

*Urban*  
**Astronomy**

Denis BERTHIER  
(translated by Klaus Brasch)



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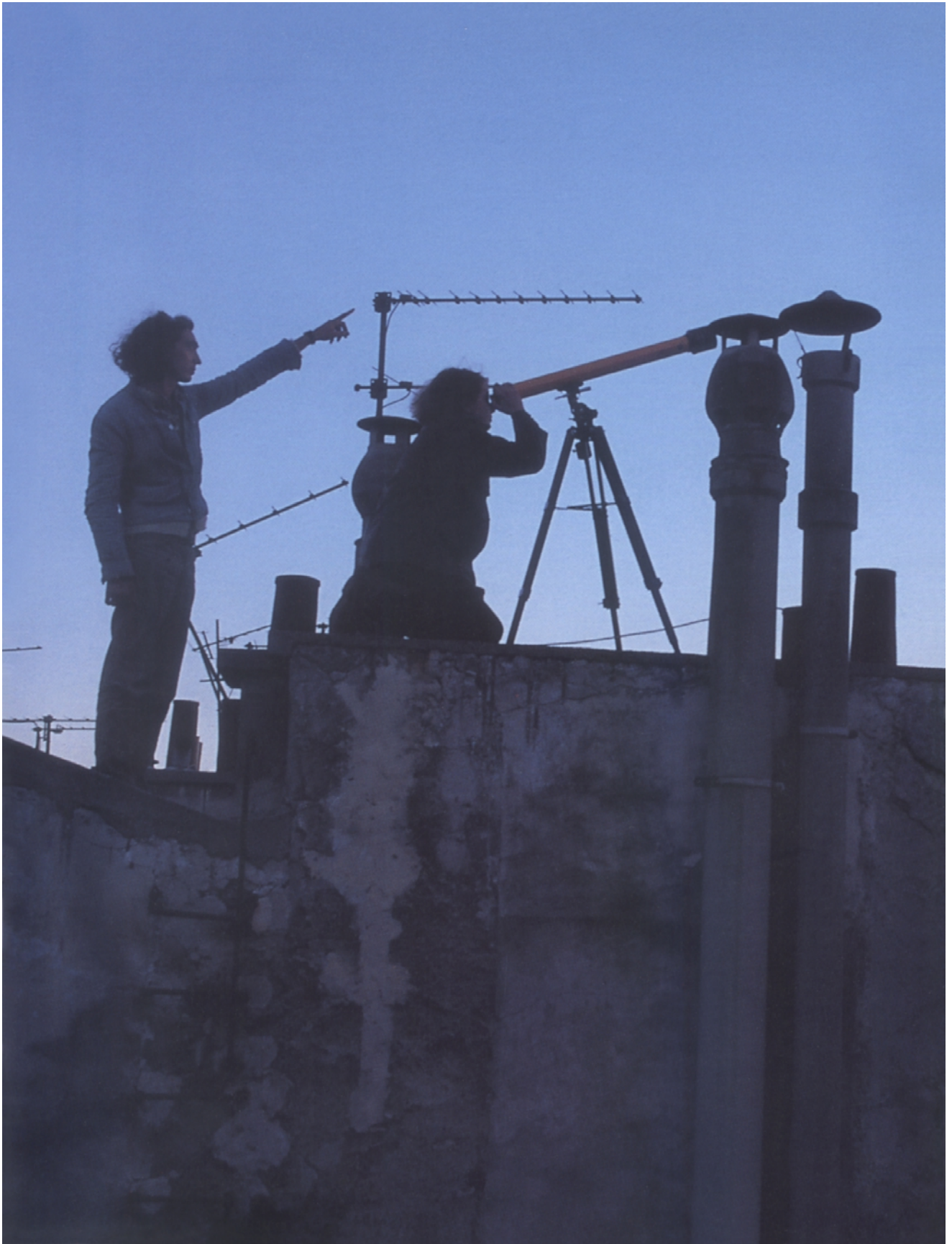
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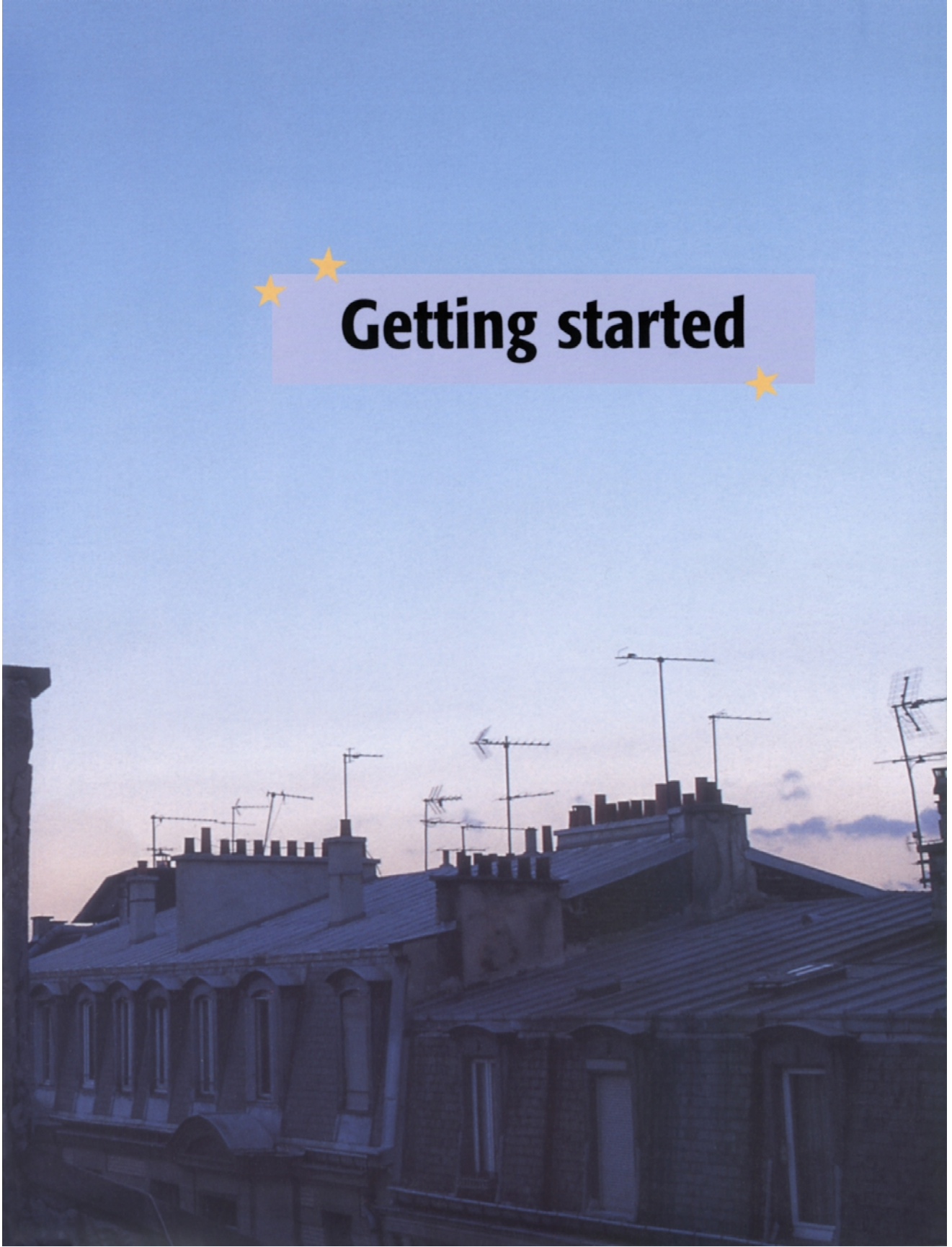
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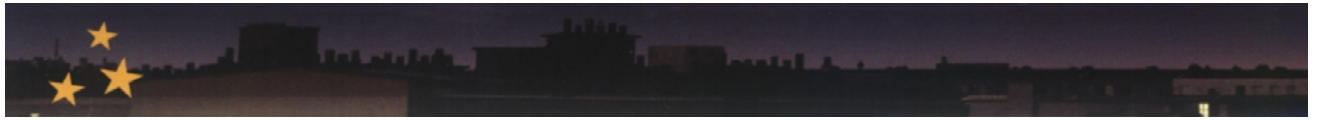
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# Getting started



## ★ Solid footing and good viewing

*The sky is clear this evening, the barometer is rising, the weather forecast is promising, and you have decided finally to go out and do some serious stargazing. What equipment should you take and from what location will you observe? Keep it simple and for starters use your own eyes.*

### Setting up your observing site

Before anything else, the urban astronomer must improvise a suitable “mini-observatory”. Ideally this would be a dark corner of your garden or back yard, shielded from direct light and showing at least a quarter of the sky toward the south or southwest. Failing that, a balcony, driveway, or patio with similar orientation will do. The drawback there is that cement or concrete floors absorb sunlight during the day and radiate it all back at night. This can cause air turbulence and degrade telescopic images, although it will not affect naked eye observing.

Even if your only access to the sky is through a window, do not worry; you can still

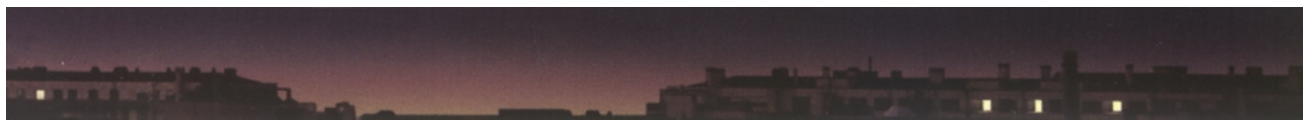


*A patio or a balcony can serve as your observatory. A balcony is particularly well suited for small instruments like this 70-mm refractor.*

observe many interesting astronomical objects. The main thing to remember is to shield your eyes and line of sight from artificial light as much as possible. Turn off your own house lights and try to block off neighborhood lights with anything you can, makeshift screens, an umbrella or tarp, whatever works. Also, do not hesitate to ask your neighbors to lower that porch light or even turn it off completely for a while; people can be quite accommodating in that regard once you explain why.

### Start with the naked eye

Your eyes are extraordinarily sensitive instruments for nighttime viewing and, once fully dark adapted, are many times more sensitive at night than during the day. This is in part because your pupils dilate in the dark to let more light in. In addition, the retina also has two types of photo-receptive cells, rods and cones. Both types transmit light signals directly to the brain; however, only cones detect colors, while the rods are sensitive to the intensity of light. Color perception decreases at night, but the rods become more sensitive. That explains why we do not see colors well at night and why things always appear monochromatic by moonlight. To enjoy the full benefit of your nighttime visual acuity, it is crucial that your eyes have had at least 20 minutes to become fully dark adapted. During that time the rods rapidly accumulate more light-sensitive pigment, allowing you to see increasingly fainter objects



and detail. You will be astonished by how many more stars you will be able to see even from the city

To help you see better in the dark and also let you read star charts without destroying your “night vision,” get yourself a pocket flash light with a dim, red colored bulb or covered with red cellophane or transparent wrapping paper.

### Keeping track of your observations

An indispensable accessory for any observer is a good notebook. Use it to record and log everything in writing and through sketches, including dates, times, location, equipment used, and any special comments or reactions. You will find this both instructive and enjoyable, especially some time later as you recall your experiences and follow your progress. Occasionally too, such notes may help in case you have made a significant discovery or novel observation.

Drawing what you observe can also be very satisfying for you, especially as you follow the progress of a lunar eclipse or some other astronomical phenomenon. Well-known astronomers, including Galileo, Camille Flammarion, and many others routinely recorded and sketched what they saw and observed.

### Using the Sun to orient yourself

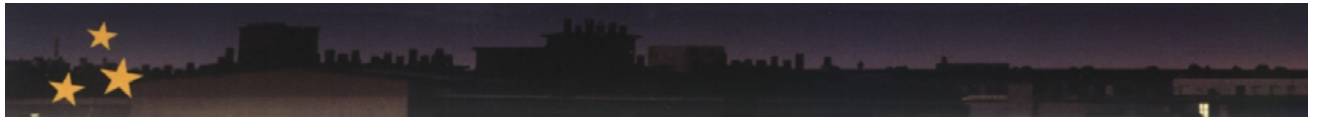
If you are just beginning and are not sure which way you are facing, north, west, south, etc., or whether your planned observing site is really the best location for stargazing, orient yourself first during the day. The Sun can be very helpful in that regard, since it rises in the east, passes the meridian at midday, and sets in the west. As the seasons change, you will note progressive changes too in the path of the Sun across the sky. In summer it rises more toward the northeast



*The sun sets in the west and rises in the east. Remember these positions with reference to local landmarks (buildings, trees, antennas).*

and sets in the northwest. In winter when days are shorter, the Sun rises in distinctly more southeasterly directions and also sets in the southwest. A compass can be very helpful here, although with a little practice you will quickly learn the cardinal points and your orientation relative to the position of the Sun and the time of day. Remember to make adjustments for local time during the summer, when solar midday is closer to 2 p.m. (14:00 hrs).

Once you become familiar with the major constellations, seek out your favorite stars to help orient yourself at night, just like sailors have done for centuries. Like the Sun the stars and constellations also appear to rise in the east, move along the meridian and overhead (zenith) and set in the west. The stars of course do not literally move across the sky, their actual or proper motion is much too slow to be seen with the naked eye. The daily apparent motion of the Sun, stars, and constellations across the sky is simply a reflection of the Earth’s counterclockwise rotation, from west to east. In sum, by properly orienting your mini-observatory during the day, you will be better oriented for nighttime observing as well, particularly if you can face toward the south or southwest.



## ★ An initial tour of the sky

*What is the nature of those intriguing and scintillating points of light in the sky? This question was of great concern to our ancestors and the earliest observers. By combining religious beliefs, mythology, and rudimentary science, ancient cultures assigned names, legends, and associations to the stars above.*

### The birth of constellations

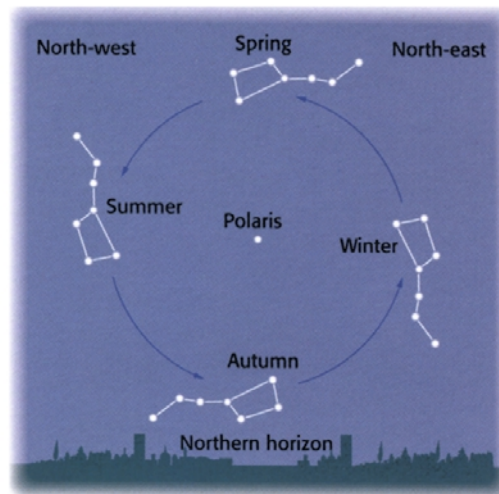
The observers of antiquity saw imaginary outlines of heroes and animals in the sky (Hercules, lions, etc.) and so the constellations, geometric asterisms with exotic names were born and survive to this day. Letters of the Greek alphabet and their stars designate the official names of constellations. The names of most principal stars are in Arabic however, since during the Middle Ages Arab astronomers first catalogued them.

The outlines of constellations are quite arbitrary since the stars in them have no actual physical connection but only appear associated in the sky by chance and line of sight. Modern astronomy recognizes 88 official constellation groups in the sky but only about 50 of these are visible from mid-northern locations, like France.

### The Big Dipper: key to the northern sky

We learned before that the Sun sets directly in the west during the spring and autumn. Make note of those directions. After sunset, make a quarter turn to the right and wait for darkness to set in. You are now facing directly north. Look up and you will notice seven brilliant stars in the shape of a ladle or Big Dipper, also known officially as Ursa Major, the big bear.

If you observe the Big Dipper at the same time on successive evenings throughout the



*The Big Dipper's seasonal rotation cycle in the sky.*

year, you will notice its changing seasonal orientation. During the spring, it will be straight overhead at the zenith around 11 p.m. About the same time in the summer, it will appear above the western horizon. In the autumn, you can spot it just above the northern horizon, and, in winter, near the eastern horizon.

These seasonal changes in the Big Dipper's position reflect changes in the Earth's orientation as it revolves around the Sun. In a similar way, the apparent counterclockwise motion of this constellation during a single night, reveals the Earth's rotation around its own axis. The Big Dipper and several other





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