

Dark Nebulae:

Galactic playground for cosmic dust bunnies

What a dark nebula is

A cold cloud of gas and dust dense enough to block the stars and bright nebulae behind it. We see it in silhouette, as a starless patch in a rich star field.

- Mostly molecular hydrogen; the tiny dust grains, about 1% of the mass, do the blocking.
- Dust dims blue light more than red, so stars seen through thin edges look reddened.
- Only a few degrees above absolute zero; the densest cores collapse into new stars.

How big they get

Example	Kind	Apparent size
B68 (Oph)	Bok globule	4'
B86 (Sgr)	Compact cloud	5'
B92 (Sgr)	Dark spot	15' × 9'
B78 (Oph)	Pipe Nebula bowl	about 3°
Coalsack (Cru)	Naked-eye cloud	about 7° × 5°
Great Rift	Cloud complex	Cygnus to Centaurus

Physically: from about half a light-year to complexes 100+ light-years across.

From "holes in the sky" to catalogues

Barnard catalogue

E. E. Barnard photographed the Milky Way with wide-field lenses at Lick and Yerkes. He listed 182 dark objects in 1919; his 1927 *Photographic Atlas*, finished after his death by Mary Calvert and Edwin Frost, lists 349.

Lynds Dark Nebulae (LDN)

Beverly Lynds catalogued 1,802 dark clouds in 1962 from the Palomar Sky Survey plates, north of -33° . Each gets an opacity class from 1 (faintest) to 6 (darkest), the observer's best guide to visibility.

1780s

Herschel reportedly calls a starless patch "a hole in the sky."

1889–1919

Barnard's plates convince him these are clouds.

1923

Max Wolf's star counts measure a cloud's absorption.

1930

Trumpler shows dust dims starlight galaxy-wide.

1947

Bart Bok proposes globules as stars in the making.

Seeing them at the eyepiece

Instruments

- 7×50 or 10×50 **binoculars** for the Pipe and Great Rift.
- 80–120 mm f/4–f/6 **rich-field scopes** for 2–3° fields.
- 6–10" Scopes, low power, for small clouds.

Sky conditions

- **Bortle 1–3:** most Barnard objects in reach.
- **Bortle 4:** opacity 5–6 clouds on rich star fields.
- **Bortle 5+:** little beyond the Great Rift.
- Moonless, transparent nights; target near the meridian.

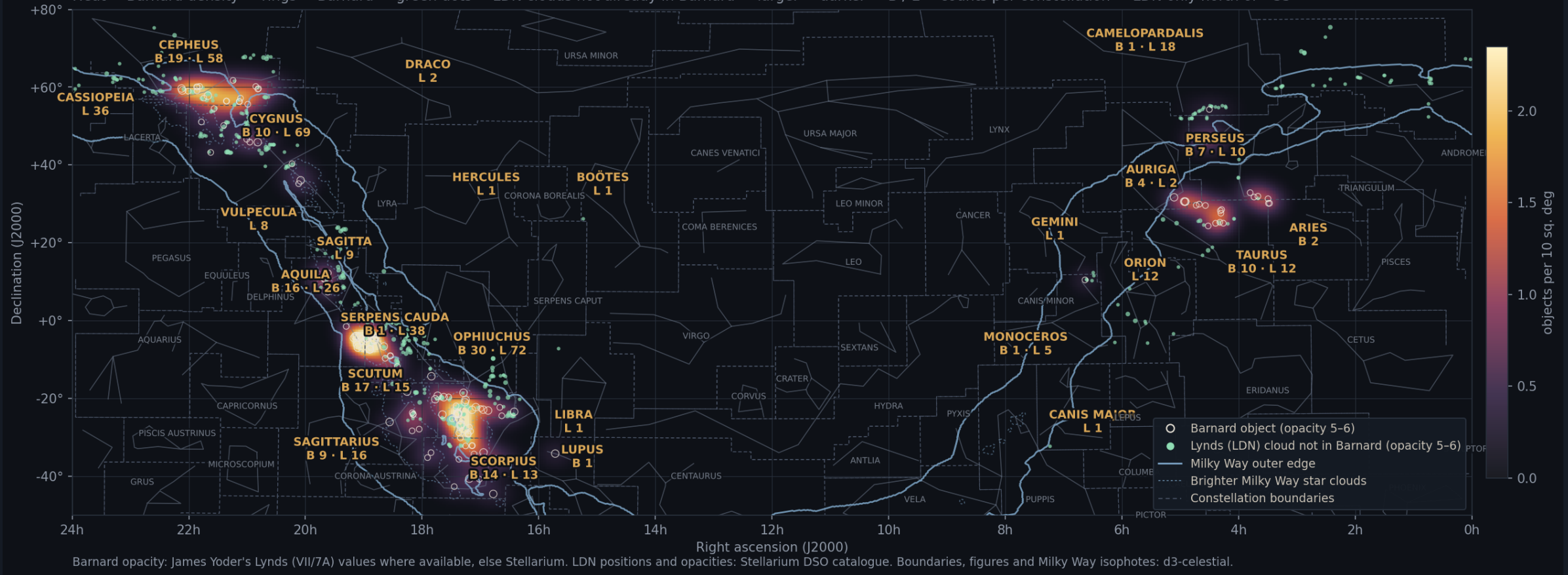
Technique

- Allow 30+ minutes **dark adaptation**.
- Only use red lights.
- Aim for a **field of view** of 2x to 3x the cloud size.
- Aim for an **exit pupil** of 5–7 mm if possible.
- No **filters**, except for lanes in emission nebulae.
- Watch the stars: look for a drop in **star density**.
- **Sweep** slowly; motion reveals the edge.
- **Averted vision**; compare with the next field.
- Start with opacity 5–6; check a photo for shape.
- Is the **edge** sharp? Is it blacker than the sky?

Where the darkest clouds are

Barnard and Lynds dark nebulae with opacity 5-6

Heat = Barnard density · rings = Barnard · green dots = LDN clouds not already in Barnard · larger = darker · B / L = counts per constellation · LDN only north of -33°



568 unique clouds at opacity 5-6: 142 Barnard + 426 additional Lynds · 4 / 4