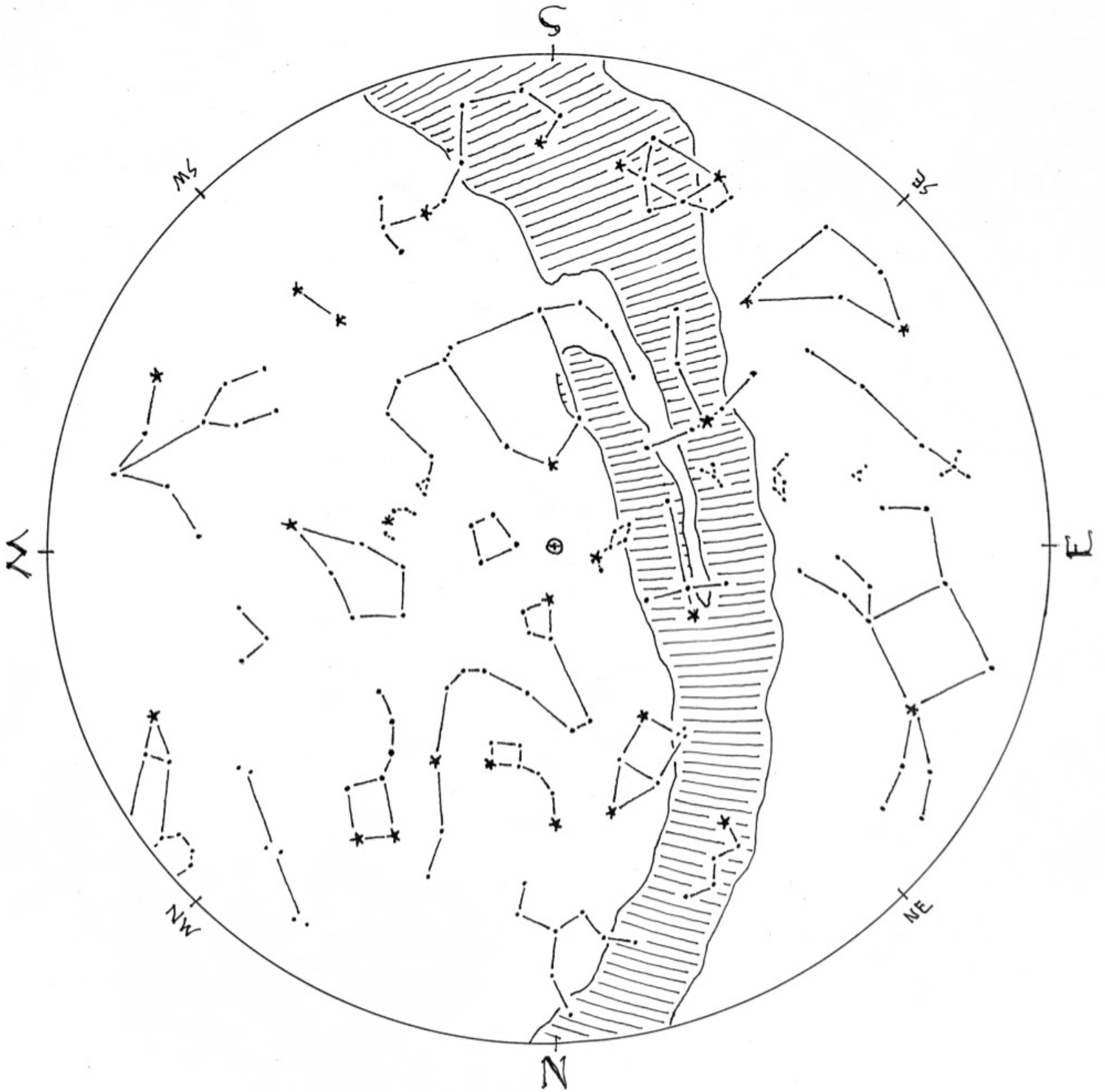
drawn nor latitude 38° N

Early July @ 11 pm / late July @ 10 pm



The Stars of July (lines only)

Here's a chart of the July skies, without the labels. Try labeling it yourself when you think you're familiar with all that it shows.



The Stars of July (blank)

The chart below shows some prominent stars in this month's sky. Can you recognize them without their names or labels? You can print this chart and test yourself - connect the dots, draw the figures, see what you remember from your nights out under the stars... or, if you'd rather, invent some figures of your own!

